



Technologies in the 21st century: Adaptation and challenges in higher education

Ashwani Umar

Research Scholar, Department of Sociology, Babasaheb Bhimrao Ambedkar University, Lucknow, Uttar Pradesh, India

Abstract

Fast technological changes are transforming higher education in many ways. This study examines how universities and colleges use digital tools to address new challenges. New tools like online learning platforms, Artificial Intelligence, programs like ChatGPT, virtual and augmented reality, and ways to track learning are changing the landscape of higher education. This study uses research articles, books, government reports, and policy documents, including the National Education Policy 2020 to explore these changes.

The results show that while technology enables learning that fits each student, provides greater access, and offers new ways of teaching, there are still significant problems such as unequal access to technology, insufficient funding, and a lack of digital skills among teachers and students. Problems like copyright infringement and data privacy need to be fixed right away. Moving to online teaching during the COVID-19 pandemic showed both what technology can do and the ongoing unfairness in the system due to the implementation of new emerging technology. Looking at the National Education Policy 2020 shows that using technology well must be planned and focused on students, with high speed internet and devices, clear rules for its use, and new ideas. The future of higher education will depend on using technology in ways that support fairness, critical thinking, and overall growth of an individual.

Keywords: Digital transformation, higher education, educational technology, artificial intelligence, ChatGPT, blended learning, digital divide

Introduction

The 21st century has seen rapid technological change, leading to a digital transformation that affects all parts of society. Higher education, once centered on in-person teaching and printed materials, is now at the core of this shift. The use of digital technologies has shifted from a support tool to a key driver of changes in how teaching, learning, and research are carried out (Bates, 2019) [3]. This shift, called "digital transformation," requires universities to rethink their structures, purposes, and how they deliver education, going beyond simply putting materials online to thoroughly rework the educational experience (Selwyn, 2022; Selwyn & Neil, 2014) [22].

The use of computers and multimedia since the late twentieth century has grown into a complex set of digital tools. Learning Management Systems (LMSs), such as Canvas and Moodle, are now the primary online tools for many schools, colleges, and universities helping with course management and sharing materials. The launch of Massive Open Online Courses (MOOCs) tried to make knowledge available to everyone by providing people around the world access to materials from top universities. In recent years, Artificial Intelligence (AI) has powered learning platforms that adjust to students and smart tutoring systems, while virtual and augmented reality (VR/AR) have opened up new ways to teach and learn (Garrison, 2017; Vehrer *et al.*, 2025) [7]. The rise of generative AI, such as ChatGPT, is a major change that challenges traditional ways of assessment of students and prompts us to rethink what creativity and authorship mean in higher education (Foung *et al.*, 2024) [6]. Integrating technology into higher education presents both significant opportunities and challenges. There are long-standing challenges to overcome the "digital divide," which is used to mean just the gap in access to computers and the internet, now also includes differences in how well people

can use technology, their skills, and the real benefits they get from it. The COVID-19 pandemic forced schools to quickly switch to online teaching, showing both the strength and creativity of educational technology and also revealing weaknesses and unfairness in education systems. In countries like India, these problems are even more obvious. The National Education Policy (NEP) 2020 sees technology as a vital key to improve access, fairness, and quality in education, envisioning a future where technology connects people across distances and their varying social backgrounds, makes learning more personal, and streamlines administration. But problems with infrastructure and economic inequality make it hard to achieve this goal. This paper takes a close look at how modern technologies are being used in higher education and the problems they entail. Instead of offering a simple positive or negative view of technology, it carefully examines the complex effects digital tools have on universities, teachers, and students. By reviewing existing research and policies, the paper examines the main forces driving technology, identifies the obstacles to fair and effective use, considers the important changes caused by the pandemic, and places these trends in the context of India's NEP 2020. The main goal is to better understand how higher education can navigate digital change in a fair and forward-thinking way, ensuring technology benefits everyone rather than leaving some people marginalized.

Literature Review

The discussion about technology in education is wide-ranging and constantly evolving. Early writing mostly focused on the technical details and possible uses of new tools, while more recent work looks at the bigger picture, including how technology affects society, teaching methods, and ethics related to their use.

1. The Historical Trajectory of Educational Technology

The journey began with computers in labs, then moved to multimedia projectors and PowerPoint presentations as supplements to lectures. This phase took a "techno-centric" approach, with technology itself as the focus. The rise of the internet and Web 2.0 technologies marked a major shift. These enabled interactivity and user-generated content. This era has seen the spread of Learning Management Systems (LMS), which put course management online, and the explosion of MOOCs. These sparked the university's future and the scalability of quality education (Bates, 2019; Reich & Ruipérez-Valiente, 2019) [3, 16]. Research on MOOCs highlighted their potential for lifelong learning. Yet, many criticized their low completion rates and their tendency to attract already educated audiences, questioning their promise to democratize education (Zermano *et al.*, 2016).

2. Theoretical Frameworks for Technology Integration

Using technology well in education is based on both old and new ideas about how people learn. Constructivist theories, shaped by Piaget and Vygotsky, say that learners build knowledge through experiences and social interaction. Technology aligns with this by enabling interactive simulations, group online projects, and learning through problem-solving. These help students take an active role in learning (Dewey, 1997) [5]. More recently, Connectivism has become a theory for the digital age. Siemens (2005) [19] says that learning happens not just in the mind, but also in the connections between people, databases, and information sources. This theory helps us understand learning in connected settings. In these places, like social media or group tools, knowing how to find and judge information is just as important as the information itself.

3. Contemporary Research Themes

Contemporary articles are dominated by several interconnected themes, such as:

- **Blended and Hybrid Learning Models:** Many agree that well-planned blended learning, which combines in-person and online activities, can be more effective than either online or traditional classes alone. Research by Garrison and Kanuka (2004) [8] suggests that the time to think during online work, along with the personal connections in the classroom, can help create a stronger "community of inquiry" (Garrison *et al.*, 2004) [8].
- **Artificial Intelligence and Personalization:** AI is a major topic, with studies examining how it can handle routine tasks, provide instant feedback, and run learning systems that adjust lessons for each student (Baker, 2016; Zawacki-Richter *et al.*, 2019) [1, 2, 24]. However, many articles also warn about the "black box" nature of some AI systems and the risk of making education feel less human.
- **The Evolving Digital Divide:** Van Dijk (2020) and others say that the digital divide happens in steps: first, not everyone has devices or internet; next, not everyone has the skills to use them; then, people use technology in different ways and for different things; and finally, not everyone gets the same benefits. (Dijk & A.G.M., 2005) This detailed view is important for dealing with inequality.

- **Faculty Agency and Development:** Research shows that teachers are key to making technology work well in education. Studies by Porter and Graham (2016) [15] show that teachers are more likely to use technology when they feel supported by their school, perceive it as useful, and feel confident in their abilities. This means that training should not just cover technical skills but also help teachers rethink how they teach.
- **Ethical and Privacy Concerns:** As data collection through LMSs and AI tools becomes increasingly common, more articles discuss the ethical issues. Scholars like Zeide (2017) [25] worry about watching students too closely, who owns the data, and the chance that computer systems could unfairly treat some students, calling for strong rules and oversight. This literature review shows that the discussion has moved from asking if technology should be used to focusing on how to use it in the best, fairest, and most responsible way. Building on this, the present paper provides a clear, up-to-date overview of how technology is being used and the challenges faced in education after the pandemic.

Research Methodology

A qualitative, descriptive- analytical methodology is employed, synthesizing insights from diverse sources to provide a comprehensive understanding of how technology is reshaping higher education. Rather than collecting new data- this research systematically analyzes existing literature, including peer-reviewed articles, books, and reports, to identify patterns, contradictions, and trends that individual studies may overlook. Iterative coding and thematic analysis are used to distill the collective knowledge of scholars, policymakers, and practitioners, thereby offering a nuanced perspective on the complex process of technological adaptation.

Key Technological Drivers of Change in Higher Education

The digital change in higher education is driven by a group of related technologies. These technologies are no longer just extra tools; they are becoming essential parts that are changing how teaching, administration, and the entire learning environment work.

1. Learning Management Systems (LMS) and Online Learning Platforms

Learning Management Systems (LMSs) such as Canvas, Blackboard, and Moodle have become the primary digital tools used by modern universities. These systems serve as central hubs for sharing course materials, administering tests, facilitating discussions, tracking grades, and communicating with students. The widespread use of LMS has made both blended and fully online learning common, giving learning greater structure and stability. Besides university LMS, public online learning platforms like Coursera, edX, and SWAYAM in India have greatly increased access to educational content. These platforms offer large online courses from universities and companies around the world, allowing learners to gain new skills and earn small certificates at their own pace, often for free or at a low cost. Even though there are still problems, such as low completion rates and limited quality of interaction between students, these platforms have made lifelong learning and job training much more accessible.

2. Artificial Intelligence (AI) and Adaptive Learning

Artificial Intelligence is expected to be one of the most important new technologies in education, with different uses which are mentioned below:

- **Adaptive Learning Systems:** AI-powered platforms, such as Knewton and some digital textbooks, use algorithms to monitor how students are doing as they work. These systems adjust the difficulty, order, and type of learning materials as students' progress, creating a learning plan that fits each student. This helps students who start college with different levels of preparation.
- **Automated Administration and Support:** AI chatbots are now commonly used to answer common questions of student about admissions, class registration, deadlines, and campus services. These systems provide support at all times, allowing staff to focus on more complex problems.
- **Generative AI and ChatGPT:** The creation of tools like ChatGPT marks a major shift in educational technology. These tools can write text, code, and ideas that seem like they were made by people, and can help with research, brainstorming, and writing. However, they also make it harder to use old ways of evaluating students, especially when it comes to honesty. Because of this, teachers need to use tests that focus more on how students think, reflect, and explain their work, not just on the final answer. Teachers also need to show students how to use these tools in a fair and thoughtful way.
- **Immersive Technologies: Virtual and Augmented Reality (VR/AR)**
Virtual Reality creates fully immersive, computer attached simulated environments, while Augmented Reality overlap digital information onto the physical real world. Both offer powerful opportunities for experiential learning:
- **Skill-Based and Practical Training:** In medical education system, VR allow students to carry out virtual surgeries or explore the human body without risk. Engineering students can work with and take apart detailed 3D models of machines. Aviation and hospitality students can practice tasks in lifelike practice scenarios.
- **Enhanced Engagement and Empathy:** History and archaeology students can take virtual tours of ancient remains and other important sites. Literature students can visit places from stories. VR can also help students better understand others by letting them experience life from someone else's point of view, such as what it is like to be a refugee.
- **Remote Collaboration:** VR platforms can make shared online spaces where students from different places can work together on projects as if they were in the same room. While cost and access are still problems, VR and AR have great potential to help students learn more deeply and make hard ideas easier to understand.

3. Big Data and Learning Analytics

Online learning systems generate a lot of data about how students interact, including when they log in, how long they use resources, how often they participate in forums, how often they take quizzes, and their grades. Learning Analytics (LA) is about tracking, gathering, studying, and sharing this data to better understand and improve how students learn (Siemens & Baker, 2012) ^[20]. The main uses of LA include the following:

- **Early Warning Systems:** Schools use computer programs to identify students who might fail or drop out by analyzing their level of involvement. This helps schools step in early with support like academic advising or tutoring, which can help more students stay in school.
- **Curriculum and Teaching Improvement:** Analytics help teachers identify which learning materials students like most and where they often struggle. This information helps teachers improve their courses and teaching methods.
- **Institutional Decision-Making:** At the school level, LA helps leaders make critical decisions about allocating resources, creating new programs, and supporting students.

4. Collaborative Technologies and Social Media

The move toward working together in learning is made easier by many online tools. Apps like Google Workspace and Microsoft Teams let people work on documents and projects simultaneously, no matter where they are. Video call platforms like Zoom became very important during the pandemic and are still used for online office hours, guest talks, and group meetings. Social media sites like Twitter and LinkedIn, along with specialized platforms like Slack and Discord, help people feel connected, build professional relationships, and support learning from one another, adding to what is taught in class.

Significant Challenges and Barriers to Integration

Even though these technologies have a lot of advantages, there are big challenges that make it hard for everyone to use them well and fairly. Many of these problems are built into the system and are connected to larger social and economic issues.

1. The Multifaceted Digital Divide

The digital divide is the biggest obstacle to making digital changes fair for everyone.

- **First-Level Digital Divide (Access):** This is the most basic part—the gap between having steady, fast internet and the right digital devices, like laptops or tablets. In both rich and poor countries, students from low-income families, rural places, and minority groups are affected the most. The pandemic made this very clear, with stories of students having to share one smartphone with siblings or travel far to get online (Czerniewicz *et al.*, 2020) ^[4].
- **Second-Level Digital Divide (Skills and Usage):** Mere access is insufficient. The second level divide involves

disparities in digital literacy—the skills needed to use technology effectively for learning. This includes not only operational skills (how to use software) but also critical cognitive skills such as information literacy (evaluating the credibility of online sources), digital citizenship (behaving responsibly online), and the ability to use technology for knowledge creation rather than just consumption (Van Dijk, 2020). This skills gap affects both students and faculty.

- **Third-Level Digital Divide (Outcomes):** The final divide concerns who actually benefits. Even when students have access and skills, those from wealthier backgrounds often have the support and connections to use technology for greater academic and career gains, widening existing gaps. This outcome divide is the most harmful because it means technology is making social inequality worse instead of better.

2. Institutional and Financial Constraints

Using new technology requires significant investment over a long period. Costs include buying software and online learning tools, acquiring and maintaining equipment such as computers, virtual reality headsets, and servers, improving Wi-Fi across campus, and hiring IT staff. Public universities, especially in poorer countries, often have very tight budgets. Because of this, they have to choose between spending money on digital tools and covering basic needs, such as paying staff and maintaining buildings. This leads to a "digital rift," in which richer, often private, universities move ahead with technology, while public universities with fewer resources fall further behind, worsening educational inequality (Selwyn, 2022)^[17].

3. Pedagogical Resistance and the Need for Faculty Development

Technology itself does not make teaching better or worse; it depends on how people use it. One big challenge is that some teachers do not want to use technology or do not know how to use it well in their teaching. This can happen for several reasons:

- **Lack of Confidence and Training:** Many teachers know their subjects well, but have not learned how to teach with technology. They may not feel confident using new tools or may not have enough time to update their courses.
- **Philosophical Objections:** Some teachers are right to question whether technology really helps students learn. They worry it could make learning less personal, lead to shallow understanding, or take away their control over how they teach.
- **Insufficient Incentives:** In many institutions, promotion and tenure committees still prioritize research publications over teaching innovation, providing little incentive for faculty to invest the considerable time and effort required to redesign their courses (Porter & Graham, 2016)^[15]. Effective, ongoing faculty development that focuses on "pedagogy-first" and helps educators reimagine their teaching with technology is crucial, yet it is often underfunded and treated as an optional add-on rather

than a core institutional priority. The digitalization of education raises serious ethical dilemmas:

- **Data Privacy and Surveillance:** LMS and AI tools collect vast amounts of sensitive student data such as academic performance, social interactions, and even biometric data through online proctoring systems. Questions about who owns this data, how it is used, with whom it is shared, and how long it is stored are largely unanswered in many institutional contexts. There is a real risk that student surveillance will normalize a culture of distrust (Zeide, 2017)^[25].
- **Algorithmic Bias and Fairness:** AI systems are trained on existing data, which can contain societal biases. If an AI used for admissions or grading is trained on historical data that reflects past prejudices, it can perpetuate and even amplify discrimination against certain racial, gender, or socio-economic groups. Ensuring algorithmic fairness and transparency is a major technical and ethical challenge.
- **Digital Well-being:** The "always-on" culture facilitated by technology can lead to burnout and anxiety for both students and faculty. The boundaries between academic life and personal life can blur, necessitating policies and practices that promote digital well-being.

The COVID-19 Pandemic as a Catalyst and a Revealer

When COVID-19 hit in 2020, schools and universities around the world had to switch to online teaching quickly, in ways they had not planned for. This sudden change accelerated the adoption of technology in education and also revealed where the system was weak. The pandemic quickly removed the usual slow pace and hesitation schools, colleges, and universities had about using digital tools. Platforms like Zoom and Microsoft Teams, which were used by only a few people before, suddenly became necessary for keeping classes going. Teachers who had never used these tools before had to learn them fast, often with help from coworkers and training from their institute. During this time, teachers tried new ways of teaching, like flipping the classroom, using online quizzes, and finding creative ways to help students feel connected online. This showed that teaching large groups online was possible, but it also prompted people to rethink traditional teaching methods. Even though institutions showed they could keep going, the crisis also made it clear that not everyone had the same access to technology. It became obvious that having a good device and a steady internet connection was now needed for learning, not just signing up for classes. Some students did not have quiet places to study at home. Being alone and tired from too many video calls became a big problem, showing that learning is about people and relationships, not just about sharing information. The pandemic made it clear that fairness must be a top priority in future digital education.

A Paradigm Shift in Perception and Strategy

In the post-pandemic context, perceptions of online and blended learning have undergone a lasting transformation. Previously regarded as secondary options, these modalities are now widely recognized as legitimate and often essential forms of educational delivery. Institutions are now focused on developing robust online offerings that prioritize quality

and equity. This shift has led to increased strategic investment in digital infrastructure, faculty development in online pedagogy, and student support services for remote learners. The pandemic highlighted the importance of agility and resilience in higher education, establishing digital fluency as a fundamental institutional competency.

The Indian Context and the National Education Policy (NEP) 2020

India's higher education system, among the largest globally, exemplifies the broader challenges and opportunities associated with digital transformation. The National Education Policy 2020 offers a comprehensive framework to guide and contextualize this process within India. The NEP 2020 explicitly highlights both the challenges and opportunities of moving to digital learning. The National Education Policy 2020 gives a clear plan to help and guide this change in India. This also focused on virtual labs to address the lack of physical infrastructure in many colleges and universities.

- **Enhancing Teaching and Learning:** It calls for creating high-quality, interactive e-content in multiple Indian languages and using AI to personalize learning and provide real-time feedback. The policy also encourages the use of technology for teacher professional development.
- **Improving Educational Governance:** The NEP advocates automating administrative processes from admissions to examinations and to improve efficiency and transparency. A key proposal is the establishment of a National Educational Technology Forum (NETF) to provide a platform for the free exchange of ideas on the use of technology and to advise institutions (Government of India, 2020)^[9].

1. Alignment with National Digital Initiatives

The NEP's vision aligns with broader national missions, such as Digital India, which aims to expand broadband connectivity to rural areas, and the push for digital public infrastructure. Platforms like SWAYAM (offering free online courses from school to university level), the National Digital Library, and the e-PG Pathshala are concrete implementations of this vision, aiming to create a national digital education architecture.

2. Challenges in Implementation

Despite the ambitious policy framework, the ground realities present formidable challenges:

- **The Scale of the Digital Divide:** Access and skills gaps in India are among the most pronounced in the world. Urban-rural, gender, and socio-economic disparities in internet penetration and digital literacy are vast. The success of the NEP depends on parallel, massive investments to bridge these foundational gaps.
- **Linguistic and Cultural Diversity:** Creating high-quality digital content in multiple Indian languages is a monumental task. Simply translating English content is insufficient; it must be culturally and contextually relevant, requiring significant investment in local content creation.

- **Funding and Institutional Capacity:** Public universities in India are chronically underfunded. Finding the resources for the large-scale technological upgrades envisioned by the NEP will require not only increased public funding but also innovative public-private partnerships (PPP).

Discussion and Analysis

The analysis of 21st century technologies in higher education reveals a landscape marked by a dynamic and often tense interplay between significant potential and persistent, systemic challenges. Key technological drivers, such as LMS, AI, VR/AR, and learning analytics, function as active agents reshaping the educational ecosystem. These technologies facilitate a shift from the industrial era, one-size-fits-all model of education to a more flexible, personalized, and student-centered paradigm. The capacity for anytime, anywhere learning and adaptive content represents a substantial advancement in educational flexibility and responsiveness. However, the distribution of these benefits remains profoundly uneven. The digital divide is a central challenge, now understood as a complex stratification that affects educational outcomes. Students with high-speed internet access, personal devices, and strong digital literacy are well-positioned to succeed, while those lacking these resources face further marginalization. In this context, technology may amplify existing social inequalities rather than promote social mobility. Faculty plays a critical role; even the most advanced technology is ineffective without skilled educators to integrate it meaningfully. Addressing faculty resistance and insufficient professional development requires a cultural shift within academia. Institutions must foster environments that value and reward pedagogical innovation, providing the necessary time, resources, and support for faculty development. This challenge is fundamentally human resources and institutional culture issue, rather than a purely technical one. The ethical side of this change is very important. Collecting and using student data to support learning can benefit students, but it also carries risks of watching and controlling them too closely. The way some AI systems operate is not always clear, raising concerns about fairness and responsibility. As more educational tasks are given to computer systems, it is important to ensure these systems are open, auditable, and fair to everyone.

The COVID-19 pandemic was a sad but important lesson. It showed how well the education sector can adapt, but also revealed its weaknesses worldwide. It taught us that being strong with digital tools is not just a nice-to-have, but a necessity. The Indian NEP 2020 is a strong, wide-ranging effort to guide this change in a positive direction. However, its success will depend entirely on the government's commitment and the funds it spends to address basic problems such as infrastructure, access, and training. The policy's focus on using many languages and fairness is good, but putting it into action will be the real challenge.

Conclusion and Recommendations

The digital changes happening in higher education are ongoing and cannot be reversed. Modern technologies give us a big chance to make higher education more accessible, interesting, useful, and effective. These new tools can help people reach their full potential like never before. However, how this change happens depends on the choices made by

leaders, teachers, and society. To help make this change fair and high-quality, here are some recommendations

1. **Make Basic Digital Tools a Priority:** Everyone should have reliable and affordable high-speed internet and access to devices, just like they have electricity or water. Special programs and public places with internet are needed to help people who do not have these resources.
2. **Teach Digital Skills in All Courses:** Students and teachers should learn digital skills in all their classes. Lessons should cover more than just how to use technology; they should also include thinking carefully, fetching good information, being responsible online, and making good choices. Teachers should keep learning new ways to teach with technology.
3. **Use Technology to Support Learning Goals:** Educational institutions should use technology in ways that help students reach clear learning goals. They should encourage teachers to try new ways of teaching with technology by offering rewards, grants, and recognition to those who improve their courses. Institutions also need clear, open rules for protecting data privacy and safety, and for using AI appropriately. These rules should be made with input from everyone, including students, and should focus on what is best for students.
4. **Foster Multi-stakeholder Collaboration:** Solving these difficult problems requires teamwork between government, businesses, universities, and the public. Working with private companies can help fund the resources require, and teaming up with EdTech companies can ensure new technology is built with both teaching and ethical needs in mind.
5. **Design for Equity and Inclusion from the Start:** All digital projects, like new online learning systems and artificial intelligence tools, should be checked to make sure they are fair. This means ensuring students with disabilities can use them, providing content in different languages, and identifying and addressing any unfairness in how the technology operates.

In conclusion, the future of higher education will likely use a mix of in-person and online learning. The goal is not to replace traditional universities, but to help them grow and change. By using technology in a thoughtful, people-focused, and fair way, colleges and universities can use new tools to keep doing what they have always done: help people learn, think for themselves, and become responsible and thoughtful members of a society. The main challenge is not just adopting new technology, but also ensuring it is developed and used in ways that align with the most important values in education.

References

1. Baker SR. Chapter X Knowledge Inference Models Used in Adaptive Learning, 2016. <https://learninganalytics.upenn.edu/ryanbaker/ComputationalPsychometricsSAnPedro.pdf>
2. Baker RS. Stupid tutoring systems, intelligent humans. *International Journal of Artificial Intelligence in Education*,2016:26(2):600–614. <https://doi.org/10.1007/s40593-016-0105-0>
3. Bates AW. *Teaching in a digital age: Guidelines for designing teaching and learning* (2nd Ed.). Tony Bates Associates Ltd, 2019. <https://pressbooks.bccampus.ca/teachinginadigitalagev2/>
4. Czerniewicz L, Agherdien N, Badenhorst J, Belluigi D, Chambers T, Chili M, *et al.* A wake-up call: Equity, inequality, and Covid-19 emergency remote teaching and learning. *Post digital Science and Education*,2020:2(3):946–967. <https://doi.org/10.1007/s42438-020-00187-4>
5. Dewey J. *Experience and education*. Simon & Schuster. Original work published 1938, 1997.
6. Fong, Dennis, Lin, Linda, Chen, Julia. *Et al.* Reinventing Assessments with ChatGPT and Other Online Tools Opportunities for GenAI-empowered Assessment Practices. *Computers and Education Artificial Intelligence*, 2024. 6. 100250. 10.1016/j.caeai.2024.100250.
7. Garrison DR. *E-learning in the 21st century A community of inquiry framework for research and practice* 3rd Ed. Routledge, 2017.
8. Garrison DR, Kanuka H. Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*,2004:7(2):95–105. <https://doi.org/10.1016/j.iheduc.2004.02.001>
9. Government of India. *National Education Policy*. Ministry of Human Resource Development, 2020. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
10. Graham E. *Summer Institute*. *Academe*,2014:100(5):5–6.
11. Greenhow C, Lewin C. Social media and education: Reconceptualizing the boundaries of formal and informal learning. *Learning, Media and Technology*,2016:41(1):6–30. <https://doi.org/10.1080/17439884.2015.1064954>
12. Gümüş S, Bellibaş M, Pietsch M. School leadership and achievement gaps based on socioeconomic status: A search for socially just instructional leadership. *Journal of Educational Administration*,2022:60(4):419–438.
13. Hodges C, Moore S, Lockee B, Trust T, Bond A. The difference between emergency remote teaching and online learning. *Educause Review*, 2020. <https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning>
14. Kavanagh S, Luxton-Reilly A, Wuensche B, Plimmer B. A systematic review of virtual reality in education. *Topics in Cognitive Science*,2017:10(1):1–22. <https://doi.org/10.1111/tops.12278>
15. Porter WW, Graham CR. Institutional drivers and barriers to faculty adoption of blended learning in higher education. *British Journal of Educational Technology*,2016:47(4):748–762. <https://doi.org/10.1111/bjet.12269>
16. Reich J, Ruipérez-Valiente JA. The MOOC pivot. *Science*,2019:363(6423):130–131. <https://doi.org/10.1126/science.aav7958>
17. Selwyn N. *Education and technology Key issues and debates* 3rd ed. Bloomsbury Academic, 2022.

18. Teräs Marko. Neil Selwyn: Education and technology: Key issues and debates. *International Review of Education*, 2022. 10.1007/s11159-022-09971-9.
19. Siemens G. Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning*, 2005;2(1):3-10.
20. Siemens G, Baker RS. Learning analytics and educational data mining towards communication and collaboration. In *Proceedings of the 2nd International Conference on Learning Analytics and Knowledge*, 2012, 252-254. ACM.
<https://doi.org/10.1145/2330601.2330661>
21. Sindhu V. The Intersection of Technology and Social Service Current Trends, Challenges, and Opportunities. *International Journal of Advanced Research*, 2023.
<https://doi.org/10.21474/ijar01/17822>
22. Snyder H. Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, 2019;104:333–339.
<https://doi.org/10.1016/j.jbusres.2019.07.039>
23. Van Dijk JAGM. *The digital divide*. Polity Press, 2020.
24. Zawacki-Richter O, Marín VI, Bond M, Gouverneur F. Systematic review of research on artificial intelligence applications in higher education – where are the educators? *International Journal of Educational Technology in Higher Education*, 2019;16(1):39.
<https://doi.org/10.1186/s41239-019-0171-0>
25. Zeide E. The Structural Consequences of Big Data-Driven Education. *Big Data*, 2017;5:164-172. 10.1089/big.2016.0061.
26. Gomez Zermeño, Marcela, Aleman de la Garza, Lorena. Research analysis on mooc course dropout and retention rates. *Turkish Online Journal of Distance Education*, 2016, 17. 10.17718/tojde.23429.