



Inclusive Education through Technology: Opportunities and Limitations in Digital Classrooms

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<p>Received: 25.05.2026</p> <p>Accepted: 22.06.2026</p> <p>Published: 09.07.2026</p>	<p>Abstract</p> <p><i>Inclusive education through technology has emerged as a significant strategy for assuring equal educational opportunities and encouraging participation among students with various needs and abilities. The opportunities and constraints of inclusive education in digital classroom settings are examined in this study. The study used a qualitative and descriptive research methodology and mostly drew from secondary sources, including books, research articles, policy documents, and academic reports about educational technology and inclusive education. The findings show that accessibility, student engagement, personalised learning, and educational involvement have all been greatly enhanced by digital tools, assistive technologies, online learning platforms, and virtual classrooms. Students from a variety of social, cultural, and geographic backgrounds can more successfully access instructional resources in technology-supported learning environments. The digital gap, poor technology infrastructure, low digital literacy, barriers to accessibility for students with impairments, and inadequate teacher preparation are just a few of the issues that the report also highlights. These limitations frequently result in unequal educational possibilities, especially for pupils from underprivileged and rural regions. The study concludes that, while technology has the potential to support inclusive education, its successful implementation necessitates accessible infrastructure, teacher preparation, equitable policies, and learner-centred educational practices to ensure meaningful and inclusive digital learning for all students.</i></p> <p>Keywords: <i>Inclusive Education, Educational Technology, Digital Classrooms, Assistive Technology, Digital Learning Environment</i></p>
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Introduction

Inclusive education is considered as one of the most essential techniques to promoting equity and participation in education. The main objective is to give every student access to high-quality educational opportunities, irrespective of their physical capabilities, socioeconomic status, language, gender, culture, or learning styles. Technological development has significantly altered the educational system in recent years and opened up new avenues for inclusive teaching methods. Teachers can now make learning more flexible, accessible, and learner-centred thanks to the development of digital classrooms, digital educational resources, smart devices, and assistive technologies. According to Chiu and Lim, (2020), adaptive and interactive teaching methods can enhance learning engagement and support a varied student body. Technology is now a crucial part of contemporary inclusive education since educational institutions all over the world have been

using digital teaching methods more and more, especially since the COVID-19 pandemic.

There are many different ways to encourage inclusiveness in the classroom through technology-based learning environments. Students with impairments and learning challenges can engage more fully in academic pursuits with the use of digital technologies including screen readers, speech-to-text software, audio books, captioning systems, and interactive educational applications. Furthermore, self-paced learning and access to educational resources across regional borders are facilitated by online learning platforms. Yenduri et al., (2023) emphasised the importance of assistive and developing digital technologies in improving learning experiences and involvement with education among the students with unique learning problems. Additionally, collaborative learning, creativity, and individualised education are promoted in digital classrooms, which assist educators in better meeting the varied requirements of their students. Consequently, technology has emerged as a key tool for developing inclusive and student-friendly learning environments.

However, there are a number of restrictions and difficulties associated with using technology in inclusive education, in contrast to its benefits. The successful deployment of digital classrooms is frequently hampered by unequal access to internet connectivity, an insufficient amount of digital devices, a lack of technological infrastructure, and low levels of digital literacy among instructors and students. These issues are more apparent in rural and economically disadvantaged communities, where many students find it difficult to access online learning. Peruzzo and Allan, (2024) stated that if equal access and accessibility are not ensured, digital education might unintentionally generate new types of exclusion. Furthermore, an over-reliance on technology may decrease kids' direct social engagement, emotional connection, and classroom involvement. Additionally, certain digital platforms are not entirely built to address the needs of children with disabilities. Therefore, appropriate educational planning, the preparation of teachers, and fair learning opportunities are just as important to the success of inclusive digital education as the availability of technology.

In this regard, the present study aims to investigate the potential and constraints of technology-based inclusive education in online learning environments. In addition to looking at challenges that prevent equal educational participation, the study aims to comprehend how digital technologies may encourage inclusive learning practices. The findings of this study could help educators, policymakers, and institutions create more effective and inclusive digital learning environments for a diverse range of learners.

Review of Related Literature

The review of related literature provides an understanding of previous studies and scholarly works related to inclusive education and the use of technology in digital learning environments. It helps identify the major findings, existing challenges, and research gaps associated with technology-supported inclusive education in contemporary classrooms.

Starcic, (2010) developed an ICT-based curriculum for pre-service primary teachers in order to investigate how educational technology may support inclusive classrooms. The primary objective of this research was to improve instructors' technological proficiency so they could assist students with special education requirements in Slovenian schools' SEVERI e-learning environment. The results demonstrated how inclusive teaching methods may be strengthened through inquiry-based learning, creative ICT use, and teacher professional development. The study also highlighted how incorporating technology into teacher education enhances instructors' capacity to design

successful digital learning experiences for a varied student body while simultaneously promoting the values of equality, diversity, and inclusive education.

Polat, (2024) used a mixed-method study that included focus groups and surveys to examine teachers' understanding of and use of educational technology in inclusive classrooms. The study revealed that many teachers lacked adequate information and training regarding children with special educational needs, considering the fact that educational technology promotes social participation, academic engagement, and inclusive learning settings. The study also found a number of challenges in inclusive digital classrooms, such as intellectual, psychological, and environmental issues that both teachers and students must deal with. In order to enhance the efficient use of technology in inclusive classrooms, the study highlighted the necessity of appropriate teacher training, technological assistance, and inclusive educational policy.

Chattopadhyay, (2025) investigated the relationship between inclusive education and digital technology and concluded that inclusive education is critical for ensuring equal engagement and learning opportunities for all students, irrespective of disability, socioeconomic status, language, gender, or cultural identity. The study found that digital tools like assistive technologies, AI, learning management systems, and virtual classrooms can help remove challenges to inclusive learning and promote educational accessibility. The digital gap, accessibility problems, privacy concerns, and unequal access to technology are just a few of the difficulties that the researcher highlighted. In order to develop sustainable and equitable digital classrooms, the study further stated that accessible infrastructure, teacher preparation, ethical technology use, and learner-centred teaching practices are necessary for effective inclusive digital education.

Simos&Katsiampoura, (2025) investigated the impact of digital tools in improving classroom inclusion and discovered that technology such as assistive aids, adaptive learning platforms, artificial intelligence, and virtual reality can help minimise learning barriers and support diverse students. The study also emphasised the necessity for appropriate training and successful technology integration in inclusive classrooms, highlighting issues such low teacher readiness, resource limitations, and ethical considerations.

Kaimara, (2026) investigated the role of digital transformation in inclusive education by creating "Waking Up in the Morning," a gamified transmedia application intended for students with impairments and special educational needs. The study found that technologies like augmented and virtual reality, and digital games can improve participation, engagement, and learning in inclusive classroom settings. The results also demonstrated that, despite their awareness of the educational benefits of digital technologies, many teachers were reluctant to use them because of their lack of training and experience with inclusive teaching methods. The study stressed that in order to support different learners in digital classrooms, effective inclusive digital education necessitates teacher readiness, collaborative resource creation, and appropriate use of the latest technologies.

Shadyrova et al., (2026) reviewed the literature on inclusive education using educational technology. The study highlighted the expanding significance of technology-supported inclusive learning by revealing a notable growth in research on inclusive digital education, especially after 2019. The results demonstrated that assistive technology, artificial intelligence, universal design for learning, and teacher preparation were important research areas. The research also noted a number of issues, including uneven involvement on a worldwide scale, little cooperation with underdeveloped nations, ethical issues with AI, and a dearth of reasonably priced technology in

schools with minimal resources. In order to improve inclusive education in digital classrooms, the researcher highlighted the necessity of equal digital infrastructure, teacher readiness, and accessible technologies.

Critical Observations and Research Gap

The reviewed researches makes it abundantly evident that technology plays a significant part in advancing inclusive education by enhancing accessibility, student involvement, and engagement in online learning environments. The benefits of assistive technologies, AI, virtual learning environments, and digital tools in helping students with a range of educational requirements have been emphasised by earlier studies. The studies also highlighted the significance of inclusive teaching methods, accessible infrastructure, and teacher preparation for the successful execution of technology-based inclusive education. Many researchers have also noted issues such as unequal access to technology, the digital divide, inadequate teacher preparation, ethical issues, and restricted accessibility to digital platforms for students with disabilities.

The advantages and difficulties of educational technology in inclusive settings have been covered in a number of studies, but there hasn't been much focus on analysing both advantages and disadvantages in the context of digital classrooms. The majority of previous research concentrated on either preparedness of teachers or technological advancements, but relatively few studies examined how these elements work together to affect inclusive learning opportunities. Furthermore, particularly in poor and resource-constrained educational environments, there is a dearth of thorough discourse on striking a balance between technical innovation, equitable access, and social inclusion. Therefore, by critically analysing the advantages and disadvantages of inclusive education through technology in digital classrooms, the present study aims to close this gap.

Objectives of the Study

The present study has been undertaken with the following objectives:

1. To examine the role of technology in promoting inclusive education in digital classrooms.
2. To identify the opportunities provided by digital tools and technologies for diverse learners.
3. To explore the limitations and challenges faced in implementing inclusive digital education.
4. To suggest measures for improving accessibility, participation, and equity in technology-supported inclusive classrooms.

Research Questions

The study seeks to answer the following research questions:

1. How does technology support inclusive education in digital classroom environments?
2. What opportunities do digital tools provide for learners with diverse educational needs?
3. What are the major limitations and challenges of implementing inclusive education through technology?
4. What measures can be adopted to make digital classrooms more accessible and inclusive for all learners?

Methodology of the Study

The present research study used a qualitative research approach to examine the benefits and constraints of inclusive education through technology in digital classroom environments. The qualitative approach is thought to be appropriate for this study since it facilitates a thorough and comprehensive investigation of educational practices, experiences, difficulties, and perspectives pertaining to technology-supported inclusive learning. The study primarily focuses on assessing present ideas, instructional strategies, and academic perspectives about how technology might support inclusive education.

Research Approach

A descriptive and analytical qualitative research methodology is used in the study. It looks into the challenges that prevent students from participating equally in digital classrooms as well as how digital technology support inclusive learning methods. The study intends to create a thorough understanding of the advantages and disadvantages of technology-based inclusive education through qualitative analysis.

Sources of Data

The majority of the data included in the study came from secondary sources. Relevant data has been gathered from a number of scholarly and instructional sources, including:

- Research articles published in peer-reviewed journals
- Books and edited volumes on inclusive education and educational technology
- Government reports and policy documents

These sources have been carefully chosen to ensure the quality, reliability, and usefulness of data pertaining to digital learning environments and inclusive education.

Method of Data Collection

Data for the study were gathered through a thorough assessment of literature on inclusive education, digital classrooms, technological assistance, educational accessibility, and technologically enabled teaching-learning processes. A review of recent studies and scholarly works was conducted to better understand the growing trends, opportunities, and problems related with inclusive digital education.

Method of Data Analysis

The data collected was examined qualitatively using descriptive and thematic methods. The studied literature revealed a variety of issues, including accessibility, assistive technology, learner participation, digital divide, teacher readiness, infrastructure constraints, and equity in education. The findings from many studies were thoroughly analysed and interpreted in order to reach relevant conclusions about both the benefits and drawbacks of technology in inclusive classrooms.

7. Conceptual Framework

Meaning of Inclusive Education

Inclusive education is a teaching strategy that offers equitable learning opportunities and active involvement for all students, irrespective of physical, intellectual, social, emotional, language, or cultural differences. It seeks to establish an educational environment where each student feels appreciated, respected, and supported in accordance with their specific needs and skills. The aim of inclusive education is to promote fairness in educational attainment and access by removing barriers to learning. UNESCO (2020) defines inclusive education as the process of enhancing the educational system's ability to effectively address diversity and reach all students. It encourages

schools to modify their curriculum, teaching strategies, and learning environment depending on various learners and places more emphasis on participation than exclusion. According to Ainscow, (2020), identifying and eliminating barriers that keep students from fully engaging in both education and society is the goal of inclusive education. As a result, inclusive education encourages social justice, equality, and learner-centred teaching methods in classrooms and schools.

Meaning of Digital Classroom

A digital classroom is a technologically assisted learning environment that uses digital devices, dependent on the internet platforms, and electronic educational resources for teaching and learning. It uses technologies like computers, smart boards, online learning platforms, multimedia resources, and virtual communication tools to create interactive and adaptable learning environments. Digital classrooms support both online and blended learning models and allow teachers and students to participate in teaching-learning activities outside of the traditional classroom. Singh and Thurman, (2019) claim that by utilising digital technology to improve communication, teamwork, and knowledge sharing, digital learning environments offer flexibility, accessibility, and learner-centred instruction. Additionally, Holmes and Tuomi, (2022) clarified that interactive instructional tools in digital classrooms facilitate individualised learning experiences and promote increased engagement. As a result, digital classrooms are an example of a contemporary educational strategy in which technology is essential to instruction, learning, and evaluation.

Technology-Enabled Learning Environment

A technology-enabled learning environment is an educational setting in which digital technologies are used to enhance accessibility, interaction, collaboration, and learning results. Learning management systems, instructional software, assistive technologies, mobile applications, virtual classrooms, and artificial intelligence are some of the technology tools used in these settings to serve a variety of learning demands. Learners are encouraged to participate actively, learn at their own pace, and engage in collaborative educational activities in educational technology environments. Mishra and Koehler, (2006) assert that meaningful learning experiences and improved teaching practices result from the successful integration of technology with pedagogy and content understanding. Furthermore, by addressing learner diversity and fostering accessible learning opportunities, technology-enabled learning environments can encourage inclusive education, according to Al-Azawei, Serenelli, and Lundqvist, (2016). Thus, in contemporary digital classrooms, technology-enabled learning environments are crucial for enhancing educational inclusiveness, flexibility, and student engagement.

Opportunities of Inclusive Education through Technology

Technology has significantly altered the educational landscape and improved inclusive learning options. Teachers may make learning more adaptable, accessible, and meaningful for students with varying needs and abilities by utilising digital classrooms and technology resources. In addition to facilitating academic learning, technology promotes engagement, communication, and equal educational opportunities for all students. The following are some key opportunities for inclusive education using technology:

- **Improved Accessibility:** Students with disabilities can benefit from assistive technologies such as screen readers, speech-to-text tools, audio books, and subtitles to better grasp lessons and engage in classroom activities.
- **Personalized Learning Opportunities:** Students can learn at their own speed and comprehension level using digital learning platforms, which helps fulfil each learner's unique learning demands.
- **Better Student Participation:** Students are encouraged to participate in learning activities with more confidence and excitement through interactive educational software, videos, online discussions, and virtual classrooms.
- **Equal Access to Learning Resources:** Technology makes it easier for students from remote, rural, and economically disadvantaged backgrounds to access educational resources, online courses, and digital libraries.
- **Improvement of Teaching Methods:** Teachers can employ creative and new teaching methods with the aid of technology, which improves classroom instruction and makes learning more engaging for students.
- **Continuity in Education:** Digital learning systems offer online and blended learning approaches, allowing education to continue during emergency situations, natural disasters, and health crises.

Limitations and Challenges of Digital Classrooms

Digital classrooms have opened up new possibilities for inclusive education, but they also offer a number of drawbacks and difficulties that reduce the efficiency of instruction. Accessing and effectively utilising digital technologies continues to be a challenge for many educators and pupils. These challenges are more apparent in rural and economically disadvantaged communities with limited access to technology and educational resources. Here are some of the major limitations and challenges of digital classrooms:

- **Digital Divide and Unequal Access:** One of the biggest challenges of digital classrooms is the unequal availability of internet connectivity, smartphones, computers, and other digital devices. Students from rural and economically disadvantaged families often struggle to access online learning opportunities. During post-pandemic blended learning in many rural schools of West Bengal, a significant proportion of students depended on a single family smartphone shared among siblings. In contrast, students in urban schools generally had greater access to personal digital devices and stable internet connectivity. This disparity often affected attendance, assignment submission, and participation in online classes.
- **Lack of Technological Infrastructure:** Many schools and educational institutions do not have adequate technological facilities such as high-speed internet, smart classrooms, electricity supply, and updated digital equipment, which affects the smooth functioning of digital learning.
- **Limited Digital Literacy:** Both teachers and students may lack sufficient knowledge and skills to use digital tools effectively. Inadequate training and unfamiliarity with technology often reduce the quality of online teaching and learning.

- **Challenges for Learners with Disabilities:** Some digital platforms and educational applications are not fully accessible for students with visual, hearing, cognitive, or physical disabilities. This may create barriers instead of promoting inclusion.
- **Economic Barriers:** The cost of digital devices, internet services, software, and technological maintenance can be a burden for many families and educational institutions, especially in low-income communities.
- **Dependence on Technology:** Overdependence on digital technology may reduce creativity, critical thinking, and direct classroom experiences. Technical problems such as internet failure or software malfunction can also interrupt the learning process.

Therefore, while digital classrooms support inclusive education in many ways, addressing these limitations and challenges is essential to ensure equal, effective, and meaningful learning opportunities for all students.

Findings and Discussions

The present study examined the opportunities and limitations of inclusive education through technology in digital classroom environments based on a comprehensive review of related literature, educational practices, and existing research studies. The findings indicate that technology has emerged as a powerful tool for promoting inclusive learning by improving accessibility, flexibility, learner participation, and educational engagement among students with diverse needs and abilities. Digital tools such as assistive technologies, artificial intelligence, virtual classrooms, online learning platforms, and multimedia resources have significantly contributed to inclusive teaching-learning processes. These technologies enable students with disabilities and learning difficulties to access educational resources and participate more actively in academic activities according to their individual learning needs.

The study further reveals that digital classrooms support personalized and self-paced learning, allowing learners from different educational, socioeconomic, and cultural backgrounds to learn according to their abilities and pace. Technology-supported learning environments encourage communication, collaboration, and interaction between teachers and students. Online educational resources and virtual learning platforms have expanded learning opportunities beyond geographical boundaries, making education more accessible to learners residing in remote and underserved areas. Moreover, technology played a crucial role in ensuring educational continuity during emergencies such as the COVID-19 pandemic when traditional classroom instruction was disrupted.

Practical observations from different educational settings further support these findings. In urban schools, particularly in metropolitan areas such as Kolkata, digital classrooms are increasingly equipped with smart boards, internet connectivity, multimedia resources, and learning management systems. Students with visual impairments often benefit from screen-reader software, audio-based learning materials, and accessible digital content. Teachers utilize recorded lectures, subtitles, interactive educational applications, and online assessments to accommodate diverse learning needs. Such technological provisions enhance student participation, independent learning, and access to educational resources, thereby strengthening inclusive educational practices.

In contrast, rural educational settings often face greater challenges in implementing technology-supported inclusive education. In many rural schools, students experience difficulties in

participating fully in digital learning due to poor internet connectivity, limited availability of smartphones and computers, and irregular electricity supply. Learners with special educational needs encounter additional barriers because assistive technologies and accessibility-support tools are often unavailable or insufficient. Teachers frequently depend on mobile messaging applications, telephone communication, and printed learning materials to ensure continuity of education. Although technology provides new opportunities for learning, infrastructural limitations significantly restrict inclusive participation and equitable access to educational resources.

However, despite these advantages, the study identified several challenges that continue to hinder the successful implementation of inclusive digital education. One of the most significant barriers is the digital divide resulting from unequal access to digital devices, internet connectivity, and technological infrastructure. Students from rural and economically disadvantaged families often encounter difficulties in accessing online learning opportunities and educational technologies. As a result, disparities in educational participation and achievement may persist despite technological advancements.

The study also found that limited digital literacy among teachers and students reduces the effectiveness of technology-supported teaching and learning. Many educators face difficulties in integrating digital tools into inclusive classroom practices due to inadequate training, insufficient professional support, and increased workload. Similarly, students who lack digital competencies often struggle to utilize educational technologies effectively, which may limit the benefits of digital learning environments.

Another major concern identified in the study is the accessibility of digital learning platforms. Many online educational applications and platforms are not fully designed to accommodate students with visual, hearing, cognitive, or physical disabilities. Consequently, instead of promoting inclusion, such technological barriers may unintentionally contribute to educational exclusion. In addition, concerns related to privacy, ethical issues surrounding artificial intelligence, reduced face-to-face interaction, and excessive dependence on technology pose further challenges for inclusive digital learning environments.

The discussion of these findings suggests that technology alone cannot ensure inclusive education. The successful implementation of inclusive digital classrooms requires accessible infrastructure, equitable access to technological resources, effective teacher training, supportive educational policies, and learner-centred pedagogical practices. Collaboration among educators, policymakers, educational institutions, parents, and technology developers is essential to create digital learning environments that genuinely support all learners.

Therefore, the study concludes that technology possesses tremendous potential to strengthen inclusive education by improving accessibility, participation, and educational engagement. However, its effectiveness depends on addressing existing challenges and ensuring equitable access, appropriate teacher preparation, accessible digital resources, and supportive educational policies. The findings underscore the need for a balanced approach that prioritizes not only technological innovation but also social inclusion, educational equity, and learner-centred practices in digital classrooms.

Recommendations

Based on the findings of the study, the following recommendations are suggested for improving inclusive education through technology in digital classrooms:

1. Educational institutions should ensure equal access to digital devices and internet facilities for students from rural and economically disadvantaged backgrounds.
2. Regular teacher training programs should be organized to improve digital literacy and inclusive teaching skills in technology-supported classrooms.
3. Digital learning platforms and educational resources should be designed according to accessibility standards to support learners with disabilities effectively.
4. Governments and educational authorities should strengthen technological infrastructure in schools by providing reliable internet connectivity and updated digital resources.
5. Inclusive educational policies should be developed to promote equal participation, accessibility, and learner-centered practices in digital classrooms.

Conclusion

In contemporary educational environments, inclusive education through technology has become a crucial strategy for ensuring equal learning opportunities and enhancing engagement among various learners. The study found that digital classrooms, assistive technologies, online learning platforms, and interactive instructional tools have all helped to make education more accessible, adaptable, and learner-centred. In addition to supporting individualised learning, collaborative learning, and continuity in education even with difficult circumstances, technology has enabled students with various learning needs to engage more fully in educational activities. Thus, technology has become a crucial component in encouraging inclusive teaching-learning practices in the schools of today.

However, the study also found that a number of challenges and difficulties, including unequal access to digital resources, inadequate technological infrastructure, low digital literacy, accessibility barriers, and inadequate teacher preparation, have an impact on the successful implementation of inclusive digital education. Economically poor and rural students are disproportionately affected by these problems, which could lead to the emergence of new types of educational inequality. Therefore, the study comes to the conclusion that technology by itself cannot guarantee inclusive education unless it is backed by accessible infrastructure, sensible regulations, enough teacher preparation, and equitable learning opportunities for every student. A balanced and learner-centred strategy is required to make digital classrooms more inclusive, equitable, and effective in the future.

The practical experiences observed across urban and rural educational settings demonstrate that the benefits of digital inclusion are not distributed equally. Urban institutions generally possess better technological infrastructure and accessibility provisions, whereas rural schools often face challenges related to connectivity, digital device availability, and technical support. Therefore, achieving true digital inclusion requires context-sensitive planning and targeted interventions for underserved communities.

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