eISSN 2583-6986
IDEALISTIC JOURNAL OF ADVANCED RESEARCH IN PROGRESSIVE SPECTRUMS (IJARPS)
A MONTHLY, OPEN ACCESS, PEER REVIEWED (REFEREED) INTERNATIONAL JOURNAL
Volume 04, Issue 12, December 2025

Technology is Transforming Classroom Teaching and Learning

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Received: 26 Dec 2025 Accepted & Reviewed: 28 Dec 2025, Published: 31 December 2025

Abstract

Ensuring inclusive and equitable quality education is a fundamental objective of the education system, and digital technologies have emerged as a vital tool in achieving this goal. These technologies not only help identify emission sources, increase energy efficiency, and replace fossil fuels with low-carbon alternatives, but also support environmental processes such as removing harmful gases from the atmosphere. Developed to increase productivity and efficiency and reduce pollution and waste, these digital technologies are having a profound impact on the education sector. Digital media has significantly transformed the education system, replacing the one-way transmission of knowledge between teacher and learner with a dynamic process of co-creation, guidance, and evaluation. Advances in technology have simplified and enhanced the student learning experience, with various software and digital tools proving more useful for preparing presentations and projects than traditional pen and paper. The use of e-books and tablets instead of bulky textbooks makes learning easier and increases interest in research. This paper highlights the need for digital technologies in education and briefly addresses their specific uses and challenges.

Keywords - Digital Technologies Inclusive and Equitable Education Technology-Enhanced Learning Educational Transformation E-learning Challenges

Introduction

New technology-assisted learning tools, such as mobile devices, smartboards, MOOCs, tablets, laptops, simulations, dynamic visualizations, virtual labs, and other digital media, have brought about significant and structural changes in the educational practices of schools and higher education institutions. The Internet of Things (IoT) is becoming one of the most affordable and effective ways to educate young people today, not only simplifying the learning process but also proving to be a powerful tool for providing global-quality education to all. Educational technology companies are constantly developing new solutions aimed at providing quality education to students who lack access to traditional resources or institutional facilities. Social media has become an essential teaching tool, and more teachers and students are using it as an integral part of e-learning, creating a collaborative learning environment. While traditional classrooms often struggle to provide immediate feedback, instant assessment, and high engagement, digital learning tools effectively address these shortcomings. Modern technologies enhance learning with efficiency, flexibility, and innovation that traditional methods cannot provide. The widespread use of smartphones and wireless devices demonstrates that schools and colleges can now incorporate these technologies into classrooms, making the teaching process more modern and accessible. While these technologies may initially seem intimidating to older teachers who fear that modern gadgets may distract students, over time, they have proven to make learning more effective, engaging, and participatory. The use of online class calendars, digital assignment portals, automated assessment systems, and student feedback tools has made the teaching process more organized, and data driven. Beyond the education sector, digital technologies are also revolutionizing other sectors like agriculture, redefining farming practices in developed countries and significantly reducing water and chemical use. During the COVID-19 pandemic, it was clear that digital methods prevented the education

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system from being completely disrupted, allowing students to continue learning from their homes. The integrated use of technology in education not only makes learning more engaging and interactive, but also increases student concentration, interest in research, and participation. The current digital revolution is reshaping education worldwide, making it more accessible, affordable, and quality-oriented. This paper presents a detailed analysis of the key concepts of digital technology in education, their uses, needs, challenges, and prospects.

Research Objectives

The primary objective of this paper is to provide a deeper understanding of the need, utility, and challenges of digital technology in education.

1. Study the need for digital technology in education.

This objective will analyse why digital technologies have become essential in today's education system. This will include studying how digital tools make the teaching-learning process easier, effective, flexible, and student-cantered in the changing social, economic, and technological environment. It is also important to understand how digital media addresses the shortcomings of traditional teaching methods and helps ensure quality and inclusive education.

2. Clarify the importance of digital classrooms and identify the role of digital technologies and their applications in education.

This objective aims to comprehensively study the concept, structure, components, and pedagogical significance of digital classrooms. It will also discuss how various digital tools, software, online platforms, smart devices, virtual labs, multimedia tools, and artificial intelligence-based applications enhance the quality, engagement, and impact of education. It also aims to identify which specific applications of digital technology enhance the quality of students' learning experiences.

3. Identify the key challenges facing digital technology in education.

This objective will include studying the practical, technical, social, and psychological barriers to digital learning. This will include analysing challenges such as the digital divide, lack of technical resources, teacher training, cybersecurity issues, internet connectivity, economic inequality, and hesitation to adopt new technologies. The aim is to understand these challenges and provide potential solutions and guidelines for future policy.

The Need for Digital Technology in Education:

The globalization of education has necessitated the use of digital technology, as online platforms already existed for conducting classes, sharing learning materials, conducting assessments, and managing the daily activities of educational institutions. However, before the global crisis like COVID-19, their use was limited and underutilized. Developed countries were well-equipped with these digital tools and handled the crisis effectively, while developing countries had to make significant efforts to meet this need. During this difficult time, digital technology emerged as a powerful and reliable medium for the education system. This global crisis highlights the need for international integration of education systems. Digital technologies help students develop skills that will be essential for their future professional competencies, such as problem-solving, creating logical structures, understanding processes, and the ability to make decisions in difficult situations. Furthermore, these technologies prepare students for an uncertain and rapidly changing future in which technology will become even more essential. Using technology in the classroom can increase student

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engagement, as today's students are already adept at using digital devices, and integrating them into education naturally increases their attention, enthusiasm, and participation levels. Integrating technology into education provides students with an interactive, engaging, and multifaceted learning experience, allowing them to focus on the subject matter without distractions. Using computers and other digital devices puts students at the centre of the learning process and allows them to play an active role, while teachers can monitor and encourage learning as guides. A variety of digital resources help students download important information, upload their own content, and connect to a variety of knowledge resources. Web 2.0 technologies like wikis, podcasts, and blogs not only help learners create content but also promote collaborative learning, mutual assessment, and group learning. Furthermore, digital technologies make it easier to implement innovative learning approaches like gamification and flipped classrooms in the classroom, significantly increasing the effectiveness and quality of learning.

Digital Classroom:

A digital classroom refers to a teaching method that utilizes electronic tools and online platforms, such as social media, multimedia resources, mobile phones, tablets, laptops, and other internet-enabled devices, to educate students. The integration of digital technology into education has significantly transformed today's educational environment and significantly improved the quality of teaching and learning. Digital learning is a learning approach that integrates the entire curriculum through technology, enabling students to learn quickly, easily, and effectively. The primary purpose of a digital classroom is to promote technology-driven learning, where students access content through interactive and engaging digital platforms using devices like laptops, tablets, Chromebooks, etc., rather than using old notebooks. Most course content is delivered online to students, allowing them to gain a deeper understanding of the subject through videos, animations, quizzes, simulations, and other multimedia-based activities. In this way, digital platforms facilitate teaching and enhance effective teacher-student interaction.

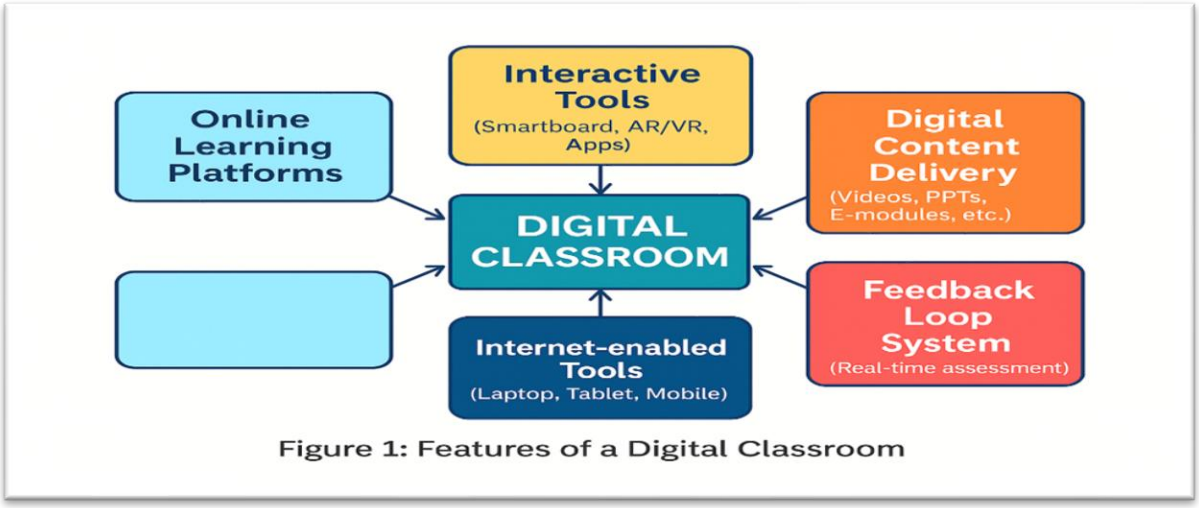

Figure 1: Features of a Digital Classroom

In digital classrooms, various educational applications and websites are used to enhance students' learning experiences. Two essential components of a digital classroom are the feedback loop and technological resources. This feedback loop allows students to receive real-time feedback from teachers, allowing for immediate assessment of their progress, learning difficulties, and learning needs. Teachers can provide feedback based on various parameters, such as students, content, groups, or activities, making the teaching

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process more personalized and effective. Today's digital learning is seeing widespread use of PowerPoint presentations, video presentations, e-learning modules, online training sessions, and other technological tools, making the classroom environment more participatory, dynamic, and stimulating. Students can also learn many subjects on their own with the help of internet resources and digital platforms. Older schools used colourful charts, graphs, and models as teaching materials, but these are now considered outdated, as digital media provides more accurate, engaging, up-to-date, and highly effective learning materials. Therefore, digital classrooms have become an essential tool for modernizing, facilitating flexible, participatory, and qualitative teaching and learning processes.

Applications of Digital Technologies in Education

S. No.	Application Area	Detailed Description
1	Improve Teaching Productivity	Advanced technological tools enhance teaching efficiency through better planning, practical learning methods, instant assessments, rich resources, and development of new skills.
2	Develop Online Libraries	Technology enables creation of digital libraries that remove physical space constraints and promote global interaction among students, teachers, and researchers.
3	Promote Distance Learning	Digital tools make distance education accessible by offering easy communication with instructors and facilitating group management via social learning platforms.
4	Support Students with Special Needs	Assistive technologies speech recognition, screen readers, Braille displays, captioning, and video conferencing help students with various disabilities participate actively in learning.
5	Create Virtual Classrooms	Learning Management Systems (LMS) support real-time interaction, resource sharing, assessments, feedback collection, and virtual teaching.
6	Build Knowledge & Understanding Skills	Engaging digital content promotes curiosity, inquiry-based thinking, and conceptual clarity among learners.
7	Create Inclusive Learning Environments	Virtual classrooms, AR, videos, and robots allow diverse learners to collaborate, engage, and participate equally.
8	Develop Teamwork & Communication Skills	Digital platforms promote collaborative learning, team projects, and communication skill development.
9	Solve Educational Challenges	Students use online platforms and hackathons to collaboratively solve real-world educational problems.

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10	Enhance Access to Educational Resources	Cloud storage, online notes, and lecture recordings make educational content available anywhere, anytime, for students and parents.
11	Help Students Complete the Syllabus	Computer-assisted learning supports students at different learning levels and helps teachers complete the curriculum efficiently.
12	Transform Innovative Learning	Use of interactive whiteboards, clickers, digital reporting, and online assignments modernizes teaching and learning processes.
13	Strengthen Mathematics Learning	Digital tools help students solve math problems using typing, writing, or dictation, enabling flexible and adaptive learning.
14	Enable Convenient Learning	COVID-19 highlighted the importance of AI-based personalized learning, ensuring continued education even during crises.
15	Reduce Blackboards & Traditional Tools	Digital screens, PPTs, videos, and smart classes replace chalkboard-based instruction in modern classrooms.
16	Make Classroom Instruction Interesting	Multimedia learning, visual content, and interactive presentations make lessons more engaging and participatory.
17	Build Curriculum & Support Material	Technology enables teachers to create personalized learning materials and innovative lesson plans.
18	Improve Student Performance	Digital assessment systems track student progress and provide teachers with insights to offer additional support.
19	Flexible Education	Online degrees, virtual learning, and mobile education make learning more flexible and accessible beyond geographical limits.
20	Develop Self-learning Abilities	Students use digital tools to research, apply knowledge, analyse feedback, and develop independent learning skills.
21	Expand Knowledge	Gamification, peer learning, storytelling, and problem-solving approaches make learning deeper and more engaging.
22	E-books & Search Engines	E-books and online search tools replace traditional textbooks, enabling faster and more accurate information retrieval.
23	MOOC Platforms	MOOCs provide affordable, skill-based courses, enabling global learners to upgrade their qualifications at their own pace.

Discussion:

Digital technologies are emerging as a major transformative force in the education system today, allowing students to explore the world, experience distant places, and access diverse knowledge sources using their computers. Technologies like video conferencing make it easy to connect subject matter experts from

anywhere in the world directly to classrooms, adding variety, authenticity, and authenticity to lesson plans. Similarly, virtual joint classes with students from another institution or country are now easily possible, fostering skills like collaboration, communication, and intercultural understanding. Online polls and digital engagement tools allow even shy students, who might otherwise hesitate to express their views in a traditional classroom, to actively participate. Through these tools, teachers can regularly gather feedback from students and make necessary adjustments to course materials and teaching methods, making it more effective to identify and address learning difficulties. Student feedback systems also promote responsible digital behaviour, interactive communication, and online etiquette in the classroom. School closures have a profound impact on the mental health of students and their families, but digital learning plays a vital role in furthering education. Online learning allows students to learn at their own pace, pausing and rewatching videos, which promotes self-directed learning. Digital media also introduces students to environmental sustainability concepts like recycling and resource conservation and helps them understand that small efforts can have long-term impact. Overall, digital technologies are taking the learning process to a new level by making education more flexible, participatory, multi-faceted and student-cantered, and are moving the modern education system towards a global, accessible and effective direction.

Conclusion:

Digital technology has become a transformative and essential component of today's education system, providing students with an easy, flexible, and effective learning experience using software, devices, and modern digital tools. Using technology in the classroom reduces time-consuming and repetitive tasks for teachers by automating processes such as attendance, performance monitoring, evaluation, and content management, significantly improving teaching quality and efficiency. Digital education teaches students responsible, safe, and strategic use of technology, developing decision-making, self-discipline, and lifelong learning skills. Digital content creation tools and educational applications give students the freedom to study at their own pace, interests, and learning style, making learning more personalized and effective. When integrated with computers, the internet, smart devices, and digital learning platforms, the traditional classroom transforms into a digital classroom where students not only learn more effectively but can also regularly assess their progress. In the future, the use of these technologies will make education more advanced, inclusive, and student-cantered, positively enhancing the digital learning environment and students' academic achievement. Furthermore, modern technologies are playing a crucial role in data analysis and long-term decision-making in critical areas such as climate change, air and water security, biodiversity conservation, and disaster management, promoting a balanced model of natural resource conservation, economic development, and social progress. Ultimately, digital education not only strengthens the quality of teaching and learning but also contributes significantly to building a sustainable, environmentally friendly, and knowledge-rich society.

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