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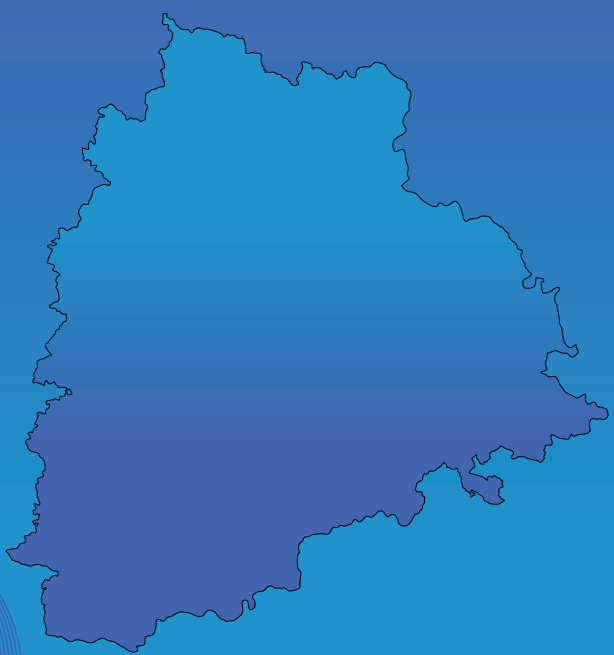
Inaugural Issue
on
TECHNOLOGY AND HIGHER EDUCATION



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TECHNOLOGY AND HIGHER EDUCATION

Editorial

Technology and Higher Education

The importance of technology in higher education has grown steadily in recent years. Classrooms, laboratories, and libraries now stretch far beyond physical spaces. Screens, software, and platforms shape how learning and teaching happen. This inaugural issue of the *Telangana Journal of Higher Education* focuses on this shift. The fourteen articles gathered here study different aspects of technology in education. The authors attend to tools such as artificial intelligence, mobile applications, and digital networks, but they also raise questions about ethics, inequality, and preparedness. The articles move between policy and practice, between possibility and difficulty. The aim is not to celebrate technology for its own sake, but to consider what it does and what it asks of teachers, students, and institutions.

In the opening article, V. Balakista Reddy begins by looking at how digital tools have entered Indian higher education over time. His article sets the stage through a historical account that moves from the post-independence period to the present. He discusses policy shifts, institutional responses, and the changes brought about by the Covid-19 pandemic. He draws attention to the unevenness of this growth, especially in training and access. His argument places technology at the centre of teaching, learning, and administration.

In the next article, A. Suryanarayana and Ramesh Kumar Miryala turn to how social media platforms are used in education. They write about the ways in which Facebook, X, and LinkedIn support peer learning, discussion, and access to academic content. They consider research models that have examined these dynamics, and they also raise concerns about distraction, data privacy, and digital competence.

In the following article, Chalamalla Venakateshwarlu takes forward the discussion by writing about how group learning plays out in digital spaces. He focuses on collaborative learning and outlines how classroom practices are shaped by group dynamics when supported by platforms and adaptive tools. Drawing on theories of learning and examples from Indian institutions, he discusses how such practices can support communication and participation.

The subsequent articles deal with various aspects of the use of technology in higher education, such as digital inequality, academic networking, the impact of accreditation, AI in mechanical engineering, future skills, tech ethics, mobile learning, institutional readiness, digital ethics, podcast learning, and AI in education. Beera Curie, for instance, writes about access and its limits. Her article examines how economic and geographical difference leads to uneven access to devices, networks, and digital literacy. She discusses how this gap affects students and teachers alike. She also brings in broader questions about equity and the pressures placed on institutions.

Priyanka Joshi and Dinesh Kumar continue the discussion on social media but turn attention to how these platforms support academic collaboration and global exchange. They discuss how students and teachers use social media platforms such as YouTube, LinkedIn, and Facebook for learning and networking. They also raise questions about misinformation and unequal access.

Pranav Kayande and Vijit Chaturvedi go into how accreditation standards influence teaching practices. They discuss how ICT tools—such as simulations and online assessments—are used in management education. Their study compares accredited and non-accredited institutions and considers how evaluation processes shape classroom methods.

Gujjar Naga Malleswara Rao and Shaik Chand Mabhu Subhani focus on mechanical engineering. They explore how artificial intelligence and machine learning are now part of design, maintenance, and robotics. Their article links technology with engineering education and shows how data-driven tools are being used in core subject areas.

The question of what students need in a digital world is raised by Mohini Mohan Kumbhakar and Nagendra Kumar. They write about skills that are seen as important in the 21st century. Their article draws on national and international research and argues for changes in curriculum, teacher preparation, and industry engagement.

Sandeep Kumar draws attention to the ethical questions that technology raises. He writes about data practices, algorithmic bias, and academic honesty. He also probes the risks of surveillance and the use of social media in academic spaces. His article calls for care in how institutions think about digital tools.

Priya R Kulkarni, V. Madhusudhana Reddy, and Vundyala Neeraja attempt an analysis of how language learners use mobile applications. They study tools such as Duolingo and FluentU and consider how they help learners with vocabulary and grammar. They also discuss how such tools help lifelong learning and access to literacy. Ch.A. Rajendra Prasad dwells on the readiness of Indian institutions to take up digital learning. He explains how higher education has responded to technology and raises concerns about inequality and student support. His article places digital teaching within the wider history of education in the country.

V Temuzion Kumuja, Pedaveti Julia, and Roshan Jameer MD focus on the ethics of digital practice. They argue that technology must be used with care and attention to fairness. They stress the need for participation and leadership in making decisions about digital tools and teaching.

In the penultimate article, K. Bhaskar attempts a discussion on artificial intelligence in higher education. He presents cases of adaptive learning and data-driven decision-making. He also raises concerns about bias and access, and underscores the need for sound policy and infrastructure.

In the final article, Roshan Jameer MD, V Temuzion Kumuja, and Pedaveti Julia undertake an enquiry into podcasts. They study how audio learning supports student engagement and memory. Their article draws on survey data and interviews to show how students respond to this format.

This issue of the *Telangana Journal of Higher Education* brings together many voices. The articles speak of enthusiasm and caution, of promise and difficulty. They raise questions that matter to teachers, students, and institutions. They do not present technology as a cure for all problems. Instead, they offer careful thought and argument, and they open space for conversation at a time when change is constant.

Prof. V. Balakista Reddy
Editor-in-Chief

Table of Contents

TECHNOLOGY IN HIGHER EDUCATION: PAST, PRESENT AND FUTURE

V. Balakista Reddy*

Abstract:

The Covid-19 pandemic caused widespread upheaval in higher education across the globe. Institutions were forced to move swiftly towards digital learning—there was little time to prepare or plan. This paper considers the use of Information and Communications Technology (ICT) in reshaping higher education, with particular attention to the Indian context. It draws attention to the growing use of digital tools, online platforms, and government-led schemes aimed at expanding reach and improving standards. While technology has made remote learning possible and has widened access to education, issues persist. These include unequal access to devices and internet connectivity, the need for staff development, and concerns around the safety of personal data. The discussion also looks ahead. It considers how policies such as the National Education Policy (NEP) 2020 may change the direction of higher education in India. It also considers how artificial intelligence (AI), virtual reality (VR), and web-based instruction are likely to become more important in shaping educational experiences in the years to come. Even with new technology and more digital tools, problems continue. Without adequate infrastructure, and without basic digital skills among both students and teachers, efforts to broaden access may fall short. Inequity remains a pressing concern. Bridging the gaps—across geography, income, and digital knowledge—will be imperative if these tools are to serve everyone fairly.

Keywords: *Higher Education, Digital Transformation; Online Learning, Covid-19, Indian Education System*

* Professor of Law, and Chairman, TGCHE, Hyderabad, Telangana

Introduction

> *"Technology is central to development, and India must leverage digital tools to empower education."*
>
> — *Narendra Modi*

Prime Minister Narendra Modi's statement draws attention to the growing role of technology in reshaping the educational setting in India. The link between technology and education is often described as working in both directions. Digital tools have changed how students learn. They have narrowed long-standing gaps in access to education and opened new ways to design learning that better suits a variety of needs. In the present century, higher education is undergoing visible shifts due to the fast-paced technological development (Marshall et al., 2024). These changes have altered long-held teaching practices. New tools have entered academic spaces—changing how knowledge is shared and received in higher education institutions (HEIs). Artificial intelligence (AI), virtual reality (VR), learning analytics, and digital platforms are no longer seen as add-ons. They are now central to how education is being reshaped (Hoyer et al., 2020). These tools could help make learning fit each student's needs. They also offer ways to spark deeper engagement and prepare students for a world that is now closely interconnected. These technologies did not enter education by accident. It has been driven by the need to meet the habits and expectations of a generation raised in digital environments. There is also pressure to respond to the demands of an economy built on knowledge and information (Seth et al., 2024). HEIs are turning to these tools to build learning spaces that are more interactive. These spaces are also becoming more collaborative—and they are no longer restricted by the four walls of a classroom. This opening sets the groundwork for a closer look at how new technologies are shaping the direction of education. Both the opportunities and the difficulties deserve attention. The use of educational technology gained new urgency during the Covid-19 pandemic. With classrooms shut,

teaching moved to online formats without warning (Mishra et al., 2020). This shift was not gradual. The crisis pushed institutions to adopt digital tools quickly—in many cases, overnight. The pandemic not only changed how learning was delivered. It also acted as a trigger for a wider turn towards technology in education. What began as a response to an emergency soon became a sign of longer-term change.

From the days of the *guru-sishya* tradition—where teaching took place under trees—to lessons held inside closed classrooms, the way education is delivered has changed in striking ways. Presentations now involve LCD touch-screen projectors. Online notes are common. Instant messages on WhatsApp have caught on among students and are now part of their daily academic exchanges. The use of ICT in education has the potential to erase boundaries set by time and place. It can open space for working together and sharing knowledge. It may also improve the standard of learning (Haleem et al., 2022). Yet, several problems remain. Access to technology is still far from equal, and many learners are left behind. Matching what technology can offer with what education truly requires is another pressing concern.

The path of technological use in Indian higher education has passed through marked stages. In the early 2000s, the focus was largely on making sure students and teachers gained basic skills in computer use. Institutions were encouraged to bring ICT into their everyday teaching practices (Bajpai et al., 2019). Various government-backed efforts were launched to push this shift forward. One such effort was the National Knowledge Commission, which ran from 2005 to 2008. Its aim was to improve the reach and quality of education through the use of new tools (Kannan, 2005). The Commission called for a National Mission on Education through ICT (NMEICT). This mission was later introduced to make wider use of technology in higher education. It sought to widen access and raise teaching standards across institutions (Livingstone, 2011).

This paper traces how the use of technology in academia has changed over time. It also looks at how it is used now and what directions it might take in the years ahead. The discussion raises several central questions. How has technology shaped higher education so far? What do current patterns tell us about its role? And what changes might lie ahead as new tools continue to emerge? By looking at both the gains and the difficulties, this paper opens a space for thought. It brings together views that matter to teachers, researchers, and those who make decisions in education. The goal is to help them respond to the shifts now unfolding in academic life.

The Past: Evolution of Technology in Higher Education

Education is a key part of how any society grows and functions. It is through formal education that future citizens gain knowledge, skills, and values. These are passed on through well-designed systems and planned instruction (Spiel et al., 2018). The way we view learning has shifted in response to the conditions of modern life. Society now pushes us to reconsider how education is shaped and delivered. Learning itself can be understood as a process of change (Darling-Hammond et al., 2019). Social development has moved from the era of industry to one shaped by digital tools. This shift—combined with the rise of artificial intelligence, which often relies on algorithms—calls for new forms of teaching. These future settings must be designed to suit the demands of a fast-moving world. At the same time, global security has become more unpredictable. There is greater tension between major powers. Armed conflicts continue to rage. These changes are now helping decide what skills people will need for future jobs. Those entering employment today—members of Generation Z—bring with them a new set of habits and expectations. They have grown up with digital tools and fast information. This change in learner profile calls for a fresh look at old teaching styles. Learning methods must now take into account the particular ways in which digital natives absorb and respond to content. The growth of technology in Indian

higher education offers a clear window into this unfolding story. It shows how the country has moved away from older teaching practices. At the same time, it reveals a growing turn towards digital education. This shift has been shaped both by changes across the globe and the needs that arise within the immediate context.

1950-1990: The Foundation of Technological Integration

The years between 1950 and 1990 formed the early stage of bringing technology into Indian higher education on a national scale (NITI Aayog, 2025). When the country gained independence, it faced a major challenge—how to expand access to education while also improving its quality. During this period, institutions such as the Indian Institutes of Technology (IITs) were set up in the 1950s and 1960s. These played a decisive role in shaping the early direction of technical and scientific learning in the country (Krishna, 2019). Much of the attention during this time went to building physical infrastructure. Laboratories were established. Libraries were developed. Research centres began to take shape across academic campuses. These efforts laid the groundwork for further steps in modernising education. By the 1970s and 1980s, universities had begun using audio-visual tools. Overhead projectors became common in classrooms. Radio broadcasts were introduced to carry lectures beyond standard teaching hours. These tools created new ways for students to engage with course material and allowed for a more interactive style of learning. In 1984, the University Grants Commission (UGC) launched the Countrywide Classroom programme. This initiative delivered educational content through Doordarshan, the national TV broadcaster. It extended access to academic material beyond the limits of the traditional classroom setting (Rao, 2018). Another important development came with the founding of the National Informatics Centre (NIC) in 1976 (Schuetze et al., 2024). This body played a part in introducing early digital systems into university administration. Though such efforts were still at a basic

level, they marked the beginning of change. Higher education was still far from fully using digital tools, but the first steps had begun.

1990-2010: Digital Revolution and the Internet Era

The 1990s marked the early stages of a digital shift that reshaped higher education in India (Mhlanga, 2024). Following the liberalisation of the Indian economy in 1991, there was a growing interest in Information and Communication Technology (ICT) and its place in academic life (Erumban & Das, 2015). The arrival of personal computers in universities, followed by internet access, changed how learning and research were carried out. These tools opened up new ways for students and teachers to connect and learn. In 2003, the Indian Institutes of Technology (IITs), along with the Indian Institute of Science (IISc), launched the National Programme on Technology Enhanced Learning (NPTEL). This initiative aimed to make technical education available online in an orderly and accessible format (Kant & Mehra, 2022). Another step came in 2009 with the creation of the National Knowledge Network (NKN). This project sought to link educational institutions and research centres through high-speed internet connections (Geetha et al., 2017). The idea was to build stronger ties across the academic world and allow for faster exchange of ideas and information. During this period, private universities and engineering colleges also began to grow in number. Many of these institutions brought computer-based learning into their classrooms from the start. This marked a move towards a more digitally aware method of teaching.

The early 1990s also saw the rise of digital libraries. One of the most notable was the Information and Library Network (INFLIBNET). This system expanded the ways in which students and teachers could access academic material. It linked Indian institutions to global knowledge sources and offered a wider range of research tools (Wani, 2021). Yet despite these shifts, the spread of digital tools in rural and government-funded universities remained limited. Many campuses

lacked basic infrastructure. Others faced financial constraints that made it difficult to adopt new systems. These gaps slowed the progress of digital education in several parts of the country.

2010-2020: The Rise of Digital Learning and EdTech Boom

The period from 2010 to 2020 brought a rapid increase in the use of digital tools within Indian higher education (Alenezi, 2023). Several factors contributed to this pace of change. The spread of low-cost smartphones played a major role. So did the rise of high-speed internet—especially following the launch of Jio in 2016. At the same time, the central government expanded its focus on digital schemes that aimed to reshape the learning environment. One of the most important initiatives during this time was the National Mission on Education through Information and Communication Technology (NMEICT). This programme promoted the use of ICT in learning. It included the creation of digital content and the development of online repositories for academic material (Dabbeeru & Gannavaram, 2024). In 2017, the launch of the SWAYAM platform marked another step. This platform offered free Massive Open Online Courses (MOOCs). These courses were produced by leading institutions and reached learners across different regions and income levels (Palvia et al., 2018).

Another advance came with the growing use of Learning Management Systems (LMS). Platforms such as Moodle, Blackboard and Google Classroom became common in universities. These tools helped organise course materials, made assessments easier, and offered new ways for students to interact (Marshall & Sankey, 2023). The decade also witnessed the growth of virtual laboratories. Projects like the Virtual Labs initiative by the IITs gave science and engineering students the chance to carry out experiments online. This was a major shift, especially for learners who had no access to physical lab spaces.

Digital libraries also expanded during this period. The National Digital Library of India (NDLI) and e-ShodhSindhu offered access to millions of academic texts and journals. These resources gave new strength to

research work and made it easier for students and teachers to draw on global sources. Another important step was the launch of the National Academic Depository (NAD). This system allowed degrees and certificates to be stored securely without the need for paper copies. It used blockchain technology to guard against tampering or loss (Gupta & Gupta, 2017).

Covidisation and Technology

Covidisation describes a sweeping shift in life brought on by the Covid-19 pandemic. Modelled on the word '*globalisation*,' it refers to the rapid and borderless spread of new habits, routines and work patterns. Since the pandemic began, covidisation has spread to every part of society. It has reshaped how countries, communities and institutions relate to one another—much like what globalisation did earlier. One of the most noticeable effects has been on the state of education across the world—a shift that brought about nameless, faceless and borderless classrooms. Covidisation has created a global village through a borderless world and opened access to education across national frontiers. People from the remotest corners of the planet could now take part in online seminars, webinars, workshops and classrooms—something previously unthinkable on this scale. Covidisation—in other words—has changed how the education system has been viewed in the past five years.

As the Covid-19 pandemic raged, universities and colleges shut down without warning and were forced to adopt digital tools at great speed to keep learning going (Dhawan, 2020). This sudden shift changed how education was delivered. It also reshaped how it was accessed and how it was experienced by both faculty and students. Moving from face-to-face teaching to digital formats entailed serious problems. Teachers and learners had to adapt quickly to new tools and unfamiliar methods (Yun, 2023). Teachers were expected to meet new demands. They had to reshape their teaching practices and find ways to keep students engaged through screens.

Information and Communications Technology (ICT) includes a wide variety of tools and systems for dealing with information. These tools are used to create, share, store, and manage knowledge. Over time, ICT has grown to cover a broad range of digital systems. It has become an important and inescapable part of modern education (Cabaleiro-Cerviño & Vera, 2020). When computing and communication technologies come together, they form what is known as Information Technology (IT). This allows for the production, sharing, and storage of knowledge. In the wake of Covidisation, technology no longer remained a passive aid—it emerged as the very mode through which education continued. During the pandemic, IT became central to education—institutions relied on it to keep academic life going.

Traditional classroom learning came to a halt almost overnight. Online education took its place. This was one of the fastest changes ever in higher education. Many universities had little experience with digital teaching. They had to adjust posthaste. Virtual classrooms became the new norm. Institutions turned to platforms such as Zoom, Microsoft Teams, and Google Meet. Learning Management Systems like Moodle and Canvas also became widely used (Singh et al., 2022). This shift was not merely logistical—it changed the way people thought about the space of the classroom itself. This fast shift helped see what digital tools can do and where they do not work all that well.

Digital learning gained unprecedented popularity during this period. Platforms such as SWAYAM and NPTEL, along with other MOOCs, saw a sharp rise in enrolments. Many students and teachers turned to these platforms in search of flexible and reachable options. In science and engineering, virtual laboratories, simulations, and augmented reality tools were used to support learning. These tools came to be regarded as ways to offer practical lessons without physical labs (Al-Ansi et al., 2023). Technology also removed some of the barriers of place. Students from remote areas could now access lessons from top institutions (Kumar & Shobana, 2024). Digital testing methods, AI-

based invigilation tools, and systems for issuing digital certificates grew more common. These tools helped maintain academic processes and supported integrity in assessment. Covidisation made it amply clear that classrooms need not be bound by geography—teaching and learning could now move across borders and time zones with ease.

However, the sudden shift to online education also led to serious problems. In India, the digital divide created large gaps in access. Many students—especially those in rural or lower-income areas—did not have stable internet, smartphones, or computers. This meant they could not take part in online classes on equal terms (Afzal et al., 2023). Teachers also faced difficulties. Many had never worked with digital tools before. They had to learn new systems while also continuing to teach (Gratz & Looney, 2019). The loss of in-person contact raised worries about student focus, emotional well-being, and the depth of learning. Covidisation, while opening new doors, also brought to light the inequalities that run through the digital world. It laid bare the gap between access and participation—between having a device and using it meaningfully.

Notwithstanding these issues, the current digital age has brought major changes to education. Indian universities and colleges are now part of this shift (Desk, 2023). Technology and new teaching methods are reshaping how learning takes place. Artificial Intelligence is being used to tailor lessons to the needs and learning style of each student. Virtual Reality and Augmented Reality are being brought into classrooms. These tools are used to build more interactive and hands-on learning spaces. Online platforms and MOOCs have made it easier for students to access study material. High-quality courses are now within reach—regardless of where students live. This kind of reach allows learners to study at a pace that suits them.

Teachers, too, have gained from this shift as administrative tasks have been reduced through digital systems. They can now invest more time in student interaction and classroom preparation. Data tools have also

gained ground. Learning analytics and similar technologies help track student progress. These systems help teachers adjust their methods and spot problems early. The aim is to improve student work and support learning outcomes.

Covidisation has thus not only changed the way education is delivered—it has reshaped the idea of education itself. What was once defined by walls and timetables is now shaped by screens and signals. Yet the full reach of Covidisation is not known. Its true weight may lie in the years ahead—as new ways of interaction continue to form and grow across the world. What we have seen so far may well be only the beginning of changes yet to come.

The Government of India has launched several schemes to expand digital learning and improve skills in this area (ToI-Online, 2022). SWAYAM offers free courses from school level up to postgraduate studies. It uses printed material, online tests and forums for discussion. SWAYAM PRABHA broadcasts lessons on 32 television channels. These are meant for students who cannot access the internet. The National Digital Library of India (NDLI) holds more than 72 lakh digital books. The National Academic Depository provides secure storage for certificates and degrees (Singh, 2022). E-PG Pathshala contains academic material in several Indian languages. E-Yantra supports learning in robotics and embedded systems (Shrivastava & Shrivastava, 2022). The FOSSEE project aims to move away from paid software. Spoken Tutorial offers free lessons in programming and software, in many languages. Virtual Labs gives students access to digital experiments—cutting down the need for expensive laboratory space. E-Shodhsindhu (eSS) connects users to over 15,000 journals and databases. The Annual Refresher Programme in Teaching (ARPIT) offers training for college staff (Shrivastava & Shrivastava, 2022). Plagiarism Detection Software is used to maintain academic honesty. VIDWAN serves as a record of experts and researchers. Digilocker allows people to store important documents online. The

National Digital Educational Architecture (NDEAR) supports the digital systems behind these efforts (Hidalgo et al., 2018). The National Scholarship Portal (NSP) helps students receive funding through a clear and centralised process. These projects aim to widen access to higher education in India—and to raise its quality across different regions.

Future Implications

India can legitimately claim to be the home to one of the largest higher education systems in the world. It has seen a sharp rise in the number of institutions, enrolments and public initiatives aimed at increasing access and raising standards. Yet the task is not only to expand education—it must also keep pace with rapid changes in technology.

Alvin Toffler (1970), writing in *Future Shock*, warned that traditional education systems rely too heavily on past knowledge. He argued that this focus leaves students unprepared for an uncertain future. Toffler believed that education should face forward—it ought to prepare learners for what is coming, not only for what has already happened. He called for constant change and adjustment. His view is more important now than ever before. Technology is now a central part of education—it is not just an extra feature. With the rise of artificial intelligence, data analysis, virtual reality and other digital systems, there is a growing need to rethink how courses are built and how lessons are delivered. Institutions must move away from memorisation and adopt new methods that support skill development, flexibility and original thinking.

The Covid-19 crisis sped up this shift. But keeping it going will require policy reform, investment in digital tools and a lasting commitment to lifelong learning. The National Education Policy (NEP) 2020 supports this direction. It promotes learning across disciplines and encourages the use of technology. By doing so, it echoes Toffler's call for education that focuses on the future instead of staying stuck in the past.

As pointed out already, the Indian higher education system ranks among the world's largest. By 2022, the country had more than 1,100 universities and over 45,000 colleges. This is based on data from the All-India Survey on Higher Education (AISHE) (Government of India, 2022). The numbers have grown from 651 universities and 31,324 colleges in 2013 (Government of India, 2022). The system includes central, state and private institutions. It also covers deemed-to-be universities and institutes of national importance such as the IITs, IIMs and AIIMS. Enrolment figures have also increased. The Gross Enrolment Ratio (GER) reached 28.4% in 2021-22. This is up from 26.3% in 2018-19. The total enrolment has crossed 4.14 crore students—or 41.4 million students (Government of India, 2022). Female enrolment has also seen a strong rise. Women now make up nearly 49% of the total student population. This points to progress in closing the gender gap.

During the pandemic, vast numbers of students turned to online and distance learning. Over 10% of all enrolments now come through Open and Distance Learning (ODL). These courses are offered by institutions such as IGNOU and the state open universities (Jena, 2020). Online platforms like SWAYAM and NPTEL have gained popularity. They offer Massive Open Online Courses (MOOCs) to large numbers of students. The National Education Policy (NEP) 2020 seeks to bring more change. It sets a target to raise the GER to 50% by 2035. It also supports a shift toward broader learning and increased use of digital tools (Mahalakshmi & Radha, 2020). The NEP allows foreign universities to open campuses in India. This is expected to improve academic standards and give Indian students wider exposure. The Study in India initiative is another key step. It aims to draw international students and establish India as a global hub for education.

Yet many challenges remain. Quality is still a concern. A large number of institutions lack proper facilities, skilled staff and research infrastructure. The problem of employability continues. Many

graduates leave with degrees but often lack the skills that employers seek. This shows the need to focus more on skill-based and vocational learning. There are also yawning gaps between regions. Urban areas often have better infrastructure and more options. Rural students tend to have fewer opportunities. Faculty shortages—especially in technical or specialist fields—also weaken teaching and research. While India ranks high in total research output, there is still a need to raise the quality of that work. This is one reason for the launch of the National Research Foundation (NRF), which aims to support deeper research and original ideas (Aithal & Aithal, 2020).

The private sector plays an important part in Indian higher education. It accounts for a major share of enrolments and offers a wide range of courses in areas such as engineering, management and medicine (Jhurree, 2005). But concerns remain about profit-driven models and weak quality checks in private institutions. There is growing focus on skill development to address these issues. Programmes such as the National Skill Development Mission promote partnerships between universities and industries. These links aim to improve student preparedness for work (Mehta et al., 2024). The pandemic also accelerated the shift to digital tools. Institutions began using Learning Management Systems (LMS), online testing methods and virtual laboratories (Chukwuere, 2024). Yet the digital divide remains a serious barrier. Rural areas still face poor connectivity—this limits access to education. India's higher education system has seen large-scale expansion. Enrolment has grown. New policies have been introduced. But problems with quality, fairness and job preparation remain. The NEP 2020 offers a path forward. It supports research, new ideas and digital systems. These may help tackle the problems that still exist. Long-term progress will depend on steady work. There must be efforts to make education open to all, to raise teaching standards and to link learning with the demands of the modern workplace (Datta & Mete, 2021).

Issues and Challenges of the Use of Technology in Higher Education

Technology has brought many helpful changes to higher education. Yet it has also raised a number of serious concerns that must be met if its full potential is to be realised. One of the most urgent of these is the digital divide. Not all students have equal access to computers, smartphones or steady internet connections. This problem is especially pronounced in rural areas and among communities stricken by economic hardship. The gap is widened by social and financial conditions. Students from low-income households often struggle to afford the tools they need. This leads to unequal chances in learning (Afzal et al., 2023).

Many universities and colleges also lack proper infrastructure. Some do not have fast internet or up-to-date digital equipment. These limitations make it harder to carry out online learning in a meaningful way (Kumari, 2022). Tight budgets add to the strain. Institutions often find it difficult to buy or maintain advanced equipment when resources are already stretched. Another major concern is the readiness of teaching staff (Alcaide-Pulido et al., 2025). Many faculty members still lack basic digital skills. Without proper training, it becomes difficult for them to work with learning platforms or digital tools. This can lead to delays, frustration and reluctance to adopt new methods. Ongoing training is need of the hour. It helps staff stay informed about tools that might change how they teach—and how students learn (Keese et al., 2023).

For students, it is often harder to stay motivated in online classes. Without direct contact with teachers, students can lose interest. Participation tends to fall. Online study also asks a lot from students. They must manage their time well and stay focused without much supervision. Not everyone finds this easy. The matter of quality in online education is another cause for concern (Haleem et al., 2022). The quality of digital content varies quite a lot. This is especially true

in subjects that rely on hands-on experience. Science, engineering and medicine often need physical practice—not just theory.

There are also questions about honesty in online exams. Cheating and plagiarism are easier when there is no one in the room. Keeping assessments fair has become more difficult. Protecting student and staff data is another serious challenge. Cyberattacks and breaches of privacy are growing threats (Fidas et al., 2023). Tools used to watch students during exams—such as remote proctoring software—also raise ethical concerns. Many of these tools track behaviour in ways that some view as intrusive. Consent and privacy are not always treated carefully. A further problem lies in how quickly technology changes. New tools emerge so fast that older systems soon feel outdated. This creates pressure to keep buying and updating. It also leads to problems with compatibility. Systems from different providers do not always work well together—and this slows down progress.

The mental and physical health of both students and teachers is also at stake. Long hours in front of screens can cause eye strain, headaches and fatigue. The lack of personal contact can lead to isolation. Many students and faculty report feeling disconnected and alone. Policy and regulation add another layer of difficulty. Institutions must deal with legal demands on data safety, intellectual rights and online learning rules (Bernate et al., 2024). Many policies do not yet cover the unique problems that online and blended learning bring. Cultural resistance within institutions can also hold back change. Some universities—especially older ones—are slow to accept new tools. Fear of change or loyalty to tradition makes it harder to move towards digital models. Transitioning to a new way of teaching often demands a total change in mindset. This takes time. Access to digital resources remains uneven. Students in remote or underserved regions face more obstacles. They often lack the devices, support and content that others take for granted. Language is another barrier. Much online content is

available only in English. This puts students who are not proficient in English at a disadvantage.

Conclusion

The use of technology in higher education has brought major changes to the learning environment. This shift became especially clear during the Covid-19 pandemic. Digital tools and online platforms have widened access. They have also made learning more flexible for many students. Yet these changes have brought new concerns to the surface. The digital divide remains a serious problem. Not all students have the same access to technology or stable internet. Many teachers, too, are still adjusting to digital methods. Concerns about how personal data is collected and stored have also gained attention.

In India, the government has introduced several schemes to support digital learning. Platforms such as SWAYAM and NPTEL, along with policies like NEP 2020, have played an important role in promoting online education. These efforts have helped expand learning opportunities across the country. Even so, major gaps remain. Many institutions still lack basic infrastructure. Internet access is uneven. Equipment is often outdated or missing. Questions about fairness and the quality of education continue to arise. These problems need to be monitored closely so that digital learning works for all students, not just a select few.

As higher education continues to shift, new technologies such as artificial intelligence, virtual reality and data analytics are set to reshape how teaching and learning are carried out. These tools have the power to change not only how knowledge is shared but also how students interact with content and with their teachers. To make this shift work in practice, institutions will need to place firm attention on digital skills. Staff training must remain a strong focus. So must efforts to keep students involved and active in their learning. Meeting these needs will require more than isolated efforts. Changes in policy must be considered. Public and private bodies will need to work together.

Digital strategies must be broad enough to include all students—not just those with access to the latest tools or strongest connections. Only by doing so can higher education become more open, flexible, and future-ready.

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SOCIAL LEARNING 2.0: HARNESSING DIGITAL NETWORKS AS LEARNING TOOLS IN EDUCATION

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Abstract

The integration of social media as a learning tool has transformed traditional education by fostering cooperation and collaboration among learners and educators. This Article examines the potential of social media platforms to enhance educational experiences by facilitating interactive learning environments, peer-to-peer communication, and access to diverse resources. The purpose of this study is to explore how social media supports collaborative learning and to identify its advantages and challenges. Although this is a non-empirical article, it utilises a comprehensive literature review to highlight theoretical insights and case-based examples from global educational contexts. The findings suggest that socil media encourages active participation, critical thinking, and the development of soft skills such as teamwork and communication. Platforms such as Twitter, Facebook, and LinkedIn are particularly effective in enabling real-time discussions, group projects, and knowledge-sharing. However, the study also acknowledges certain limitations, including digital literacy gaps, distractions, and privacy concerns. This article contributes to the growing discourse on digital learning by synthesising existing knowledge and offering a framework for educators to effectively integrate social media into their teaching practices. The implications emphasise the importance of digital competency, policy-making for secure online learning, and the role of educators in guiding students to utilise social media constructively. The novelty of the article lies in its comprehensive

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approach to bridging theoretical perspectives and practical applications, providing a roadmap for leveraging social media as a cooperative learning tool. While the study does not include primary data, its insights are intended to inspire future empirical research and policy development in this domain.

***Keywords**: Social Media Learning, Collaborative Learning, Digital Education, Educational Technology, Online Cooperation, Digital Literacy, Learning Innovation*

Introduction

Social media has revolutionised the way people communicate, collaborate, and share knowledge, extending its influence into the realm of education. As technology advances, educators and learners alike are exploring how social media platforms can facilitate cooperative and collaborative learning. According to Tess (2013), "Social media has transformed education into a more interactive and participatory experience, enabling learners to engage beyond the boundaries of traditional classrooms." This shift underscores the potential of social media as a tool for fostering deeper connections and strengthening critical thinking.

Furthermore, "social media fosters the democratisation of education by providing learners with access to global resources and expertise, thereby creating opportunities for innovative learning practices" **(**Veletsianos & Kimmons, 2015). Such platforms, including Facebook, LinkedIn, and Twitter, support real-time discussions, collaborative projects, and knowledge-sharing. As Greenhow and Lewin (2016) note, "The adoption of social media in education enables not only skill development but also the cultivation of digital literacy critical for professional and personal growth." However, integrating social media into learning environments is not without its challenges. Scholars such as Manca and Ranieri (2016) argue, "While social media promotes collaboration, educators must address concerns regarding digital distractions, privacy risks, and unequal access to technology."

Addressing these challenges requires a balance between leveraging the advantages of social media and mitigating its limitations. This paper seeks to analyse the potential of social media as a learning tool by synthesising existing research, offering a theoretical framework, and outlining its implications for modern educational practices.

Contextual Framework

The use of social media in education has emerged as a significant paradigm shift, integrating theoretical constructs such as collaborative learning, 'connectivism,' digital literacy, and self-regulated learning. Collaborative learning, as Greenhow and Lewin (2016) note, is supported by social media's ability to "foster interactive engagement and teamwork through virtual group discussions and shared projects." This aligns with the Theory of 'Connectivism,' which Siemens (2005) describes as "a learning theory for the digital age where knowledge resides in the connections between individuals and information nodes."

Digital literacy is another critical construct in the framework, addressing the competencies required for effective participation in online learning environments. According to Manca and Ranieri (2016), "Social media can enhance digital literacy by promoting skills such as information evaluation, communication, and online etiquette." These competencies are essential for navigating the complexities of collaborative and networked learning spaces. Self-regulated learning also plays a pivotal role, as learners on social media platforms must manage their goals, motivation, and progress. Tess (2013) emphasises that "social media enables learners to take ownership of their education by providing flexible and personalised opportunities for growth." However, these opportunities are often mediated by factors such as accessibility, privacy concerns, and digital distractions. As Kimmons and Veletsianos (2012) argue, "Integrating social media into education requires a nuanced understanding of its theoretical underpinnings and practical implications for learners and educators."

The integration of social media into educational practices is grounded in several theoretical constructs, including collaborative learning, digital literacy, connectivism, and self-regulated learning. Collaborative learning, as Greenhow and Lewin (2016) state, "encourages group interactions and shared responsibilities, allowing students to engage in meaningful peer discussions and co-create knowledge." This is further supported by the theory of connectivism, which Siemens (2005) describes as "a learning model emphasising the significance of networks where knowledge is distributed across various connections." Digital literacy is central to the effective use of social media in education.

As Manca and Ranieri (2016) note, "Social media provides a unique platform for learners to develop critical digital skills such as content evaluation, effective communication, and ethical online behavior." This construct highlights the need for learners to possess the skills necessary to navigate an increasingly digital landscape. Self-regulated learning is also an essential theoretical perspective in this framework. Tess (2013) argues that "social media tools enable students to personalise their learning experiences, fostering autonomy and intrinsic motivation for academic growth." However, challenges such as privacy concerns and unequal access to technology must also be addressed to maximise the potential benefits of social media in education. By synthesising these theoretical constructs, this framework demonstrates how social media serves as a transformative tool in education.

Kimmons and Veletsianos (2012) emphasise that "the integration of social media requires a balanced approach, ensuring its benefits are harnessed while mitigating its risks for learners and educators alike." Together, these constructs form the basis for a contextual framework that explains how social media enhances education by enabling interaction, resource-sharing, and global connectivity.

Empirical Review

The integration of social media into educational settings has been the subject of extensive empirical research, particularly within the Ivy League institutions. This review examines ten evidence-based studies that explore the impact of social media as a learning tool, highlighting key findings and their implications for educational practices. (Junco et al., 2011). This study investigated the influence of Twitter on student engagement and academic performance. The findings revealed that students who actively used Twitter for academic purposes exhibited higher engagement levels and improved grades compared to non-users. The authors concluded that Twitter can be a powerful tool to enhance student engagement and learning outcomes.

- The comprehensive survey by Smith and Caruso (2010) examined undergraduate students' use of information technology, including social media, in their learning processes. The study found that "a significant number of students leverage social media platforms to collaborate on academic projects and communicate with peers," suggesting the potential of these tools to support collaborative learning.

- Through a literature review, an article by Tess (2013) explored the integration of social media in higher education. The author noted that "social media platforms offer unique opportunities for enhancing student engagement and facilitating communication between instructors and students," while also cautioning about potential distractions.

- The study by Moran et al. (2011) surveyed faculty members across various institutions, including Ivy League universities, to understand their use of social media in teaching. The results indicated that "over 80% of faculty use social media for some aspect of their course," highlighting its growing acceptance as a pedagogical tool.

- The experimental study by Junco, Elavsky, and Heiberger (2013) assessed the effects of Twitter on student collaboration and success. The authors found that "Students who participated in Twitter discussions were more likely to collaborate and had higher academic success rates," emphasising the platform's potential to foster collaborative learning environments.

- Dabbagh and Kitsantas (2012) explored the relationship between personal learning environments and social media, finding that "social media tools support self-regulated learning by enabling students to set goals, monitor progress, and reflect on outcomes," thereby bridging formal and informal learning contexts.

- A study by Chen and Bryer, T. (2012) examined instructional strategies for incorporating social media into learning environments. The findings suggested that "when effectively integrated, social media can enhance both formal and informal learning by promoting active participation and knowledge sharing."

- The research by Veletsianos and Navarrete (2012) investigated learners' experiences with online social networks in formal education. The authors reported that "students engaged in meaningful learning activities and developed a sense of community through the use of social networks," supporting their use as formal learning tools.

- Ahern et al. (2016) explored how social media use correlates with social capital among university students. The results indicated that "active engagement on social media platforms is positively associated with the development of bridging social capital," which can improve learning through expanded networks.

- Gikas and Grant (2013) examined students' perspectives on learning with mobile devices and social media. The findings revealed that "students appreciate the flexibility and accessibility

provided by mobile devices and social media, which support timely communication and access to course materials."

Collectively, these studies underscore the transformative potential of social media in higher education. They underscore its capacity to enhance student engagement, facilitate collaboration, and support self-regulated learning. However, they also caution educators to be mindful of potential challenges, such as distractions and the need for clear guidelines to maximise the benefits of social media as a learning tool.

Survey of Related and Relevant Literature: Beyond the Classroom—the Power of Social Media in Education

The role of 'social media' as a 'learning tool' has been extensively examined in academic literature. A comprehensive review of 15 published articles, each summarised with italicised citations is provided.

- Alsayed and Pathan (2023) conducted a systematic review analysing the application of social media in higher education, highlighting its effectiveness in enhancing student engagement and learning outcomes.
- Al-Rahmi et al. (2015) explored the use of social media platforms by graduate students, emphasising their experiences and the impact on their learning processes.
- In a subsequent study, Al-Rahmi et al. (2017) investigated the influence of social media usage on students' academic performance, focusing on perceived usefulness and improved communication.
- Manca and Ranieri (2013) reviewed the literature on the use of Facebook as an educational tool, discussing its potential benefits and challenges in the learning environment.

- Kassens-Noor (2012) examined the incorporation of Twitter and blogs into undergraduate courses, assessing their impact on student engagement and learning.
- Ellison et al. (2007) explored the relationship between social media use and social capital among university students, highlighting the role of online interactions in academic contexts.
- Tess (2013) analysed the use of social media as a tool for learning across multiple disciplines, emphasising its impact on student engagement and knowledge acquisition.
- Mensah and Nizam (2016) examined the influence of social media on students' academic achievement, considering various factors that affect learning outcomes.
- Hamid et al. (2015) assessed the use of social media platforms by students for educational purposes, evaluating their effectiveness in supporting learning activities.
- Greenhow and Lewin (2016) offered a critical review of literature on social media's affordances in the classroom, discussing its potential to enhance learning experiences.
- Cheston et al. (2013) investigated the use of social media as a learning tool among medical students, evaluating its impact on their academic performance.
- De Wever et al. (2006) explored the role of social media in enhancing collaborative learning among students, with a focus on communication and knowledge sharing.
- Redecker et al. (2009) examined the use of social media platforms for informal learning, discussing their potential to complement formal education.

- Junco et al. (2011) analysed the effectiveness of social media as a tool for learning in higher education, incorporating various pedagogical approaches.
- Chen and Bryer (2012) further investigated the use of social media in educational settings, focusing on its impact on student engagement and learning outcomes.
- Zaidieh (2012) emphasised that "while social networking sites offer numerous opportunities for educational growth, they also present challenges such as distractions and the risk of decreased academic focus" (p. 20).

Research Gaps on Social Media as a Learning Tool

While extensive research has explored the role of social media in education, several critical gaps remain that warrant further investigation. For instance, there is limited understanding of "how the integration of social media into formal curricula affects long-term learning retention and cognitive development" (Alsayed & Pathan, 2023). The impact of diverse cultural and socio-economic contexts on the adoption and effectiveness of social media as a learning tool also remains underexplored.

As noted by Al-Rahmi et al. (2015), "the majority of studies focus on developed nations, leaving gaps in understanding the challenges faced by learners in developing regions." The nuanced roles of specific social media platforms in fostering collaborative versus individual learning also require deeper analysis.

Manca and Ranieri (2013) observed that "most studies provide a generalised view of social media, without addressing platform-specific affordances and limitations." Furthermore, there is a lack of empirical studies evaluating "the potential negative consequences of excessive reliance on social media for educational purposes, such as digital

fatigue and reduced critical thinking" (Ellison, Steinfield, & Lampe, 2007).

Another underexamined area involves the influence of instructors' digital literacy and pedagogical approaches. As Tess (2013) emphasised, "the role of instructors' digital literacy and pedagogical strategies in maximising the benefits of social media in classrooms" remains insufficiently explored. In support of this, Hamid et al. (2015) argue that "future research must investigate how educators can tailor social media use to align with specific learning objectives and diverse student needs."

Finally, Cheston et al. (2013) draw attention to the need for longitudinal studies to assess "the sustainability of learning outcomes achieved through social media integration over extended periods.

Trends and Future Directions on Social Media as a Learning Tool

- The integration of social media into education has undergone a significant evolution, leading to the identification of emerging trends and prospective future directions. Recent studies underscore "the growing role of Artificial Intelligence (AI) in personalizing social media-based learning experiences" (Zawacki-Richter et al., 2019). AI-driven tools such as chatbots and adaptive learning systems embedded within social media platforms provide fresh opportunities for "tailoring content to individual learners' needs and preferences" (Tang et al., 2020). Their study introduces a neural model that employs dynamic propagation structures to improve rumour detection on social media. By integrating structural representations and content features into a unified framework, they demonstrate improved accuracy in identifying misinformation across real-world datasets.

- Another promising development is the integration of immersive technologies. "Leveraging immersive technologies, such as

augmented reality (AR) and virtual reality (VR), in conjunction with social media for experiential learning" is gaining traction, particularly in STEM disciplines (Greenhow & Chapman, 2020). These technologies develop interactive and engaging environments that deepen conceptual understanding.

- Looking forward, the focus is expanding toward "building cross-disciplinary collaborations to explore how social media can bridge gaps between formal and informal learning contexts" (Kimmons & Veletsianos 2013). Furthermore, "social media platforms are increasingly being used to promote global citizenship and digital literacy among students," indicating a shift towards more civic-oriented educational goals.

This underscores the urgent need to establish clear guidelines and safeguards to protect student privacy and promote ethical technology use in educational contexts.

Takeaways from the Article

This article has presented several critical insights and practical implications regarding the role of social media in education. Key takeaways include:

- *Collaboration and Engagement*: social media facilitates active learning by fostering "collaborative environments where students and educators engage in meaningful exchanges of ideas" (Manca & Ranieri, 2013).
- *Personalised Learning*: Platforms such as Facebook and LinkedIn enable tailored educational experiences, allowing students to "customise their learning pathways and access diverse resources" (Tess, 2013).
- *Bridging Formal and Informal Learning*: social media effectively integrates formal education with informal learning opportunities by

offering "an ecosystem where learners can connect with peers and experts beyond classroom walls" (Greenhow & Chapman, 2020).

- *Technological Affordances*: The incorporation of emerging technologies like AI, AR, and VR into social media platforms is "revolutionizing the way educational content is delivered and experienced" (Zawacki-Richter et al., 2019).
- *Future Opportunities*: There is a growing emphasis on "leveraging social media for global citizenship, cross-disciplinary learning, and fostering digital literacy skills" (Kimmons & Veletsianos, 2013).
- *Instructor's Role*: Educators serve a pivotal role in "curating and guiding the effective use of social media, aligning it with pedagogical objectives" (Hamid et al., 2015).

These takeaways underscore the transformative potential of social media in reshaping educational paradigms while also acknowledging the complexities and responsibilities inherent in its implementation.

Concluding Comments

Leveraging the transformative potential of social media platforms has become a strategic imperative for Higher Educational Institutions in India. These platforms enhance collaboration, foster active engagement, and enable personalised learning, thereby creating dynamic educational ecosystems that transcend traditional classroom boundaries. The integration of advanced technologies, including Artificial Intelligence (AI) and immersive tools like Augmented Reality (AR) and Virtual Reality (VR), further enriches the learning experience by offering tailored and interactive environments.

Nevertheless, several critical challenges persist—particularly concerning data privacy, digital fatigue, and unequal access—which must be systematically addressed to ensure inclusive and effective implementation. The evolving role of instructors as curators and

facilitators highlights the necessity of pedagogical competence in aligning social media use with instructional goals.

Looking forward, a concerted effort among stakeholders is required to deepen research into the ethical dimensions, cross-disciplinary applications, and global implications of social media in education. As the educational landscape continues to evolve, social media will undoubtedly remain a key catalyst in reshaping pedagogical paradigms—provided its integration is guided by thoughtful strategies, empirical evidence, and ethical responsibility.

While social media holds immense promise as an educational enabler, its true potential can only be realised through a balanced approach—one that embraces innovation while remaining cognizant of its limitations. Continued research, policy formulation, and instructional innovation will be vital to fully harness its benefits and mitigate associated risks.

Summary Thoughts

There is no denying that social media platforms can be effectively integrated into educational settings, fostering collaboration, learner engagement, and personalised instruction. These platforms provide dynamic spaces where students and educators interact beyond the constraints of traditional classrooms, thereby enabling informal learning and enriching peer-to-peer exchanges. The incorporation of emerging technologies—such as Artificial Intelligence (AI), Augmented Reality (AR), and Virtual Reality (VR)—further amplifies these benefits by facilitating adaptive and immersive learning environments.

However, for social media to be effectively utilised in education, it is imperative to address critical challenges, including data privacy concerns, digital fatigue, and unequal access to technology. The growing responsibility of educators in guiding and curating social media use underscores the need for pedagogical alignment and

instructional purposes. Moving forward, social media is poised to play a pivotal role in shaping the future of education, particularly through its capacity to support global learning networks and cross-disciplinary collaboration.

Ultimately, while social media offers immense promise for improving educational outcomes, its successful integration depends on a thoughtful approach—one that balances innovation with ethical awareness and inclusivity. Ongoing research and reflective practice will be essential to fully harness its potential while mitigating its limitations.

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COLLABORATIVE LEARNING: GROUP DYNAMICS AND PEDAGOGICAL STRATEGIES IN THE DIGITAL AGE

Chalamalla Venakateshwarlu*

Abstract

In the new age of collaboration, group dynamics, peer impact, and digital strategies have all played a major role in collaborative learning pedagogy. With the rise of digital platforms and digital learning environments, students can work together on projects and assignments in new and exciting ways that allow them to share knowledge, build collaborative problem-solving skills, and foster critical thinking. Thus, this paper could be seen in a less post-human way trying to figure out what happens with group dynamics in collaborative learning and how technology contributes to the factors of communication, involvement, and learning outcomes. Drawing on effective pedagogies that promote collaboration (e.g., role-based learning, peer assessment, and project-based activities), this paper explores educators' opportunities to enable meaningful teamwork within digital and hybrid classrooms. The study also explores issues like unequal participation, digital fatigue, and adaptive instructional designs. These findings inform the broader discourse surrounding digital pedagogy by shedding light on improved collaborative learning experiences in education today. Collaborative learning methodologies have transformed with the advent of digital education, allowing for group work to become more dynamic, flexible, and even applicable beyond geographical boundaries. In contrast to traditional classrooms, digital collaborative learning employs IT tools for discussion, interaction, and co-creation of knowledge. Tools like Google Classroom, Microsoft Teams, and Moodle support synchronous and asynchronous collaboration, which empowers students to work on

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group assignments, peer reviews, and share knowledge beyond the walls of a traditional classroom. The group dynamics are critical for the collaborative learning success. The qualities of interactions between students, the collaborative division of tasks, and the modes of peer interactions are among the most salient features that shape learning in groups. However, there are challenges such as motivational hurdles, differences in digital skills and the challenge of keeping people involved in a virtual environment. This research aims to investigate the convergence of collaborative learning, group dynamics, and digital pedagogy, scrutinising how technological progress has facilitated or obstructed collective learning processes.

Keywords: *Collaborative Learning, Group Dynamics, Digital Pedagogy, Online Education, Peer Interaction, Technology-Enhanced Learning, Cooperative Learning Strategies, Virtual Classrooms*

Introduction

As technology continues to evolve and the world becomes more digitalised, education has been permanently changed. This shift responds to growing expectations to equip students for a connected, technology-driven world in which collaboration is crucial—whether on-location or virtually. Furthermore, a study by the Ministry of Education in India in 2020 revealed that 85% of K-12 teachers in the country have adopted digital collaboration platforms as a way to facilitate student learning and improve student involvement. Digitally transformed learning spaces also break down geographical boundaries, enabling students from different backgrounds to engage in collaborative learning.

Collaborative learning is a student-centred pedagogical method that encourages active learning, knowledge sharing, and teamwork. This model revolves around collaborative efforts, requiring students to work on various tasks, projects, and assignments in groups while utilising shared resources to achieve joint learning outcomes, unlike rote learning. It goes beyond just self-learning, fostering conversations

and critical exchanges that lead to co-creation. Such collaborative learning promotes cognitive development, communication skills, and social-emotional learning opportunities as students learn to appreciate the perspectives of others. Further, it is amplified through structured peer instruction, cooperative learning, role-playing projects, and digital interfaces, including electronic whiteboards, learning management systems, and AI-mediated tutoring platforms.

Collaborative learning emphasises teamwork and joint academic success, whereas group dynamics explores the psychological, emotional, and social interactions that take place in such groups. A great group environment can improve motivation and lower learning anxiety, among other things. Johnson and Johnson (1994) points out that positive interdependence in groups promotes academic success and understanding of subject matter, with students feeling responsible for their own learning as well as the learning of others. Group dynamics is the empirical study of how individuals interact, communicate, and influence one another in a group. Kurt Lewin's field theory works off the premise that individuals' actions are based largely on external factors, such as peers and social context. One can identify higher forms of energy as well as forms close to extinction, which are high on the scale of energy. Factors like roles in leadership, how to resolve conflict, and how decisions are made impact whether a learning environment is productive or not. Moreover, Vygotsky's socio-cultural cognitive developmental theory suggests that collaborative learning is achieved through social interactions that are cognitively demanding, thereby scaffolding students toward a deeper level of understanding through guided participation.

The use of technology has also redefined the landscape of collaborative learning. Whether through discussion threads on online forums, shared cloud document interaction or applications for real-time collaborative work like Google Docs, Microsoft Teams, and Zoom, students can communicate with their peers no matter where they are.

Online collaborative learning also brings unique challenges, including access to technology, differences in digital competency, and risks of passive involvement. Addressing such challenges calls for the educators to devise inclusive strategies that promote equal participation, encourage involvement, and leverage adaptive learning technologies to augment learning needs. Thus, this conjunction of learning of several in a joint means with group concept through is an innovative technique for that training standards to get again. Instead, this approach prepares students through critical thinking, social interaction and problem-solving for many of the skills required in the 21st century. Considering the ongoing evolution of digital platforms and collaborative technologies, as well as the future potential for further study, new strategies are emerging for integrating collaborative technology into face-to-face classroom learning. These strategies aim to provide equal, student-inclusive, and effective approaches to learning environments, whether in physical classrooms or online.

As early as 1944, Kurt Lewin described group dynamics as the study of how groups form, evolve, and react with other people, groups, and larger institutions. This branch of psychology studies the reciprocal influencing psychological dynamics occurring within groups leading to the shared perceptions as molded through emotions and experiences. Lewin's three processes that transform individuals into group members are: inclusion, collectivism, and identity change. Specifically, inclusion allows persons to move from outsiders to insiders by granting them membership in a group. Collectivism occurs when the interests of the collective are superseded by self-interests. Instead, identity transformation is when people internalise the qualities of a group into their self-concept, fusing their individual identity with that of the collective.

Collaboration, group dynamics and Vygotsky's Zone of Proximal Development (ZPD) are intertwined concepts that open new venues of learning. This is due to the significance of the difference between

independent learning and assisted learning (Vygotsky's Zone of Proximal Development). It takes advantage of this by encouraging interactions between peers with scaffolding, mutually helping each other progress in their Zone of Proximal Development (ZPD). Group dynamics are vital; good communication, support of one another and shared goals help create an environment in which learners can challenge and assist one another. Needless to say, including group dynamics observations into collaborative learning practices greatly improves education in general.

Review of Related Literature

Critical reviews have discussed collaborative learning, group dynamics, and pedagogical strategies in digital environments in several papers.

In 2023, Türkmen and Aydın performed a systematic review encompassing 54 studies on group metacognition in online and face-to-face learning environments. In their research paper, A Systematic Review of Group Metacognition Researches on Online Learning, they surveyed the development of group metacognition research and underscored the need for instructional designs that promote group awareness of knowledge and collaborative problem-solving skills among learners.

Lavanya, Kumari, and Padmambika conducted a 2024 study on Collaborative Learning in Digital Environments: Understanding the Dynamics of Group Learning, which focused on various aspects of collaborative learning, with respect to group dynamics and learning outcomes. Their study highlighted the importance of successful group formation and the use of technology to support communication and information exchange between learners.

Mena-Guacas (2023) did a systematic review with the title Collaborative Learning and Skill Development for Educational Growth of Artificial Intelligence. This study offers a longitudinal analysis of the application of artificial intelligence techniques in

collaborative learning across two decades and discusses the potential, in addition to the challenges, of collaboration to enhance learning in terms of sustainability, involvement, and deeper learning experiences.

Martin and Bolliger conducted a systematic review in 2021 that incorporated 10 years of previous studies on the collaboration of online learners. Their study of 63 articles reviewed the trends in publication, participant contexts, and research methods, and identified the correlation of effective collaborative technologies with design, facilitation, and outcomes in online learning environments. Maqtary, Mohsen, and Bechkoum (2019) conducted a systematic literature review on group formation methods used in computer-supported collaborative learning environments. Their work proposed taxonomies of group formation attributes and techniques, critiqued existing approaches, and suggested avenues for future research serving collaborative learning.

According to Centre for Teaching Excellence, Cornell University (2014), there are four basic tenets of collaborative learning: a focus on students as the centre for instruction; the need for active involvement and opportunity for peer-to-peer interaction; involvement in collaborative group work as the key learning vehicle; and the inclusion of real problems, solved with focused strategies. Building on this, Jin et al. (2011) published Dynamic Group Environment for Collaborative Learning (DGE/CL) to help students be better informed about making collaboration choices. Through Cluster Pattern Interface technology, this framework bridges the gap between improvised in-person interactions and digitally remediated printed materials, helping learners retain their accustomed physical resources while allowing them to enjoy the improvements achieved through digital technology. The benefits of group work include the development of critical thinking, problem-solving, and self-reflection skills, as well as the co-construction of knowledge (Chiong & Jovanovic, 2012). But they note that keeping up active participation in online communities is

challenging, partly because of variations in students' collaboration skills and competing demands on their time.

Building upon this, Mondal and Chellamani (2018) also mention that digital tools increase interactivity and enable information-sharing mechanisms while facilitating reflection and critical thinking processes, thus improving faculty and student academic performance. While an example of potential media influences on learning, Hoter (2020) takes this a step further, focusing her research on Virtual Reality (VR) and collaborative learning, finding that immersive virtual learning environments improve the involvement and interactivity of the student, leaving room for experiential learning opportunities.

According to Palloff and Pratt (2005), collaborative learning builds critical thinking and reflection and creates a sense of community, both of which are necessary for sustained student enthusiasm. Technology, they argue, can promote participation and accountability in collaborative contexts when well integrated. Also, Subramanian (2016) notes that peer-to-peer learning, which requires mutual respect and cooperation among participants, helps develop a collaborative learning environment where the use of technology is a key component and ensures a transfer of knowledge so that both individuals and groups can grow. To complement this perspective, Jaimini (2014) emphasises the need for understanding group dynamics to enable effective collaborative learning. She argues that teachers must be purposeful in their assessment of group interaction, examining behaviour both on the individual level and across groups so that students receive social and emotional skills in addition to domain-specific content knowledge. According to Sotto (2021), collaborative learning plays a vital role in students' academic performance, enhancing teamwork, knowledge, and skills. His findings suggest that male students may perform better in activities requiring higher levels of involvement, indicating that well-designed collaborative tasks can close this gap. Expanding on this idea, Idi et al. (2021) addressed critical thinking, emotional intelligence,

cognitive development, and open-mindedness in their theoretical model of collaborative learning. According to them, the combination of these elements creates a holistic learning environment that facilitates intellectual and social skills.

Kochis et al. (2021) note that while students acknowledge strategies for effective teamwork, they often struggle to initiate discussions about collaborative work. They suggest that educators emphasise students' responsibility for learning with peers and dedicate classroom time to organised reflections as a team. This is consistent with the findings of Uz Bilgin and Gul (2020), who found no significant difference in students' attitudes toward group learning between gamified and traditional-based groups. However, gamified groups demonstrated superior cohesion and received higher self- and peer-evaluation scores. Mena et al. (2023) explored the integration of AI in collaborative learning environments and found that AI technologies can personalise learning experiences, provide instant feedback, and promote equitable participation among group members. Extending previous work on digital collaboration, Building on research in adaptive learning, Hussain et al. (2025) emphasised that AI-driven systems improve collaborative learning by aligning tasks with students' strengths and learning styles, thereby streamlining group dynamics. Similarly, Godsk and Møller (2024) argue that thoughtfully designed digital support structures foster student autonomy while maintaining group cohesion, offering timely scaffolding to ensure effective collaboration in technology-enhanced learning environments. The method of collaborative learning evolves with every innovative technology integrated to optimise student involvement and assimilation. Although digital tools and structured processes improve the effectiveness of collaboration, access to technology, varying student motivation, and the need for structured guidance for students persist. Future studies should explore how emerging technologies such as AI can be integrated into tasks and how other technologies can enable access in

both physical and virtual classrooms to ensure inclusive, equitable participatory processes.

Impact of Collaborative Learning on Group Dynamics

Collaborative learning has a considerable influence on group dynamics in education as it develops in students critical communication, social and cognitive skills. Research proves that collaborative workplaces help to build group cohesion, increase motivation, and foster general performance. For the creation of a productive and supportive educational environment, there is a focus on positive aspects of group dynamics. The UNESCO report highlights several proven impacts of collaboration in education:

Student Involvement and Learning Outcomes: Collaborative learning maintains a vibrant and active classroom environment and promotes critical thinking, deeper understanding, and better retention of new information. It also develops social and communication skills by allowing students to engage with and learn from each other (UNESCO, IIEP Learning Portal).

Integration with Technology: Students can collaborate remotely, access diverse resources, and participate in activities that would be challenging to carry out in traditional environments thanks to the application of technology in collaborative learning. Yet, the report identifies challenges, which include digital inequalities and data privacy risks (2023 GEM Report, UNESCO).

Approach to Integration: A New Era of Learning

Even after October 2023, where AI has made its first impact, education is no longer limited to textbooks and classrooms as technology integration takes over collaborative learning and teaching. The power of digital resources has opened new vistas for educators and learners alike, allowing collaboration and interaction to become easier, faster, and more involving. Using technology, they transform

traditional classrooms into dynamic learning environments by involving the students actively.

Digital communication is among the essential features of technology integration in collaborative learning. Virtual meetings are facilitated with the help of video conferencing platforms where different people can connect to this platform and take part in group activities, discussions, debates, brainstorming, etc., in real-time. Whether in a day or over many years, technology does not have the limitations of time. Instant messaging applications, discussion forums, and similar tools offer space for continuous dialogue, and allow students to share their opinions and insights for further development or clarification. These tools play an important role in keeping connected and creating a community that is conducive to learning.

Cloud providers that allow sharing of documents and editing simultaneously are also key components of technology-driven collaboration. Collaborative online tools such as Google Docs, Microsoft OneDrive, and collaborative whiteboards also enable several people to work on the same document simultaneously and support cooperative learning through collaborative content production. This helps to make sure each person in a group is able to share their ideas, edit them even when others have viewed it already, and see who made what change, improving both collaboration and accountability. These kinds of tools break the constraints of time and geography and make group work more flexible and readily available.

Aside from self-directed learning, technology has also made it possible for collaborative learning to rise with the existence of collaborative resources via interactive learning management systems (LMS) to help structure course content, submission of tasks, and feedback systems. Learning Management Systems (LMS) like Moodle, Blackboard, and Google Classroom provide a structure for teachers to share content, track students' academic progress, and promote group discussion. Such systems encourage student participation with respect to the

course material, allowing for timely feedback and guidance from teachers, which adds value to the experience of learning.

Extending that experience using data analytics based on a participant-centric approach is also possible through artificial intelligence. AI-powered tools can assess student performance and suggest individualised learning paths so that each has help based on strengths and areas where they can improve. Automated feedback systems allow students to refine their work, and chatbots and virtual assistants provide immediate answers to questions, minimising delays in the learning process. Interactive digital instruments and gamification add an additional sport to the technology-built-in collaborative studying experience. Various game-based elements, including quizzes, leaderboards, and team challenges, are incorporated into platforms to encourage active involvement and collaboration among students for common goals. By using VR and AR applications, learners can immerse themselves and explore complex topics interactively. These technologies deploy learning in creative interactive experiences that reinforce their learning through experiential learning.

Technology supports collaborative teaching, but also the collaboration and professional development of teachers. Online communities, webinars, and digital workshops enable educators to share best practices, talk about pedagogical innovations, and fine-tune their teaching practice. Digital tools that enable collaborative research projects and co-teaching models enable teachers to jointly design curricula, share lesson plans, and assess student performance. These collaborative efforts enhance the education system as a whole and support students in receiving the most from their education. Another factor is technology which is necessary because it facilitates collaborative learning and teaching; however, there are also problems that have to be addressed with technology like digital literacy, access, and online involvement among others. It is important to have students and educators trained to use the technology effectively. Closing the

digital divide requires access to reliable internet connections and technologies. The teaching of digital etiquette and online collaboration skills as part of the digital citizenship initiative contributes to establishing a respectful and productive virtual learning space.

Technology facilitates collaboration and enriches the learning experience, making education more inclusive and involving, as well as adaptable to the unique needs of each learner. Technology is an essential tool in modern education that allows educators and learners to communicate from different geographical locations, exchange resources in real-time, or engage in significant dialogue. Collaborative learning experiences will be further enhanced through the ongoing development of digital tools, creating a more interconnected and knowledge-driven academic environment.

Case Studies

There have been some recent case studies on collaborative learning as well as digital pedagogical strategies in India. With universities from Western Switzerland HES-SO, a 2018 study was conducted in Symbiosis International University, India, where an online collaborative international learning programme was implemented. The programme was designed to improve cross-cultural understanding and collaboration between students of the two countries. Using digital platforms, participants formed joint projects and participated in virtual meetings and collaborative assignments. Designing activities that question prejudices, encourage teamwork, and promote intercultural communication was the key finding in this study showing that the programme was successfully implemented with intercultural communication competence and collaboration skills in the students.

One recent Indian undergraduate Computer Science assessment in 2023 shows that the digital assessments had an overall constructive impact on student motivation, peer learning, and group dynamics. The students even used different groups to cover different modules of the course and then knotted cords together to create YouTube videos to

convey their learning. The study was found to enhance peer learning and positively impacted group dynamics as a result of this process. Moreover, it strengthened students' ability to manage conflict, as they dealt with challenges together.

In 2024, Anurag University, Hyderabad, explored collaborative learning techniques for teaching Python programming among B.Tech Computer Science and Engineering students. The curriculum included strategies such as Think-Pair-Share, open problem-solving, quality circles, concept mapping, and web-based learning. (Sekhar & Goud, 2024). These strategies were shown to positively impact their involvement, understanding of programming concepts, and collaborative skills. In 2020, Gupta and Gupta made an empirical study on the influence of social media and mobile devices on collaborative learning at a university in eastern India. In surveying 360 students, the researchers evaluated usage as it impacted peer-to-peer and student-teacher interactivity in its study. Social media were found to improve collaborative learning through effective communication and sharing of resources, having a positive impact on academic performance.

A study six months later, in December 2024, investigated the effectiveness of blended learning in an Indian higher education institution. Researchers utilised Keller's ARCS model to explore learners' experiences, satisfaction, and feedback in a blended learning environment that included both online and face-to-face instruction. This study showed a dramatic and positive impact on student involvement, satisfaction, and overall learning outcomes.

Empirical studies in different educational contexts have increasingly explored collaborative learning in digital environments. A study of the ways in which master's students worked in small groups for a fully online course on philosophy of science, ethics, and research methods, conducted at a Norwegian university between February 2018 and May 2019 by a team of authors, provided further insights. (Gustavsen et al., 2022) Through six focus groups and 13 solo interviews, the study

identified three working processes: joint responsibility with flexible organization; individual responsibility with flexible organization; and individual responsibility without organization. The results highlighted that groups where individuals rotated responsibility and in which there was a structured method of working together experienced deeper learning outcomes, while groups that neither organised nor collaborated well struggled with being on the same page with each other and keeping involved in their work.

Another case study at Ørestad Gymnasium in Denmark looked at how students were working together on group work via Google Docs. The study included four high-achieving girls working in a group through an assignment for English class related to Douglas Coupland's novel Hey Nostradamus (Olesen, 2020). In this study, which combined video ethnography and screen recordings, it was found that digital collaboration enabled the online/offline conversation to flow seamlessly. Students were able to self-organise amidst the chaos, with a natural leader ensuring that things were moving along at a steady pace. The study emphasised how hybrid learning environments, made possible by digital support, encourage cooperative learning and stimulate involvement.

A simulation-based collaborative learning experience launched by HEC Paris in April 2024, dubbed '2050NOW,' brought together more than 300 stakeholders, including students, academics, and business leaders, to explore how their fields would look in the year 2050 (HEC Paris, 2024). The community-oriented programme aimed to tackle sustainability issues through multimedia simulations and collaborative problem-solving exercises. Participants also traversed virtual environments like a digital version of Kinshasa to analyse the long-term effects of business decisions. Experiential learning provided insights in certain areas such as understanding relationships between business and society, building collaborative skills, and creating sustainable business models. Findings and conclusions drawn from

these case studies illustrate the efficacy of digital pedagogical strategies and collaborative learning in revolutionising education in India and enhancing communication, involvement, and academic performance of students.

Initiatives and Policies in India

Various government initiatives and policies in India also promote collaborative learning in order to aid interactive and cooperative learning. NCERT integrates collaborative strategies in its curriculum and instructional materials, so students learn together actively. Likewise, the Central Board of Secondary Education (CBSE) expands its curriculum and evaluation systems through iterative processes in order to foster teamwork and education based on peers. The National Institute of Open Schooling (NIOS) emphasises and complements this concept by providing flexibility in terms of education where students are encouraged to work in groups, learn from each other, and engage with local activities to create a more shared learning experience.

NEP 2020 promotes holistic, integrated, enjoyable, and relevant learning, emphasising experiential learning, critical thinking, and higher-order thinking skills, collaborative learning, and multidisciplinary education. It emphasises the need for technology in education along with training teachers to create collaborative learning spaces. These advances are highly supported by the Digital India Campaign in creating better digital infrastructure across educational institutions, allowing technology to blend into collaborative learning seamlessly. National Digital Education Architecture (NDEAR) is a step to ensure that with a structured framework, students and educators can avoid some of the obstacles posed to them in the utilisation of digital resources and online platforms, therefore also leading to a more collaborative learning environment.

To help make collaborative education possible, some online platforms have been created. Courses are offered on Swayam in diverse areas and subjects, as well as fostering collaboration amongst users by using

discussion forums, peer evaluations, and group-based learning exercises. Diksha is another national platform that provides various learning materials, including interactive content, quizzes, and collaborative assignments to engage students better. It is a part of the National Institution for Transforming India, which works to promote a creative and innovative approach to entrepreneurship and establishes 'Atal Tinkering Labs (ATL)' which provide a platform to create hands-on, collaborative, and recreate projects for the students. On the other hand, schemes like the Rashtriya Madhyamik Shiksha Abhiyan (RMSA) and the Samagra Shiksha Abhiyan facilitate better learning at the secondary school level through interactive learning, effective teacher training, and curriculum design so that collaborative learning can be embedded as a premised form of teaching.

Digital media plays a crucial role in collaborative learning. Platforms such as Zoom, Microsoft Teams, and Slack facilitate synchronous communication and enable the real-time exchange of ideas so that learners can collaborate using shared workspaces and chat functionality. Furthermore, collaborative platforms like Google Workspace and Microsoft OneDrive enable users to work together on common documents at the same time, promoting accountability and productivity. Digital libraries, instructional websites, and multimedia resources effectively supplement the learning experience by providing students with access to a variety of educational materials. Learning management systems like Edmodo and Moodle promote collaboration through interactive assignments, discussion boards, and involvement-increasing features, improving the quality of participation and peer collaboration.

The learning process is made engaging and effective through gamification and simulations. Platforms like Kahoot! and Quizizz promote competition and teamwork by fostering collaboration while also reinforcing critical thinking skills.[77] Course management systems that include discussion boards, blogs, and wikis offer flexible

opportunities for asynchronous collaboration, allowing students to work at their own pace and respond in non-linear ways. Additionally, digital tools such as Turnitin and Peergrade help with peer feedback and assessment so that students can successfully elaborate and enhance their learning outcomes through constructive critique. Virtual Reality (VR) and Augmented Reality (AR) technologies, such as Google Expeditions and Nearpod VR, help foster collaborative learning by creating immersive, playful experiences that inspire critical thinking and teamwork.

Groups can be both productive and meaningful through collaborative learning experiences. Clearly identifying group objectives gives everyone a common understanding of what they should achieve and their individual responsibilities, resulting in less confusion and keeping everyone focused on collective goals. Promoting active participation allows every individual to bring their insights and talents into the mix, enhancing the collective output of the group. Assigning different roles helps in balancing tasks, distributing responsibility equally among all, leading to accountability at an individual level, ensuring no person dominates the group, and working towards an equal, enthusiastic learning environment.

Active listening is essential for effective collaboration, ensuring that all members feel noticed, seen, and respected. An environment of mutual recognition allows groups to reason together more effectively and accomplish tasks better. Using digital tools like shared documents, communication apps, and collaborative sites can improve coordination and task management to a great extent as this enables members to communicate and cooperate easily. It is essential to evaluate group progress to address differences before they take a toll on productivity. Effective feedback is one of the cornerstones of enhanced collaboration and productivity. New member feedback prevents groupthink by providing insight and recommendations on focused outcomes, which helps members evolve their contributions and build

stronger collaborative skills. Promoting self-reflection also reinforces collaborative learning by prompting participants to evaluate their participation, identify areas of improvement, and apply strategies for becoming more effective group members. It cultivates a learning environment where collaborative actions are responsive and influential across the entirety of the educational journey.

Conclusion

Collaborative learning is a strategy often implemented to improve educational outcomes and promote skill development like social interaction, critical thinking, and teamwork, and is laid down to promote inclusivity. This method creates an environment where education is not discouraged and students learn as a team. As such, enabling effective collaborative learning in the digital age is a major challenge for educators, requiring detailed planning, supervision and methods to influence group dynamics, and ensure fairness in participation. With the passage of time, all involved in education must consistently scrutinise the changing nature of these involvements and determine how best to utilise digital technologies to enhance educational opportunities. Locating the challenges of digital collaboration and optimising its potential for learning and being collaborative and therefore an appropriate culture of learning in education.

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IMPACT OF DIGITALISATION ON HIGHER EDUCATION: THE CONCEPT OF DIGITAL DIVIDE

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Abstract

The digitalisation of education led to digital divide that affected access to higher education, creating disparities between students belonging to different classes and different geographical locations. Students from rural areas and low-income groups faced challenges in accessing online learning platforms, digital libraries, and virtual classrooms, limiting their educational opportunities. The Covid-19 pandemic further highlighted these inequalities, as remote learning became essential. This article addresses the problem of digital divide and tries to find ways to reduce the gap, through government intervention, for ensuring equal access to higher education. It also studies the impact of introducing digitalisation and blended learning in education.

***Keywords**: Digital Divide, Online Education, Inequality, Equity in Education, Digital Literacy, Digital Infrastructure, Educational Technology*

Introduction

The onset of Corona virus opened up a plethora of problems in India leading to sudden suspension of all activities including running of educational institutes. Technology came to rescue in educational institutions especially in Higher Education institutions (HEIs). New methods of teaching were introduced. Teachers and students had to adapt to new technologies to continue classes. The necessity to use technology for attending classes raised issues among student community. Most of the students hailing from rural areas had issues of internet connectivity, data accessibility and accessibility of

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smartphones and laptops. This gave rise to the usage of the term, 'Digital Divide.' Digital Divide refers to the gap between individuals or communities who have access to modern information and communication technology (ICT) and those who do not. This divide seems to greatly impact access to technologies used in higher education thus affecting the ability of students to learn, engage, and succeed in their academic pursuits. As higher education institutions increasingly integrate digital learning resources, the disparities caused by the digital divide become more evident, necessitating urgent action to ensure equitable access.

The term digital divide originated in an unknown source in the middle of the 1990s and was first used officially by the US Department of Commerce's National Telecommunications and Information Administration (NTIA, 1999). [See Gunkel (2003)].

The article aims at understanding the effects of digitalisation of education in India; its effect on students of rural and urban areas. The study tries to find about the assumption on Digital Divide that it has been widening the gap between the haves and have nots. This article is predominantly based on secondary resources.

Scope and Significance

The study tries to understand the impact of digitalisation of education in India. The study tries to observe the impact of digitalisation of education on different sections of students cutting across socio-economic barriers. The study also tries to offer recommendations to make blended learning and use of ICT more inclusive thus reducing the gap of Digital Divide.

Framework for Understanding the Digital Divide

The digital divide is not a singular issue but rather a complex phenomenon influenced by multiple factors, including economic status, geographic location, education level, and technological infrastructure. It can be broadly categorised into three levels:

1. **Access Divide:** Access Divide means the differences in access to hardware, software, and internet connectivity. Lower-income families often struggle to afford the necessary devices and internet connectivity for accessing educational technologies.
2. **Usage Divide:** Usage Divide is the difference in the ability to effectively use digital tools and platforms. Rural and remote areas frequently lack the infrastructure for high-speed internet, making it difficult for residents to utilise digital educational resources. Rural and remote areas frequently lack the infrastructure for high-speed internet, making it difficult for residents to utilise digital educational resources. Most of the students studying in Government educational institutions cannot afford to have high speed internet facility.
3. **Quality Divide:** Disparities in the quality of internet services, digital literacy, and available support systems. Rural and remote areas frequently lack the infrastructure for high-speed internet, making it difficult for residents to utilise digital educational resources. Even the institutes that need to use digital equipment lack good internet facilities that makes digital education inaccessible to students in rural areas.

The combination of these divides results in unequal opportunities for students in higher education, making it essential to examine its consequences and potential solutions in depth. In terms of access, the research on digital divide can be categorised into four types of access: motivational, physical, skills, and usage (van Dijk, 2006). However, this study highlights the accessibility of digital equipment to students in higher education in India which is leading to marginalisation of the marginalised. To understand this in Marxist terminology, we can infer that education is becoming more and more capitalistic by increasing corporatisation of education.

Methodology

The study is based on review of secondary sources and newspaper articles. It has examined the impact of digitalisation of education in foreign countries in comparison with India. The study focuses on identifying the reasons behind the digital divide in rural and urban higher education institutions. It explores various perspectives on the causes of this divide and also suggests strategies to help bridge the gap.

Digitalisation of Higher Education—Digital Divide

Digitalisation of Higher Education led to several challenges in various countries. However, there is an unambiguous difference between the use of digitalisation in developed, developing and underdeveloped countries. While the developed nations were able to reap its benefits the underprivileged nations had to struggle with the problems encountered. Some of the problems highlighted by the studies conducted are as follows.

Limited Access to Online Learning Platforms

Many higher education institutions have transitioned to online learning platforms, but students without reliable internet access or appropriate digital devices struggle to participate fully. This digital gap disproportionately affects students from low-income backgrounds and rural areas, limiting their ability to access course materials, attend virtual lectures, and submit assignments on time. Studies have shown that students in underprivileged communities often rely on outdated devices or public internet access, which can be inconsistent and unreliable.

Limited access to digital resources can result in a poorer quality of education, as students are unable to participate in interactive and multimedia-rich learning experiences. As per India Development Review (2023), access to the internet through any kind of device was found to be far better in urban India at 44 percent than in rural areas at 17 percent. Scheduled Castes and Scheduled Tribes accounted for

only 4 percent of students who had access to a computer and the internet. The richest 10 per cent has access to both digital appliances as well as internet facilities. Students mostly from the third world countries lack resources. Adnan and Anwar (2020) found that online learning may not produce desired results in underdeveloped countries such as Pakistan, where most students lack internet access due to technical and financial problems. The same applies to India and other third world countries.

Equity in Education: The digital divide exacerbates existing educational inequalities, as disadvantaged students fall further behind their more privileged peers. Nikore (2022) found an income-based digital divide between households. They also specifically raised the issue of gender gap in accessing mobile phones and internet. Nikore claimed that during Covid when most of the teaching learning process went online, boys were more favoured rather than girls. Urban area (61%) is found to be more digitally literate rather than rural areas (25%). Lack of skills also hampers equity in education.

Teacher Preparedness: Digitalisation of education has affected teachers as well. Teachers need to integrate digital tools into their teaching for practicing teaching. They need training in utilising ICT for educating students. A lack of resources hampers their ability to provide a modern, engaging education. Teachers are adapting to the new ways of classroom teaching with the help of innovative methods. Technology has been supporting them in bringing in the knowledge and information from all the possible resources available.

Hortovyani and Ferincz (2015), suggested that successful integration of technology in the classroom depends on the teacher's perception about using technology with the teaching. Attitude of the teacher also plays an important role in analysing the use of ICT by teacher. There are technology savvy teachers who try to adapt themselves to changing technologies and there are teachers who are rigid and resist change.

The Indian government has also been collaborating with tech players like Microsoft and Dell Technologies. India's All India Council for Technical Education (AICTE) has partnered with Microsoft on the Microsoft Learn for Educator (MSLE) platform. The platform empowers learners and educators with future-ready skills. Sharma (2021) emphasises the importance of training the teaching faculty on use of technology in classroom. She reiterated Government's commitment to train teachers by collaborating with different technological giants in the field of education. The objective is to improve the digital literacy of the teachers and bridge the digital divide in the country.

Institutional Challenges: Higher education institutions must invest in technology infrastructure and support services to bridge the digital divide among their student populations. This can be a significant financial burden, particularly for underfunded institutions. Use of ICT in Institutions starts with the use of ICT in administration. Teaching and Learning process has shifted from classroom to online mode. Even after the end of covid, the mixed mode of teaching is being carried on. Learning has become student-centred with teacher acting as mentor. Traditional learning is displaced by computer-based learning which makes learning more feasible. Research became easier because of availability of plenty of material online. Institutes of higher learning also started contributing to the economy through innovation. The institution had to face significant challenges in terms of pecuniary inputs.

A review of different sources either papers published in journals or working papers of different prestigious institutes gives us insights into different perspectives. It is observed that the ICT is supported for a more inclusive approach whereby a student can get access to online education wherein he can have access to lectures by renowned scholars. But there is problem with the availability of infrastructure.

The following points are observed in the course of study of different papers published.

1. It is observed that a significant proportion of students in rural areas experienced connectivity issues due to the lack of broadband infrastructure apart from absence of devices. This sabotaged learning process thus making rural students unable to participate in real-time.
2. Even when students have access to technology, differences in digital literacy levels create barriers. Some students may not have prior experience using educational software, research databases, or collaboration tools, making it difficult for them to keep up with coursework compared to their digitally proficient peers. Digital literacy includes skills such as:
    - Navigating online learning management systems (LMS)
    - Conducting research using digital libraries
    - Utilising communication tools like email, video conferencing, and discussion forums
    - Understanding cybersecurity and data privacy principles

Educational institutions must recognize the importance of digital literacy and integrate training programmes to help bridge this knowledge gap.

Financial Constraints on Technological Resources

The cost of devices such as laptops, tablets, and high-speed internet can be a significant burden for financially disadvantaged students. Higher education institutions often require students to use specialised software or hardware, further widening the gap between those who can afford these resources and those who cannot.

Many universities have implemented financial aid programmes, device lending schemes, and subsidised internet packages to assist students in

need. However, these measures often fall short of addressing the full scale of the problem. A long-term approach would involve collaboration between educational institutions, governments, and private companies to ensure sustained access to digital resources.

Impact on Academic Performance and Engagement

Students facing digital divide challenges often experience lower academic performance due to difficulties in accessing essential resources. Dumford et al. (2018) say that they may also struggle with engagement in collaborative projects, virtual discussions, and research activities, leading to isolation and reduced participation in academic communities. As there is a divide in students coming from disadvantaged sections and the advantaged, separated by economic conditions, class and other criteria, it is observed that students coming from economically disadvantaged groups cannot cope with the competition thus leading to lower academic performance. The students who studied in mother tongue have been facing further disability as there is a language barrier since most of the lectures available online are in English.

Psychological and Emotional Impact

The digital divide not only affects academic performance but also contributes to mental stress (Mahmood, 2016). Students who constantly struggle to keep up with their peers due to technological limitations may experience anxiety, frustration, and a sense of exclusion. The students who are techno savvy and for whom there is availability of laptops and those who are skilled in operating computers and laptops are in better position while rest of the students faced psychological problems in their effort to meet up to the expectations. Lack of social interaction among students, poor communication, lack of ICT resources impact learning outcomes. Therefore, a supportive learning environment is needed.

Institutional and Policy Interventions to be made

To bridge the digital divide, educational institutions and policymakers must implement solutions such as:

1. **Providing free or subsidised internet access and digital devices** to students in needed. Governments may tie up with companies to provide affordable devices and internet plans for low-income families. At the institutional level, the student to computer ratio may be such that all students can have access to internet facilities during leisure hours.

    - **Offering training programmes on digital literacy** to ensure all students can effectively use educational technologies. A general observation among college students about digital literacy is that students pursuing sciences are more skilled in using digital applications rather than students pursuing courses in social sciences. However, the middle class who have access to digital devices in household have no problems because the Gen Z students who are born after 1996 are characteristically not allergic to technology.

    - **Integrating hybrid learning models** that combine digital and traditional teaching methods to accommodate all students. Blended learning has to be incorporated in educational institutes.

2. **Training to Teachers should be provided** for making teaching online easier for educators. Teachers may be trained to make them adapt to use of technology in education system. The constant need to keep updating with the new innovations makes it an overwhelming experience for the teachers.

Conclusion

Digitalisation of education helps students receive quality education at their door step enabling access to lectures from prestigious universities

as well as making available material for students. Muthuprasad et al. (2021) studying about 'Students' perception and preference for online education in India during the Covid-19 pandemic' felt that digital education enhances the skills of students, but it is also reiterated that digitalisation of education imposes a significant challenge to equitable access to higher education.

Digitalisation of education brought in issues that requires a collaborative effort from educational institutions, governments, and technology providers to ensure that all students, regardless of their socioeconomic background and sex can benefit from digital learning opportunities. More inclusive policies may be formulated for improving digital literacy by investing in infrastructure development and minimise digital divide and thus reduce the digital divide in HEIs.

The digital divide is caused due to digitalisation of education which involves access to technology and internet which is controlled by capitalist structures. While the developed nations struggled through during early 2000 when computerisation spread rapidly in the West, it is experienced in the developing nations much later. Students in wealthier nations and wealthier students in third world countries seem to have better access to digital education compared to marginalised groups of the third world countries.

Looking at the whole scenario in the Marxist perspective, it can be seen as Capitalism at work because the companies producing digital technologies prefer profit rather than equal access. The whole system exacerbates the class differences by making online learning more accessible to the wealthy rather than to the underprivileged class.

Apart from bringing the changes in the form of digitalised education, there is a need to shift from profit driven nature of digital access to promotion of digital education among children.

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SOCIAL MEDIA TRANSFORMING HIGHER EDUCATION BEYOND LIKES AND SHARES

Priyanka Joshi* & Dinesh Kumar♦

Abstract

The use of social media in higher education has changed the way we think about education, promoting collaboration, professional connections, and sharing of information. This research article delves into ways social media can affect higher education, encourage collaboration among teachers, and increase student participation. It investigates how informal and experiential learning can be supported by social media while looking at the problems that come along with the use of social media in academic world. The literature review and theoretical examination emphasise the power of social media in encouraging collaborative learning and instant sharing of information and communication among professionals. Social media platforms such as Facebook, YouTube, X and LinkedIn have enhanced collaborations and communication along with addressing the gap between formal and informal learning set ups. It also emphasises the significant role of social media in encouraging critical learning skills and enhancing digital literacy for both students and educators. This article also discusses various adversities such as false information, concerns about privacy and diversions caused by digital content that hinder the effective use of social media. It stresses on the need for the establishment of strict policies and rules by institutions to ensure the structured and responsible use of social media to enhance learning. The outcomes suggested that social media is not just a resource; rather, it enhances learning when used responsibly. This article also

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accentuates the requirement for thorough research dealing with the long-term impact of social-media aided learning in relation to student performance, scores and institutional guidelines. With the increasing adaptation of digital trends among institutions, it is important to understand the effect of social media on teaching strategies that can nurture more engaging, inclusive, and effective learning.

Keywords: *Social Media, Higher Education, Engagement, Collaboration, Technology, Learning, Digitalisation, Innovation***Introduction**

Advancements in online learning has completely changed the working practices of Higher Education. Today social media has become an indispensable resource for knowledge sharing, academic collaboration and professional networking rather than being used only for fun and to be connected with friends and family (Ahmed et al., 2018). Social media, conventionally regarded as a medium for social ties, has now turned into essential tool for educators as well as learners by encouraging active learning, boosting participation and helping them in improving their skills and communication. This change is driven by the rising use of digital tools in academia, especially as colleges and universities seek to develop more interactive and student-centred learning experiences (Zhou et al., 2024). Higher education institutions have now begun to notice how different social media platforms like YouTube, Facebook, LinkedIn etc can scaffold both informal and experiential learning considering these platforms enable teachers and students to share ideas, discuss and analyse research findings and to develop competencies and expertise. These platforms make collaborative learning and teamwork effortless by connecting people around the globe for worldwide discussions, engagement and digital globalisation (West et al., 2024). Integration of social media in academics have made it easier for students in accessing a diverse range of educational material and to have more personalised, adaptable and enjoyable learning experience.

Due to technological advancements and increased reliance on digital resources a shift has taken place from traditional formal classrooms to digital, blended classroom learning as social media platforms have emerged as an alternative for real-time peer group discussions and collaboration. Research have shown that social media platforms when used effectively not only help to change the student-teacher interaction and mentorship dynamics but also to boost academic participation and digital literacy (Kazmi et al., 2024). Covid-19 pandemic had further highlighted the importance of social media in the academic sphere particularly in those institutions that do not have a resilient Learning Management System (LMS). Numerous students and educators have used platforms like YouTube tutorials, WhatsApp groups, Facebook groups, etc., to keep up with their learning pursuits and to enable virtual learning during those difficult times. This versatile nature of social media shows that in difficult times it can effectively support conventional teaching-learning methodologies by supporting remote and self-directed learning (Dharmarathne, 2024).

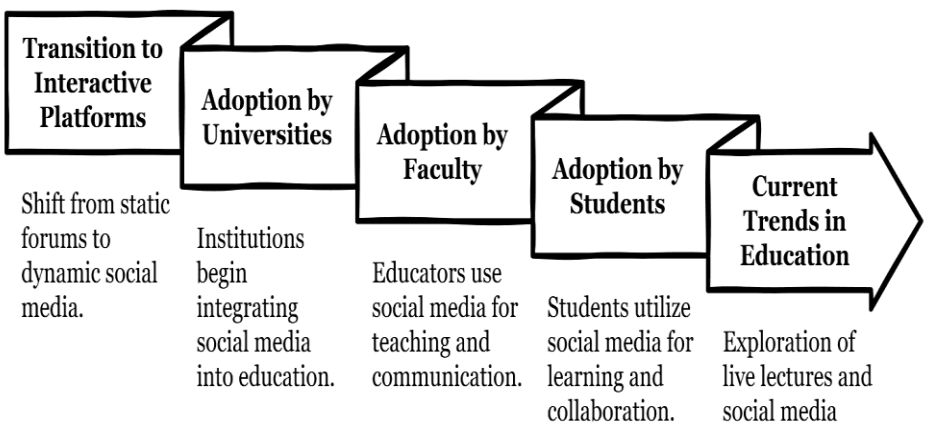
This research article explores the role of social media platforms in reshaping higher education. Based on review of existing literature, scholarly articles, case studies and comparisons this article tries to present a comprehensive picture highlighting the influence of social media on academic activities and practices. Delving deeper, the article further discusses the pros and cons of using social media in academics and also the most effective way of utilising social media in educational set-up to comprehend how social media is transforming the higher education landscape. This research article aims to comprehend that when used wisely social media paves the way for better learning experiences with improved student collaboration and virtual participation.

The article is organised in sections discussing theoretical perspective of social media in academic field, various social media platforms, about using it for teaching-learning, challenges and ethical concerns and what

the future holds for social media in higher education. This research article further demonstrates the fact that there is need for careful and thoughtful incorporation of social media in academics. It also points out the fact that social media is not just about communication; but when used properly it can boost collaborative learning, help faculty development and prepare students for the digital job market (Mamsaoui & Harrizi, 2024).

Evolution of Social Media in Education

The world of digital education has undergone a significant change due to the advent of social media. It has moved from simple online learning sites to lively, vibrant, interactive platforms. Previously, tools like discussion forums and learning management systems (LMS) mainly allowed asynchronous communication, i.e., allowing students to communicate at different times, which offered few chances for real-time interaction. Nevertheless, with social media becoming popular, education has become more engaging and collaborative experience allowing learners, educators, and institutions to connect in a much more interactive way (Zhou et al., 2024).



Transition from Traditional Online Learning Forums to Interactive Social Media Platforms

In the beginning phases of digital education, platforms such as Moodle and Blackboard were the main players, providing structured and organized course content and forums for discussion. While these tools established the groundwork for online learning, they fell short in facilitating real-time interaction or peer-to-peer engagement. As technology advanced, social media platforms became popular alternatives, offering more engaging, dynamic, user-friendly, and collaborative learning experiences (Demeke, 2024). In contrast to traditional learning management systems, social media enables real-time conversations and discussions, which enables quick feedback and collaboration (Mamsaoui & Harrizi, 2024).

Web 2.0 applications have transformed digital learning by enabling users to create content, engage with one another, and share knowledge within communities (Hsu et al., 2014). Social media platforms such as Facebook, X (formerly Twitter), LinkedIn, and YouTube have become essential to academic discussions, acting as spaces for scholarly conversations, virtual classes, and collaborative learning (Williams, 2023). These platforms offer both real-time synchronous and flexible asynchronous learning opportunities, promoting a variety of educational experiences that boost student engagement and improve knowledge retention (West et al., 2024).

Adoption of Social Media by Universities, Faculty, and Students

The integration of social media within higher education has expanded remarkably, with universities, educators, and students progressively using these platforms for academic purposes. At first, institutions were cautious about adopting social media because of apprehensions about credibility, the accuracy of information, and data security. However, the educational benefits of social media have made it widely accepted, evolving it into a valuable resource for academic networking and professional growth (Hamuth & Buics, 2024).

Higher education institutions have actively integrated social media platforms into their academic curriculum, acknowledging their potential to enhance knowledge dissemination beyond conventional classroom settings. Educators utilise resources like LinkedIn Learning for strengthening skill acquisition, while X supports scholarly discourse through hashtags such as #AcademicChatter and #EdTech (Kazmi et al., 2024). The use of social media for academic networking has allowed both students and educators to participate in transnational education, overcoming geographical barriers and encouraging global collaborations (Zhou et al., 2024).

The function of social media within the academic sphere can be categorised into three distinct phases: the initial use of digital learning tools, the adoption by institutions, and the contemporary trends. In the early stages, universities utilised static online forums and learning management systems (LMS) for supporting remote learning. As the advantages of social media became more recognised, educational institutions began to integrate these platforms into academia. Presently, social media has transformed into a widely accepted mainstream educational resource, profoundly influencing teaching pedagogies and the knowledge dissemination (Alzouebi & Isakovic, 2014).

Current Trends: Live Lectures, Academic Networking, and Social Media-Based Assessments

Recent developments in digital education reflects a growing trend in use of live-streamed lectures, academic networking platforms, and assessments conducted through social media. Websites like YouTube, X, and Facebook Groups etc act as repositories of academic content, enabling students to obtain learning materials beyond the traditional classroom boundaries (Al-Rahmi et al., 2022a; Al-Rahmi et al., 2022b). Live lectures on social media encourage real-time interactions, which improve student engagement and participation in learning (Romero-Hall, 2017).

The importance of academic networking has increased with platforms like LinkedIn, which support scholarly discussions, professional collaborations, and knowledge sharing among students and faculty. Social media catalyses the creation of virtual academic communities, enabling researchers and educators to share insights, exchange ideas, collaborate on projects, and disseminate research findings more effectively (Dharmarathne, 2024). A study from the University of Peradeniya underscores this trend, showing that 65% of students utilise social media for academic and scientific inquiries, underlining its growing role in digital pedagogy (Dharmarathne, 2024).

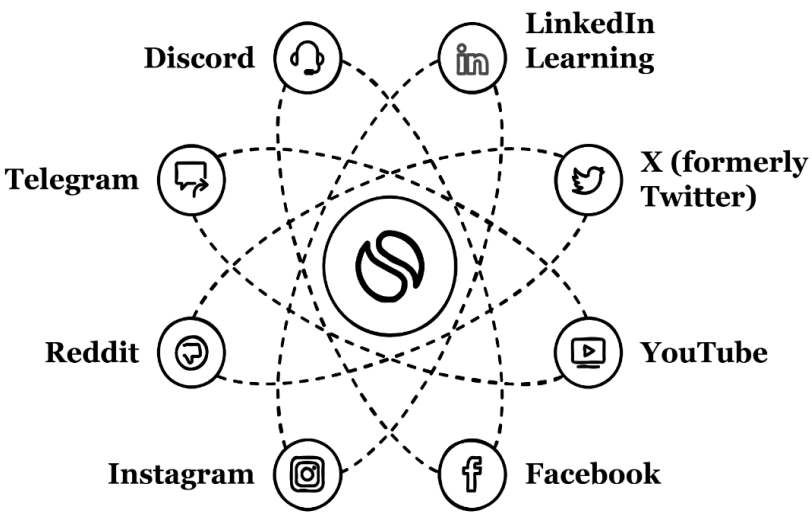
The use of social media as an assessment tool for evaluating student's performance is now emerging as a fresh trend in the field of education rather than just depending on traditional methods of evaluation, including written examinations and assignments. Teachers are now increasingly adopting the interactive social media assessments conducted in various ways including peer-reviewed discussions, collaborative projects, and real-time feedback mechanisms that encourage active learning and critical thinking (West et al., 2024). Educators also are promoting social media tools for evaluation that aligns with the modern teaching methods for creating interactive quizzes, discussion-based evaluations, and formative assessments (Hamuth & Buics, 2024).

A significant change from passive, traditional learning methods to engaging student-centred teaching style is brought in the educational field by the influence of social media. The way in which social media platforms have revolutionised higher education can be clearly seen by the amplified use of live lectures, online tests, and academic communities (Demeke, 2024). Social media has actively changed the field of education by promoting real- time communication, interdisciplinary teamwork, and by providing chances of informal learning. This in turn has created new path for professional development and knowledge acquisition.

In short now as an increasing number of higher education institutions, educators and learners are integrating these social platforms, social media is now emerging as a dynamic and interactive learning aid in academics. As social media is progressing steadily it can be predicted that social media will have a greater impact on higher education in future resulting in improved educational experience along with broadened opportunities for knowledge discourse and collaboration.

Key Platforms and Their Role in Higher Education

LinkedIn Learning



By offering various micro-courses, industry-approved certifications and multiple opportunities of networking aiding vocational growth; LinkedIn Learning now is emerging as one of key social media platform facilitating professional skill development. Therefore, a growing number of institutions are now incorporating LinkedIn Learning in their academic curriculum to mediate and create a balance between theoretical knowledge and practical industrial requirement thereby improving students' employability and career preparedness (Zhou et al., 2024; Hamuth & Buics, 2024).

Case Study—Integration in University Courses: Multiple universities have now adopted LinkedIn Learning as an additional learning resource allowing students to gain certifications along with their regular university degree. Studies have shown improved career readiness, professional engagement and interdisciplinary learning with LinkedIn Learning integration in academic courses (Dharmarathne, 2024; Mamsaoui & Harrizi, 2024).

X for Academic Discussions

X enables individuals in academia connect by using hashtags such as #AcademicChatter and #EdTech. This allows researchers, teachers, and students to join in on live discussions, share their research, and collaborate on exchange of knowledge (West et al., 2024; Demeke, 2024). The platform plays crucial role for building academic networks, engaging in informal learning, and promoting public scholarship (Evans, 2013).

Case Study—Live Tweeting in Academic Conferences: Live tweeting is now a common and standard practice at academic conferences. It enables the attendees to connect with audiences around the globe thereby broadening discussions in their fields and making knowledge more accessible beyond their institutions (Al-Rahmi et al., 2022a; Williams, 2023).

YouTube as an Educational Repository

The growth of educational YouTube channels developed by universities and educators has led to a gigantic collection of academic content. The interactive - visual format of video tutorials aid in catering diverse learning needs, especially in flipped classrooms, where students occupy themselves with instructional material before participating in in-class discussions (Kazmi et al., 2024; Dharmarathne, 2024).

Case Study—Impact of YouTube-Based Flipped Classrooms: Research specifies that flipped learning models make use of YouTube pronouncedly improve student engagement, retention of concepts,

and independent learning. Educational institutions that implement YouTube-centred teaching methodologies remark increased levels of comprehension and improved academic outcomes (Romero-Hall, 2017).

Facebook Academic Groups and Collaborative Learning

Facebook academic groups functions as platforms promoting collaborative learning, student-to-student interaction, sharing knowledge, and formation of virtual study groups. These groups are brought into effective action by universities to help collaboration between different institutions thereby encouraging interdisciplinary interactions facilitating the exchange of resources (Mamsaoui & Harrizi, 2024; Hamuth & Buics, 2024).

Case Study—Facebook Groups for Cross-University Collaboration: Research have shown that Facebook groups excel at forming virtual learning communities. In these groups, students and teachers can discuss various topics, exchange research ideas, and make-up interdisciplinary networks (Dharmarathne, 2024; Al-Rahmi et al., 2022a).

Instagram for Visual Learning and Outreach

Instagram has metamorphosed from just a social media platform into a powerful instrument for education and visual learning. Multiple institutions are using Instagram for sharing academic infographics displaying their research findings, and engage with students (West et al., 2024). The platform stresses visuals, making it easier to break down complicated concepts into something simple through easily digestible educational posts, carousel explanations, and Instagram reels (short videos) (Kazmi et al., 2024).

Studies indicates that Instagram's interactive characteristic, like polls, Q&A sessions, and IG Live lectures, boost participation of student and their engagement (Dharmarathne, 2024). Universities also leverage Instagram to strengthen their digital visibility, display their research

accomplishments, and create a sense of community among educators as well as learners.

Reddit as a Knowledge Exchange Forum

Reddit is a worldwide platform where students and scholars can exchange their ideas and knowledge. They engage in discussions on different topics in specific subreddits like r/AskAcademia, r/Professors, and r/GradSchool (Zhou et al., 2024). These online platforms provide a safe and informative environment for discussing research methods, experiences in higher education, and the various challenges faced in academia (West et al., 2024).

Case studies indicates that students turn to Reddit for seeking peer-reviewed content, exploring different career opportunities, and collaborating on problem-solving through community input (Hamuth & Buics, 2024). The AMA (Ask Me Anything) sessions that features both scholars and researchers further strengthen the knowledge sharing process and academic discussions.

Telegram for Academic Networking and Resource Sharing

Telegram has emerged as a popular platform in higher education because it not only offers secure communication but also supports large groups (Dharmarathne, 2024). Telegram channels and groups are being used by faculties and institutions for encouraging learning, for sharing academic content and for conducting real-time academic discussions.

Studies have shown that Telegram assists synchronous as well as asynchronous learning as it allows students as well as educators to share files, have real-time discussions and take quizzes using chat bots (Kazmi et al., 2024). Educational institutions have also observed improvements in students access to learning materials, their participation and collaboration in online academic groups as they implemented Telegram as one of their learning strategies (Hamuth & Buics, 2024).

Discord for Study Communities and Research Collaboration

Although Discord was initially developed for gamers, but it now has become an acclaimed platform for educational and research discourse (West et al., 2024) as more institutions are now employing Discord servers for upgrading the functioning of their virtual classrooms via real-time text, voice and video interaction.

Discord's voice chat feature, threaded conversation and document sharing function have further promoted its involvement in collaborative and research discussions (Zhou et al., 2024). Multiple case studies have illustrated that the learners in institutions with Discord communities not merely have better problem-solving abilities and acquire instant feedback, but they also hold cross-disciplinary discussions within adjoining academic fields (Kazmi et al., 2024).

Benefits of Social Media in Higher Education

As digital platforms are continuously changing their significance is also consequently increasing in academic sector as it strengthens both inclusivity and cost-effectiveness of education. This segment discusses various advantages of social media platforms in higher education.

Increased Engagement through Interactive Learning: Social media in contrast to traditional classrooms makes learning spaces more dynamic, interactive and vibrant as it gives students the chance to share content, have real-time conversations and employ various types of media for learning thereby making students to be more involved in their learning process. This leads to a better understanding of the material and more active participation. It has been shown by studies that when educators participate in social media academic discussions, they likewise get a chance to have meaningful interactions with others in their field enhancing their learning experience (Zhou et al., 2024). Furthermore, as quoted by West et al. (2024), discussion threads, online forums and live sessions not merely deepens students' knowledge but also strengthens retention of learning material. Owing to the interactive

feature of social media it also creates more engaging and participatory learning space for students rather than just passive knowledge sharing spheres.

Collaborative Learning Beyond Classroom Boundaries: One major benefit of social media is how it helps students learn together outside of regular classrooms. Online platforms allow for discussions between students, sharing of knowledge, and teamwork across different subjects. Research shows that students who participate in online learning communities tend to develop better critical thinking and problem-solving skills because they are exposed to various opinions and helpful debates (Hamuth & Buics, 2024). Websites, social media groups, and discussion boards let students connect with each other, share ideas, and get feedback from teachers and professionals (Kazmi et al., 2024). These interactions help students gain a deeper understanding of their subjects, promoting active and social learning. Plus, social media makes it easier for students to connect with their classmates no matter where they are or which school they attend (Romero-Hall, 2017).

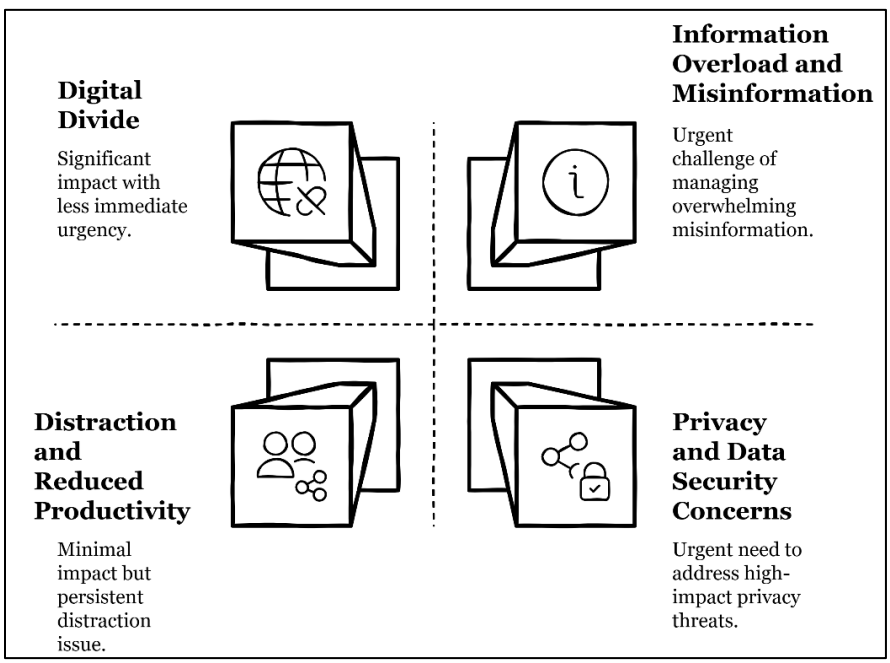
Access to Global Knowledge and Diverse Perspectives: Social media gives students and teachers amazing access to a huge amount of knowledge from around the world. It connects students with experts, researchers, and universities around the world. By exploring different perspectives, students can enjoy richer learning experiences, which deepens their understanding of various subjects. Some scholars argue that social media bridges local education with international research, enabling students to access the latest studies, academic discussions, and expert insights instantly (Dharmarathne, 2024). When students engage with social media, they become more aware of global issues, new developments in various fields, and emerging trends (Williams, 2023). Additionally, platforms like LinkedIn Learning, ResearchGate, and X facilitate direct communication between students and professionals, expanding their knowledge and career networks (Al-Rahmi et al., 2022a). These online interactions not only enrich what students learn

in the classroom but also encourage them to think critically and engage with information from a broader, global perspective.

Skill Development: Enhancing Digital Literacy and Professional Competencies: Another important advantage of social media in higher education is how it helps students develop important skills, especially in digital literacy, communication, and networking for their careers. When students interact with academic content on social media, it boosts their ability to use digital platforms effectively, which in turn sharpens their research skills and understanding of media (Mamsaoui & Harrizi, 2024). Since education is increasingly relying on digital tools, being good at online communication and analysing information is super important for both Their academics and future profession. Plus, sites like LinkedIn and X give students chances to create professional connections, showcase their skills, and connect with leaders in their fields (Digital Marketing Institute, 2023). Learning to express ideas clearly, joining academic discussions, and sharing research through digital means gets students ready for the changing job market, where being digitally skilled is a big advantage (Alvermann et al., 2012). As digital learning becomes more common, using social media in college courses can really help students prepare for success in their careers.

Cost-Effectiveness and Accessibility of Educational Resources: Social media makes education readily available to everyone by providing free and easy-to-find learning resources, which helps students from different financial backgrounds. Websites like YouTube, X, and various educational platforms provide a wealth of academic resources, including live classes, video lectures, research papers, text files, academic notes and discussion forums, all at no cost (Williams, 2023). Also, as pointed out by Mamsaoui and Harrizi (2024), these digital learning platforms do cater diverse learning needs of students along with providing them an opportunity for self-paced and self-directed learning and this happens due to the quality academic content made available on these digital platforms helping learners even more to

sharpen their skills (Al-Rahmi et al., 2022a). Thus, by utilising social media as a cost-effective learning tool, educational institutions can work to reduce disparities in resource distribution, promote educational equity and can extend support to those who can't afford expensive textbooks and academic courses, thereby promoting the notion of Inclusive learning.



Challenges and Limitations

Even though social media has changed the learning process in universities and colleges, it does come with its own predicament. To use social media efficiently, it is important to identify these problems. These hindrances include overload of information, occurrence of misinformation, diversions that can obstruct the proficiency, challenges related with privacy and security of data, and the fragmentation among people concerning how easily they can access

technology. The role of social media as a teaching tool is influenced by these variables.

One of the major problems we face today is the abundance of information and the widespread dissemination of false information. It is difficult for both students and teachers to tell apart sources which are dependable, and which are not, due to the prevalence of unregulated data. With finite means to examine and validate information, it becomes difficult to maintain the academic integrity (Zhou et al., 2024). This emphasises the importance to incorporate media literacy as an essential component of digital education (Mamsaoui & Harrizi, 2024). Finding trustworthy sources continues to be a problem that encourages students to develop constructive evaluation skills to browse through the large amount of information available and utilise it (Dharmarathne, 2024; Al-Rahmi et al., 2022a).

Decreased productivity and the possibility for diversions are some prominent demerits. Despite its casual nature which tends to pull away students' concentration, social media nurtures the idea of collaboration and interaction. Studies have shown that indulging in social media for longer hours can lead to lack of concentration and reduced productivity (West et al., 2024). The engaging and somewhat addictive qualities of social media can make it difficult for students to stay focused by disrupting their time management (Williams, 2023). It is difficult for many students to stay focused and maintain an equilibrium between academics and social media. This points out the need for institutional policies that promote responsible use of these digital platforms along with effective regulation strategies (Mamsaoui & Harrizi, 2024; Al-Rahmi et al., 2022a).

Complications in use of social media in educational institutions also arises due to privacy and data security concerns. Moral concerns about student privacy and institutional safety have emerged due to the mishandling of private data (Mamsaoui & Harrizi, 2024). Institutions should encourage strict policies to protect user data and to promote

responsible digital behaviour (Williams, 2023). The risk of cyber-attacks, challenges like data monitoring and the involvement of outside parties also pose a threat that requires strict rules and policies (Al-Rahmi et al., 2022a). It is necessary to analyse the ethical conflicts associated with social media in order to protect student rights and uphold institutional integrity.

The digital divide caused by gaps in access to social media increases obstacles to learning and deepens educational disparities. Differences in economic and geographic conditions create disparities in the accessibility of fast internet and digital devices. Students from rural areas and low-income households are unable to use social media effectively due to a lack of tools (Kazmi et al., 2024). The scarcity of infrastructure and poor internet connection restricts the participation of students in online learning (Romero-Hall, 2017). Therefore, policies to ensure that students have access to digital learning regardless of their economic background are required alongside proper infrastructure (Al-Rahmi et al., 2022a).

Thus, incorporating social media into higher education is beneficial if implemented while carefully addressing the challenges associated. By recognizing and tackling underlying issues, colleges and universities can build a better and more inclusive online learning space that takes advantage of social media's positives while minimising its negatives.

Future Prospects and Recommendations

Social media's dynamic nature is bringing changes in the ways we learn, and this marks the need for universities and colleges to have smart rules, strategies and guidelines for maximising the advantages of social media in academia. For optimising the benefits and to employ social media platforms effectively and responsibly improvement is required in certain key areas discussed below.

Institutional Policies for Social Media Integration: Through discussion in this article up until now we know that social media is getting upgraded

every day and each upgrade leads to a consistent increase in social media integration and its utilisation in academic institutions. This underscores the need for educational institutions to have clear guidelines for stimulating thoughtful communication as well as to mitigate potential risks and vulnerabilities (Mamsaoui & Harrizi, 2024; Williams, 2023). These guidelines will make sure that instead of hindering the learning process social media will support it by prioritising morals, ethics, privacy and academic integrity (Al-Rahmi et al., 2022a).

AI-Powered Personalisation in Learning: The use of AI for individual purposes is one of the most reassuring developments in the learning process. By personalising content according to each student's individual requirements, this technology can significantly enhance adaptive learning. Artificial Intelligence (AI) is able to create personalised learning experiences using machine learning algorithms that adapt to student's unique learning patterns and interests (Mamsaoui & Harrizi, 2024). Tailored educational material can be prepared via social media using AI, which encourages students to engage more in their studies (Williams, 2023). Moreover, tracking students' progress in real-time and providing suggestions and feedback for further improvement can also be achieved through the use of AI personalisation which encourages an independent learning approach (Al-Rahmi et al., 2022a).

Strengthening Fact-Checking Mechanisms: The distribution of misinformation has become a major challenge with increasing dependency on digital platforms. There is a need for institutions to enhance their fact-checking policies and systems to ensure that the content available on social media is reliable. It is crucial to establish automated fact-checking tools and to initiate digital literacy programmes that will help students to check the reliability of information available online (Mamsaoui & Harrizi, 2024). Academic publishers, research organizations, and institutions must work in

collaboration to create databases of genuine and reliable information that students can access (Williams, 2023). Encouragement of strong digital literacy skills will also make students better equipped to distinguish between genuine and false information, creating a 'well enlightened' community (Romero-Hall, 2017).

Bridging the Digital Divide: Higher Education presently has another pressing concern that is refraining students from having equitable participation to tech-driven learning, i.e., Digital Divide. It's crucial for policymakers and educational institutions to focus on initiatives that will bridge this gap by ensuring everyone has fair access to digital resources (Dharmarathne, 2024). To create a more inclusive digital learning space, collaboration among governments, universities, and private companies is vital, so that all students, no matter their economic background, can take full advantage of education that relies on social media (Williams, 2023).

By focusing on these important aspects, institutions can fully utilise social media, turning it into a strong tool for career growth, collaboration in learning, and achieving academic success (Kazmi et al., 2024; Demeke, 2024).

Conclusion

This article has presented how social media can change the landscape of higher education. Websites like LinkedIn, X, YouTube, and Facebook etc have made it easier to share knowledge, create community and encourage worldwide academic discussions. Social media enhances access to educational resources by enabling students and teachers to engage in learning together outside the traditional classroom setting.

While social media holds great promise for education, it also presents several notable challenges. However, when used thoughtfully and combined with effective teaching strategies and technology, it can significantly improve the learning experience. A study conducted by

the University of Peradeniya found that social media increases student engagement and advances academic networking, enriching the overall learning experience (Dharmarathne, 2024). While it may not completely substitute traditional teaching methods, it certainly improves and supports the learning process.

Future studies should explore the long-term effects of social media learning on students and their overall academic performance. Conducting longitudinal research is essential to evaluate the effectiveness of this approach in various educational settings and across different countries (Kazmi et al., 2024). There is also a need to explore policies that strike a balance between fostering innovation and upholding academic integrity. Colleges and Universities need to develop new technologies, that will help to use social media wisely to create inclusive, engaging, and enriching online communities that promote lifelong learning (Williams, 2023).

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AN ANALYTICAL STUDY OF ICT-BASED TEACHING IN RTM NAGPUR UNIVERSITY'S MANAGEMENT INSTITUTES FOR NBA/NAAC STANDARDISATION

Pranav Kayande* & Vijit Chaturvedi♦

Abstract

In the Indian context, the statutory powers vested with the University Grants Commission (UGC) should uphold and develop quality in Indian institutions of higher education. The main problem, though, is at the second rung B-schools that hundreds of institutes throughout the nation have started. Such institutions have displayed consistently weak standards of quality in several areas critical to the credibility and integrity of institutions of higher education. They have, over the years, been plagued by poor teaching faculty, poor research, and mediocre consulting services, finally leading to poor placement opportunities for students graduating from such institutions. Several committees and commissions on education have, over the years, time and again stressed—directly and indirectly—the imperative need for significant improvement and acknowledgment of quality in the Indian higher education system. This need for improvement not only seeks to raise the level of scholarship but also works towards meeting international standards of education, making the graduates more competitive in the future. The ongoing problems in these institutions highlight the need for overall reforms and rigorous quality control measures to effectively address these long-standing issues. These reforms need to emphasise the attraction and retention of quality faculty members, research culture and innovation, and industry partnerships for improving placement opportunities. Regular evaluation and accreditation mechanisms are also needed to help these institutions meet minimum standards. More importantly, the UGC

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and other regulators need to take a more proactive role in regulating and guiding these second-tier institutions. This might include offering resources, mentorship schemes, and incentives for quality improvement. In this way, India can go about enhancing the quality of the higher education system, specifically in management education, to make it stronger and internationally competitive.

***Keywords**: Quality Assurance, Management Education, ICT Integration, Accreditation, Pedagogical Practices*

Introduction

In India, it is the role of the statutory powers of the University Grants Commission (UGC) to ensure quality in Indian universities and colleges.

Section 12 of the UGC Act, 1956 mandates UGC to be charged with "the determination and maintenance of standards of teaching, examinations, and research in universities." To carry out this mandate, the UGC has been actively evolving mechanisms for monitoring quality in universities and colleges directly or indirectly.

The role of UGC in quality assurance goes beyond regulation. It also promotes excellence in higher education in several ways. For improving quality, it has set up national research facilities and Academic Staff Colleges to re-orient teachers and refresh their courses in subject areas. These centres are also the centres of continuous professional development so that the teachers remain abreast with the current advancement in their subject areas as well as pedagogic practices. Throughout the years, different committees and commissions on education have either directly or indirectly highlighted the necessity of quality improvement and recognition in the Indian higher education sector. Such persistent focus underlines the utmost significance of quality in determining the destiny of India's educational scene.

The idea of autonomous colleges, as suggested by the Kothari Commission (1964-66), has its genesis in the idea of quality improvement. This advice was a pioneering move towards strengthening institutions to innovate and excel under a regime of accountability. There has been a huge increase in educational opportunities at all levels, especially in higher education, since the adoption of the National Policy on Education (1968). This growth proves India's efforts to democratise access to education. But with the burgeoning increase in the number of educational institutions, education quality became an issue. The issue was that of how to balance quantity with quality and see that expanded access does not jeopardise education standards. The constitutional amendment in 1976 put education in the concurrent list, which increased the responsibility of the central government to improve the quality **(**Stella and Gnanam, 2003). This change in responsibility highlighted the national significance of education and the necessity for a coordinated effort towards quality improvement.

The New Education Policy (1986) also stressed the identification and recognition of excellence in the performance of institutions and the verification of sub-standard institutions (Mishra, 2006). This policy was a major departure towards a more positive quality assurance approach in higher education. Standardisation in the context of higher education means the acknowledgment and assurance of quality. This is done through several certifications and approvals in academia.

In India, these include membership with regulatory agencies like the UGC and the All India Council for Technical Education (AICTE), accreditation by the National Board of Accreditation (NBA) and the National Assessment and Accreditation Council (NAAC), and certification by the International Organization for Standardisation (ISO). Each of these organizations has a distinct role to play in ensuring that institutions achieve certain quality standards. UGC affiliation guarantees that institutions comply with minimum standards

of infrastructure, academic qualification of faculty, and curriculum. AICTE approval is particular to technical education institutions, addressing industry relevance and technical ability. NBA accreditation is specific to the program, judging the quality of individual courses, especially in engineering and management. NAAC accords institutional accreditation, judging the quality of the institution in general across multiple parameters. ISO certification, which is not limited to education, is a quality management system framework that can be used by educational institutions. These standard mechanisms have several functions. They offer an institutional framework for evaluating and improving their quality on an ongoing basis.

For parents and students, they present a degree of guarantee regarding the quality of education to be received. Accreditations of institutions act as indicators of possible quality graduates to their employers. At the national level, these standards assist in international benchmarking of Indian institutions to global standards, essential for global recognition and cooperation. In addition, these frameworks ensure transparency and accountability, establishing a culture-friendly environment for innovation and excellence. By following these standards, institutions not only attain credibility but also improve their long-term sustainability and growth capacity.

Review of Literature

The quality assurance literature in higher education offers worthwhile information regarding the impact and integration of standardisation elements.

Dhouchak and Kumar (2023) conducted a comparative study on the quality of management education delivered through public and private technology-enabled learning platforms in India. Their findings highlight the role of platforms like SWAYAM in enhancing educational quality and accessibility.

Kumar et al. (2023) discuss the integration and expansion of ICT-based initiatives in the Indian higher education system, emphasising government-led programs and their impact on teaching practices.

Yang (2023) explores how organizational support influences students' ICT self-efficacy, engagement, and satisfaction in blended learning environments, providing insights into effective ICT integration strategies.

Dirckinck-Holmfeld et al. (2023) examine how students in resource-constrained university settings utilise ICT in their study practices, shedding light on the challenges and opportunities of ICT adoption in such contexts.

Madronero and Madronero (2024) provide a systematic review of ICT usage in social science education, identifying trends, tools, and the impact on student performance.

Cheng et al. (2004) outline the process of implementing ISO 9000 within the systems of higher education in Taiwan. The authors believe that the application of ISO 9000 quality systems is positively affecting the quality of education. Their research identifies the way by which standardised quality management systems are easily translated into educational environments to achieve better processes and results.

Khurana (2009) contributed towards the development of management educational institutions and its influence on quality in the case of Haryana. He recommends that institutes emphasise value creation, quality programs, and specified end outcomes. This study stresses the importance of adopting a comprehensive concept of quality, whereby institutions are not only compliant with regulatory requirements but are also attempting to establish distinctive value propositions. Khurana's report highlights the significance of establishing quality initiatives that are aligned with market needs and student performance. The research also suggests that concerned authorities should ensure that demand and supply forces are present. This argument emphasises

the necessity of a harmonious process of educational growth in which institutional expansion is synchronised with demand in the market for graduates. Quality enhancement, says Khurana, must be achieved within a specified timeframe so that institutes are distinguished from institutes that have failed to enhance their quality. The time-based method of quality improvement generates a dynamic system where institutions are constantly encouraged to improve.

As Vlasic et al. (2004) assert, the quality of education is one of the main drivers of business quality and hence enhances competitive advantage. This view connects educational quality with economic performance directly, with a focus on the contribution of higher education to national competitiveness. Through the delivery of high-quality educational services, educational institutions contribute significantly to the development of the national economy and society, and of its individual members. Vlasic et al. also believe that to enhance the quality of education, a key component of economic and social progress in the 21st century, it is necessary to diminish the vast quantity of knowledge students are required to acquire. Rather, they propose to draw students' attention to a system of elementary knowledge, creativity, problem-solving, and lifelong learning. This strategy follows modern theories of education, where skills acquisition takes precedence over rote learning, to equip students with a changing world of work.

Methods

The research utilised the mixed methods design to effectively evaluate the effects of standardisation certifications on RTM Nagpur University-affiliated management institutes.

1. Survey Methodology: The questionnaire was the main data collection instrument used based on requirements from implementation of Certificates of Standardisation (ISO, NBA, and NAAC) in management institutes. The survey served the purpose of collecting quantitative data regarding several facets of the teaching-

learning environment, such as pedagogical practices, modes of assessment, and use of technology in education.

2. Exploratory Research: To supplement the quantitative findings, the research also employed qualitative methods. These involved casual conversations with consumers (students), employees (staff and faculty), management, and competitors (other schools). More formal methods via in-depth interviews and case studies were also utilised. These qualitative methods yielded rich, contextual data that supplemented interpretation of quantitative results and captured the intricacies of standardisation application.

3. Expert Interviews: Experts in certification of standardisation were randomly chosen for interviewing from ISO, NAAC, and NBA. These interviews aimed to collect expert views regarding the application of these certifications of standardisation in academics. The views of these experts offered useful insights into the challenges and best practices in applying quality standards in higher education.

The blending of quantitative surveys, qualitative exploratory research, and expert interviews enabled a complete and in-depth understanding of the effect of standardisation certifications on management education quality.

Results

The research aimed to test the following research hypothesis:

H1: Certificates of Standardisation bring positive modifications in the teaching learning process in terms of good learning environment particularly with the help of ICT (Information Communication Technology) To verify this hypothesis, a Chi-Square Test of Contingency was used as described in Table no. 1 and 2 of Annexure.

The independent variable, Standardisation, was handled as a nominal variable with two response categories (1 = Accredited, 2 = Non-Accredited).

The dependent variable, A Good Teaching Learning Environment, consisted of 11 components that involved ICT like: 1. Online Class tests, 2. PPT presentation, 3. Videos, 4. Computer lab work, 5. Online Analytical software, 6. Class Participation, 7. The Simulation Software 8. Role plays, 9. Field Work, 10. Case Study discussion and 11. Assignment. All these components were measured on a dichotomous scale (1 = Yes, 0 = No). Null hypothesis (H0) was that there is no correlation between Standardisation and Good Teaching Learning Environment, whereas alternative hypothesis (H1) assumed a correlation between the variables. The significance level was fixed at $\alpha = 0.05$. Important Observations from Hypothesis Testing: 1. There were significant correlations between standardisation and all the pedagogical practices under study, except for the use of videos and computer laboratory work. 2. Accredited schools had higher rates of implementation of instructional practices like Online Class tests, ppt presentations, case study discussions, and simulation software than their non-accredited counterparts. 3. The two exceptions, Assignment and Case Study work, were not significantly related to accreditation status. The evidence favours the alternative hypothesis (H1), suggesting that Certificates of Standardisation considerably improve the teaching-learning atmosphere in various ways. This result highlights the positive contribution of accreditation towards enhancing academic processes. Therefore, H1 is accepted. These findings indicate that standardisation certifications and accreditation have a significant influence on the implementation of varied and effective teaching practices in management institutes. The greater implementation rates of various pedagogical practices in accredited institutions show that these certifications promote a more holistic and student-focused approach to education.

Discussion

The primary objective of this study was to investigate the impact of standardisation certifications (ISO, NBA, and NAAC) on the teaching-

learning environment in management institutes affiliated with RTM Nagpur University. The findings affirm the importance of certifications in fostering an improved academic environment, providing empirical evidence for their positive influence on pedagogical practices and academic processes.

Restating the Purpose and Contributions: This research points out the way accreditation and certification programs contribute to effective teaching techniques and pedagogic tools in management studies. Through analysing the relationship between certifications and certain teaching practices, this study makes important contributions to the function of standardisation in defining quality education. The findings not only reaffirm the need for standard measures in academic contexts but also underscore their wider implications in making students more competitive and employable.

Findings in Terms of Goals: The research validated major correlations between standardisation and some pedagogic practices such as Online Class tests, ppt presentations, videos, computer lab-work, fieldwork, class participation, simulation software, and role-plays.

Accredited institutions showed greater implementation of the practices compared to non-accredited institutions.

This indicates that accreditation has a positive impact on both the depth and width of instructional methodology.

Yet, no strong relationship was found between standardisation and the application of case study and assignment work as an instructional tool. This exception could indicate certain contextual variables, like resource constraints or curriculum emphasis, that need to be investigated further.

Connecting Findings to Previous Literature: The findings are consistent with previous research highlighting the contribution of accreditation to quality education (Cheng et al. 2004; Khurana, 2007). Cheng et al. (2004) observed that ISO 9000 system implementation enhances

institutional processes, whereas Khurana (2009) underlined the requirement for periodic quality improvement to align with educational needs. Such results support Vlasic et al.'s observation that educational quality is a major driver of economic and social advancement.

Further, the focus on varied pedagogical practices within accredited institutes highlights the flexibility and creativity espoused by Mishra (2006).

The findings of the study are in support of the argument that standardisation promotes institutions to be more holistic and student-oriented in their educational approach, consistent with modern theories of education that focus on the development of skills and experiential learning opportunities.

Possible Explanations for Unexpected Findings: The absence of a statistically significant relationship between videos and computer lab work and accreditation status can be explained due to diverse institutional priorities or technology differences. Non-accredited institutions might prefer conventional approaches to technology-based tools, perhaps due to financial limitations or a lack of technical skills. Accredited institutions, though better resourced, might also not make the best use of these tools, relying more on interactive and experiential learning methods like role plays and simulation software. Another explanation could be that the utilisation of videos and computer labs has become widespread in all institutions, both accredited and non-accredited, because of the overall trend of digitalisation in education. This widespread use could have resulted in no meaningful difference between accredited and non-accredited institutions in these areas.

Managerial Implications: These results offer practical implications for policymakers and administrators in higher education. Accreditation agencies like NBA and NAAC should lay greater stress on the inclusion of multiple and novel teaching methodologies as a parameter of standardisation. This can entail guidelines or standards for putting

in place diverse pedagogic practices. Management schools must use certifications as not only regulatory instruments, but also as strategic facilitators for excellence in academia. This entails utilising the process of accreditation as a chance for self-evaluation and ongoing improvement, as opposed to a simplistic box-ticking exercise. In addition, the research highlights the significance of budgeting for technological improvements, so that all institutes, whether accredited or not, can implement advanced teaching aids. Institutions need to prioritise filling the gaps in those sectors where wide variations were not noticed, e.g., the application of videos and computer laboratories, to provide an integrated and technology-enabled learning atmosphere. Policymakers may plan to introduce incentives or support structures to enable non-accredited institutions to enhance their teaching-learning settings. This might involve technology upgradation grants, faculty development schemes, or mentorship programs involving accredited and non-accredited institutions.

Conclusions

From the results of this research, the following are some major conclusions that can be derived.

1. Accredited colleges assess student performance based on a variegated variety of modes such as Online Class tests, ppt presentations, videos and Computer lab. This diversified mode of assessment indicates a more inclusive assessment of student learning and abilities.

2. Internal assessment of students at non-accredited colleges is largely dependent on Online Class tests, assignments, and ppt presentations. Although these approaches are beneficial, the narrower variety indicates a potential area of enhancement in diversification of assessment methods.

3. Accredited Management Colleges of RTM Nagpur University primarily attribute the same emphasis towards Computer labs, Role

plays, fieldwork, Simulation software, and videos, in addition to conventional lectures via Cases. It reflects adherence towards giving diverse students a qualitative diverse learning process marrying theoretical concept along with hands-on application.

4. RTM Nagpur University's non-accredited management colleges primarily employ Cases, Assignments, and Roles as pedagogies in addition to general lecturing classes. Although these are useful resources, the relatively narrower scope in relation to accredited colleges indicates a potential to increase the pedagogical methods.

5. RTM Nagpur University-affiliated accredited management colleges utilise cutting-edge library software, Department-wise Advanced software, Internal Assessment software, MS Office, SAP, and SPSS. The high level of usage of technology speaks volumes about a serious commitment towards offering students access to industry-based tools and ensuring overall improvement in learning.

6. Most RTM Nagpur University-affiliated non-accredited management colleges utilise the MS Office and SPSS software to a greater extent.

Although these are necessary tools, the less extensive range than that of accredited colleges indicates a possible area for technological improvement.

These findings point out the beneficial effect of accreditation on the teaching-learning environment of management institutes.

Accredited institutions reflect a more varied and thorough approach to teaching methods as well as evaluation techniques.

They further exhibit more embedding of technology into the learning process, potentially even more suitably preparing students to deal with the realities of today's workplace.

Limitations

Even though this research gives considerable insights into how standardisation certification has influenced quality management education, one must bear its limitations in mind.

1. The research only deals with RTM Nagpur University-affiliated management institutes and thus may not present the totality of Indian management education practice diversity. For that reason, an extrapolation of these findings into a general framework should be considered with a note of caution. Regional differences in educational practice, resources, and cultural orientations may affect standardisation certification implementation and effects.

2. The study only assessed the effect of ISO, NBA, and NAAC certification on teaching-learning environments. Other important quality assurance frameworks or institutional variables like private accreditations or industry collaborations were not considered. These other factors may be involved in determining the quality of education and may interact with the effects of the examined certifications.

3. The research was largely concerned with whether or not specific teaching practices and technologies existed, without exploring in detail the effectiveness or quality of their execution. Subsequent research would be enhanced by a more sophisticated analysis of the execution of such practices and their influence on students' learning outcomes.

4. The cross-sectional design of the study gives a snapshot of the situation at hand but fails to show the longitudinal impact of accreditation. A longitudinal study would be able to provide insights into how the institutions change over time following accreditation.

5. The research was based on self-reported data from institutions and is therefore potentially subject to social desirability bias. Future studies might include more objective measures or third-party ratings to confirm the results.

6. Although the research has identified correlations between certain educational practices and accreditation, it does not have the ability to assess causality. Alternative explanations, including leadership or resources within institutions, may determine both the chances of accreditation and the implementation of varied teaching practices.

7. The research did not thoroughly investigate the views of employers, alumni, or students.

Inviting these stakeholders' opinions may yield a better insight into the effects of accreditation on education quality and results.

Regardless of these drawbacks, the research offers important information regarding the function of standardisation certifications in defining the quality of management education.

Future studies can use these results to overcome these drawbacks and expand our knowledge on quality assurance in higher education.

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THE IMPACT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING ON MECHANICAL ENGINEERING

Gujjar Naga Malleswara Rao* & Shaik Chand Mabhu Subhani♦

Abstract

The latest technologies, artificial intelligence (AI) and machine learning (ML), are tools that are improving the quality of human life by generating instantaneous decisions during problem solving. On the other hand, mechanical engineering is a core technology that gives knowledge on production, manufacturing, quality control, and design and analysis on machine components. This paper focuses on the changes artificial intelligence and ML bring to the field of mechanical engineering. In terms of specific applications in the field of mechanical engineering, this paper states how artificial intelligence and machine learning are involved. AI and ML have roles from the beginning of product optimising design. They also monitor the health of the machine components. They predict the equipment life and failure and improve quality control. This combination of AI and ML, and deep learning technologies also examine and improve the efficiency and lifetime of the equipment. They reduce the cost and increase the benefits. They predict the more suitable practices. This study will also describe the involvement of AI and ML technologies in the fields of fluid dynamics, thermal management, automobile engineering, product management and maintenance, fault detection and robotics.

Keywords: *Mechanical Engineering. AI&ML, Impact and Applications, Predictive Maintenance, Computational Fluid Dynamics, Robotics, Design Optimisation*

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Introduction

Artificial intelligence is a technology that is concerned with intelligent behaviours which can sense, think and take optimum decisions to give the best result. Machine learning is a subset of artificial intelligence that extracts knowledge from the data such as neural networks, supervised and unsupervised learning, decision trees, and linear regression and makes decisions to perform the specific task. Tiwari et al. (2018) in their study found that deep learning is a part of ML that guides computers to process data in a way similar to how human brain used to solve a wide variety of problems like image recognition, speech recognition, etc. (p. 1).

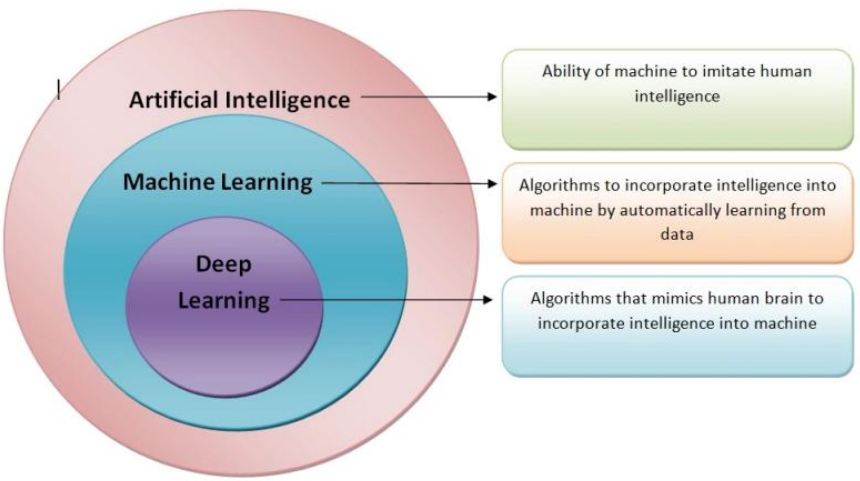

Fig 1. An illustration of the position of machine learning ML and deep Learning (DL) within Artificial Intelligence (AI)

John McCarthy was an American computer scientist. He is also the father of AI. He defined the science and technology of making machines to think and intelligent machines.

Applications of Artificial intelligence and machine learning

Artificial intelligence (AI) methods include machine learning, NLP (natural language processing), DL (deep learning), CV (computer vision), reinforcement learning, robotics, and expert systems. The applications of AI in human life are:

- To help doctors diagnose diseases, develop treatment and personal care.
- Create education plans based on students' needs.
- AI can help customers get information about their banking and investment accounts.
- Fraud detection during purchase of credit cards.
- In social media, AI can analyse user interactions and trends to personalise content, suggest new connections, and detect harmful behaviour.
- AI can allow robots and humans to communicate.

Machine learning learns from data. Data is cheap and abundant. The applications of ML in human life are:

- ML can identify objects and people in images, which is used in facial recognition, password protection, and law enforcement.
- ML can automate friend-tagging suggestions. It can identify faces in a user's database.
- ML can filter spam and automate emails.
- ML can predict products on the basis of a user's preferences.
- ML can perform tasks like voice to text and predictive text.

ML Models

The most important concept is model training, in which the model learns through information as input. Models are normally trained once and then used for predictions. Machine learning algorithms vary depending upon the data, and ML has the following categories shown in Fig. 2.

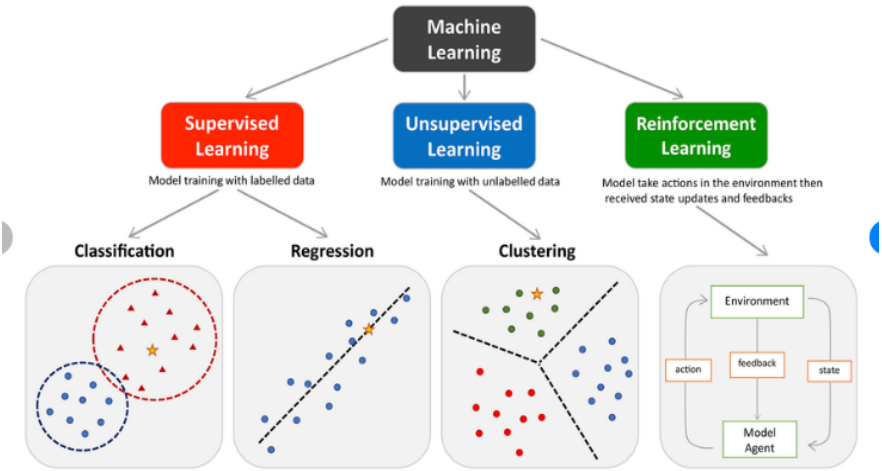

Fig 2. Types of super learning

Machine learning can be trained to use reinforcement, and supervised and unsupervised learning methods.

In reinforcement method, the ML is trained by punishment and reward. Every solution usually receives a score by the assignment of points. Rewards are expressed by an increase in points, and penalties by a decrease in points. Dhandapani and Sivaramakrishnan (2019) study found:

In supervised method, the ML is trained with example values of input and output. For the example of malfunction analysis, one would feed sample sensor data into the system along with information about upcoming malfunctions. If the model receives incorrect sample data, it will learn incorrect correlations. (p. 94)

In unsupervised method, the ML model learns from sample inputs, and the data do not include output. ML learns from data clusters and typical data. In case of machines application, the model learns from sensor data of the machine. Lamba (2023) study found:

AI and ML are changing future of mechanical engineering. They drive new techniques in design, manufacturing, and sustainability. These changes have deep implications for society. The integration of AI and ML changes mechanical engineering. These changes lead to progress in design, predictive maintenance, smart manufacturing, and sustainable practices. AI/ML influence mechanical engineering. This influence causes change from design and manufacturing to sustainability. It reshapes the field and raises important ethical questions. (pp. 32–33)

IV Impact of AI&ML in Mechanical Engineering Field

1. Raw material is data

In the 21st century, data is a currency. Data is the foundation of AI and ML. Data is becoming a factor in industries alongside capital, land, material, information, labour, time, and accuracy. This data allows cost reduction, time saving, waste reduction, and improvement of new business models. Data causes AI and ML to extract information from it. AI and ML create their own algorithms, change the sequence of algorithms, and make decisions based on data. This same pattern was followed during the manufacturing of programmable chips. First, the problem is defined, then objectives and work are programmed as a sequence of algorithms. In practice, these algorithms receive data, and users reach decisions based on the results. This approach is currently undergoing structural change. The data are now gathered in advance and analysed with generally valid algorithms in the second step. This results in causalities, on which decisions are made, for example, to optimise production, and these decisions are increasingly made autonomously.

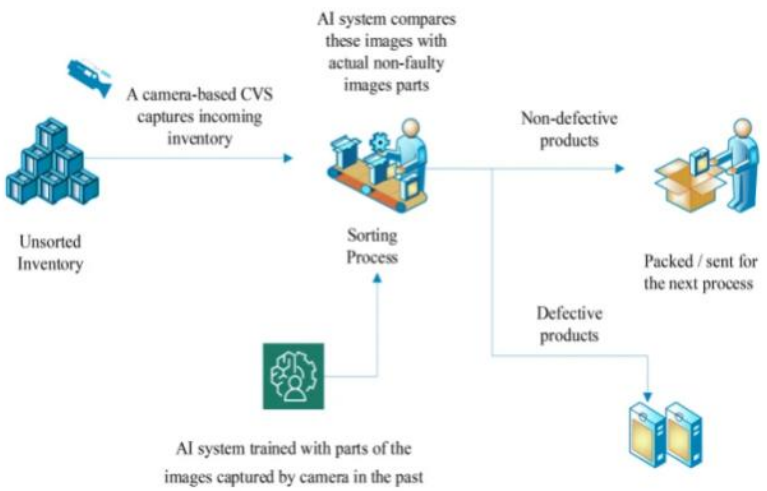

Fig 3. Gathering data from materials

2. Design of mechanical components and their optimisation

Within the field of mechanical engineering, the impact of AI and ML technologies has led to new improvements in the design of mechanical components and their optimisation. These technical algorithms offer a greater number of design possibilities for specified constraints. This method not only reveals innovative solutions but also speeds up the design iteration process. This technology generates algorithms that address complications in design without violating optimal configurations while modelling some complicated objectives. By using large amounts of data and iterative learning, these technical algorithms identify complex patterns and relations between data, leading to designs of components with the best efficiency, reduced material usage, and improved overall performance. Shaonak et al. (2017) study found the following:

ANNs in this beam crack analysis case significantly stops down analysis time and effort. Instead of repeatedly remodelling and re-analysing the beam for different crack scenarios using finite element methods, ANN can train on a limited set of simulations. Once trained,

the ANN efficiently predicts the desired outputs for various crack parameters, proving particularly useful for complex and non-linear problems. This proves the growing importance of AI in engineering for tackling challenging analytical tasks. (pp. 7–9)

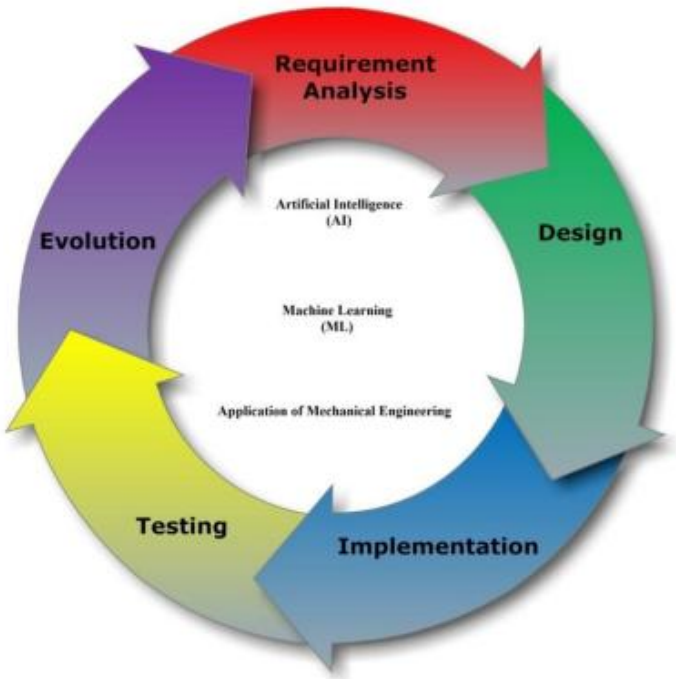

Fig 4. Application of Mechanical Engineering using ML/AI

3. Smart manufacturing and robotics

AI and ML in mechanical engineering have fuelled the evolution of smart manufacturing processes, revolutionising production processes and reconceptualising the role of robotics and automation in industries.

AI-operated automation improves the efficiency of machines and accuracy in manufacturing environments. Machine learning algorithms optimise production layers, regularly monitor the data to tune

production in real time. This optimisation allows nimbleness in response to varying demands, reduces waste, and increases output.

4. Predictive Maintenance

Mechanical engineering heavily depends on storage and maintenance, and AI algorithms are transforming this field. AI-powered systems use real-time sensor data to track the condition of equipment, detect problems, and facilitate preventative maintenance. These technologies increase equipment life, minimise downtime, and avoid repairs.

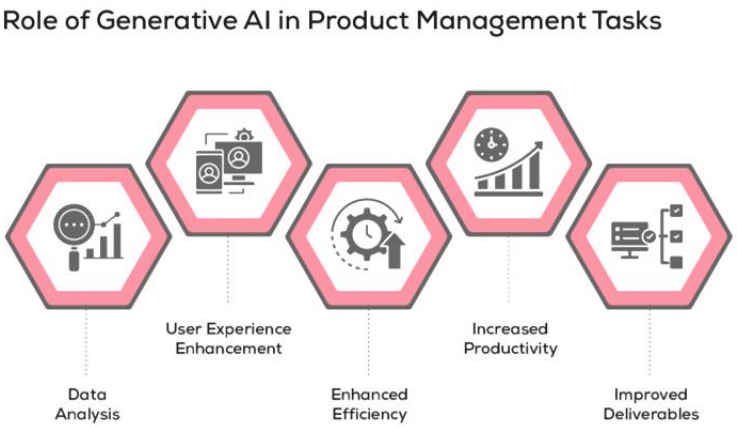

Fig 5. Role of generative AI in product management tasks

5. AI in Thermal Management

In modern technology, artificial intelligence (AI) is utilised by industries to improve efficiency and enable capabilities. One hard field where AI has shown promise is thermal management. It involves regulation of temperature to optimise performance, safety, and longer life of various systems, from small scale to large-scale industrial processes.

Thermal management is necessary in all heat interaction applications. These include electronics, power plants, data centres, electric vehicles, and industrial machinery. Effective thermal management keeps

systems operating within safe temperature range. It prevents overheating, reduces wear and tear, and improves performance.

Fig 6. AI servo cooling technology for future thermal management solutions

Thermal management has been used in mechanical field such as fans, heat reservoirs, heat exchangers and coolant systems. According to Subhani and Sravani (2021):

A Heat Exchanger is a device which is used to transfer heat from one fluid to another, whether the fluids are separated by a solid wall so that they never mix, or the fluids are directly in contact. Every year Heat Exchanger technology grows to develop efficient, compact and economical heat exchangers, all over the world. Updating the community for this development needs an interaction.

AI algorithms start a new dimension to thermal management by offering intelligent, adaptive and predictive capabilities. The involvement of AI can improve thermal management through the following ways:

a. *Prophetic Analytics*: By identifying patterns and trends, AI and ML algorithms can analyse temperature data and predict future thermal behaviours. AI can detect temperature spikes and adjust cooling mechanisms. This helps in preventing overheating and increases optimal performance.

b. *Adaptive Control Systems*: AI-driven control systems can automatically adjust thermal efforts based on real-time data. Unlike traditional systems that can operate at different speeds or settings, AI can optimise thermal efficiency by changing the intensity and distribution of thermal resources as required. For instance, in a data centre, AI algorithms can direct cooling efforts to hotspots, making sure that no single server or component becomes a failure.

c. *Thermal Energy Efficiency*: AI can sponsor more energy-efficient thermal management. AI programming to optimise when and how cooling resources are used, AI reduces unnecessary energy consumption. Especially this is important in large-scale operations like data centres, where thermal effect represents a large portion of total energy usage. AI can help achieve a balance between keeping optimal temperatures and reducing energy costs.

d. *Fault Detection and Maintenance*: AI systems can sense and detect potential faults in thermal management systems. AI can detect over limit data that might indicate component failure or less efficiencies by continuously analysing sensor generated data. Timely maintenance, reducing downtime and extending the lifespan of equipment will be possible by this early fault detection.

e. *Design and Simulation*: During the design of electronic devices or industrial equipment, these technologies can be used to simulate thermal behaviours under various conditions. This analysis can guide engineers in designing more efficient solution for thermal

management. His algorithms can evaluate more scenarios rapidly, identifying the great effective designs and materials for heat transfer.

Some practical cases of AI&ML algorithms in Thermal Management:

- Companies like Google and Microsoft use these algorithms to manage the thermal conditions of their offices. These systems optimise thermal efficiency, decrease energy consumption, and give reliable operation of servers.
- AI helps manage the thermal conditions of batteries and power systems in electric vehicles. This gives optimal performance, extends battery life, and improves safety.
- AI and ML-driven thermal management is becoming common in laptops, smart phones, and gaming centres. By managing heat properly, these devices can give high performance without overheating.
- In industries, algorithm helps manage the thermal conditions of machinery and during operations also. This increases efficiency, reduces the risk of overheating, and reduces maintenance costs.
- AI algorithms also assemble with other smart home devices, such as smart blinds, fans, and even lighting. By controlling these devices, AI can create a proper environment that improves thermal comfort.
- Thermostat devices also use these technologies to adjust the temperature to keep the home comfortable and energy-efficient.
- AI technologies optimise the operation of heating, ventilation and air conditioning systems to lower energy consumption while people keep comfort. This machine learning understands the thermal dynamics of a building—how shortly it heats up and cools down—these programs will adjust temperature changes and

adjust heating or cooling rapidly. This minimises energy waste and lowers maintenance bills.

6. Application of AI & ML in computational fluid dynamics

Fluid dynamics means the study of fluids (both liquid and gases) when they are in motion. Nowadays, these complex mathematical problems are solved by using software like ANSYS Fluent, etc. The advent of artificial intelligence and machine learning is recreating this field by introducing new ways that improve both the accuracy and efficiency of simulations and analyses.

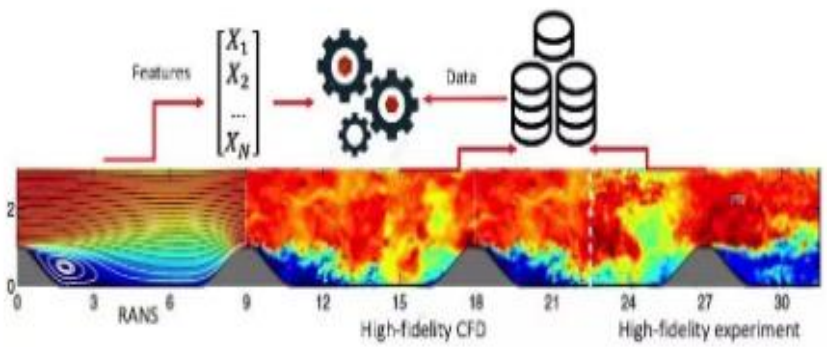

Fig 7. Simplified workflow of machine-learning-enhanced turbulence modelling.

One of the primary advantages of AI and ML algorithms in fluid dynamics is the use of ML to improve the quality of fluid simulations. Traditional computational fluid dynamics (CFD) models require significant computational energy and time. Machine learning algorithms, particularly deep learning methods, may be trained on existing simulation data to estimate fluid behaviour more shortly. These ML models learn to recognise patterns of analysis and relationships within the fluid analysis data. They enable the models to produce. Naga Malleswara Rao and Subhani (2023) found from their article that:

Heat is primary form of energy, fuelling power generation and serving diverse human needs across transportation, households, and power plants. Sensible heat storage in water tanks emerges as an excellent method for incorporating heat into thermal energy systems. These tanks boast benefits like minimal upkeep and efficient heat transfer. In cooling, air conditioning, and heating systems, heat storage tanks play a vital role by storing a considerable amount of energy as heat, ready for deployment during peak demand periods. Hot water, sourced from a collector tank equipped with a mantle heat exchanger, enters the storage tank at the bottom. This temperature difference initiates heat stratification, causing the warmer water to rise due to variations in density at different locations within the tank.

AI also plays a crucial role in the real-time monitoring and control of fluid systems. By adding AI with sensor technology, engineers can develop systems that regularly monitor fluid dynamics in real time. For instance, in the oil and gas industry, AI-powered systems can detect anomalies in pipeline flows, estimation of failures, and suggest preventative measures. This capability not only reduces operational costs but also increases safety by preventing un-expected downtime. AI algorithms can optimise control units for fluid flow management.

Optimisation of Heat Exchangers Using Al & ML

Heat exchangers are mechanical components used to exchange heat between two fluids or more fluids without mixing them in various industrial processes. Their effectiveness directly impacts the total energy efficiency and cost of operations in fields such as power generation, chemical processing, and HVAC systems. Traditionally, the design and optimisation of heat exchangers have depended on old methods and manual calculations. With the usage of AI and ML, there is a data-driven approach that promises increased efficiency and its effectiveness. Common types of heat exchangers are shell-and-tube, plate, and finned tube heat exchangers. Each type is influenced by factors such as fluid properties, flow rates, and temperature

differences. These methods give a good design. They often require iterative adjustments and can take a long time. The complexity of heat exchanger systems, with their nonlinear and multivariable nature, poses serious problems for traditional optimisation techniques. Artificial intelligence offers a strong alternative to traditional methods by using advanced algorithms and large amounts of fluid. AI techniques such as machine learning neural networks and genetic algorithms can model complex relationships between variables, predict performance existence, and identify optimal design parameters for problem.

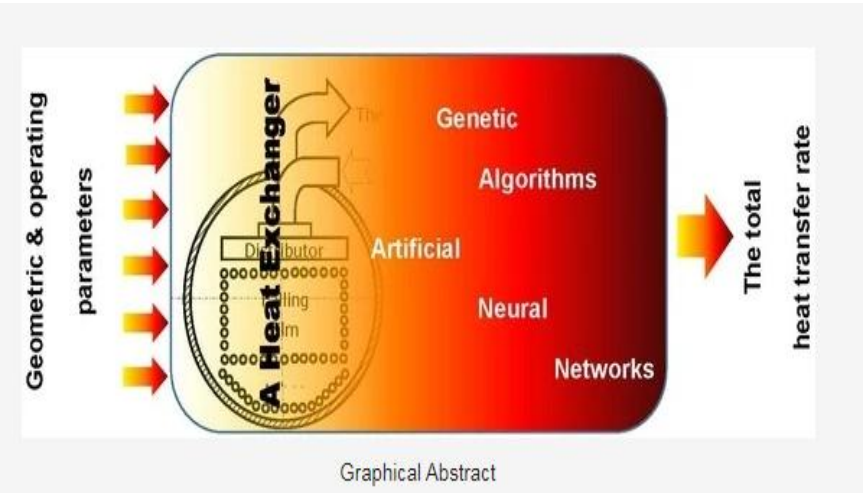

Fig 8. Graphical Abstract using AI&ML

1. **Security**

   As mechanical engineering components are interconnected systems, the risk of unauthorised access increases. The security of AI algorithm applications is necessary to prevent sabotage, industrial espionage, and other malicious activities.

2. **Profit improvement**

   By using AI and ML algorithms, the profit improvement becomes better. In some cases, it becomes high also. From

the use of advanced hardware for equipment to the investment in specialised algorithms and the training of personnel, the financial barriers can be moderate. This is true particularly for small-sized and medium-sized enterprises (SMEs).

3. **Effect of AI and ML in driverless cars**

The implementation of AI and ML in driverless cars in India faces challenges due to the country's roads and also often due to traffic conditions. The road infrastructure in many areas is not good. Marked lanes are damaged often. Road construction is frequent. A mix of various types of vehicles and pedestrians exists on the road. The system must have strength to handle these conditions. This is a highly technical challenge. Gaining public response and positive acceptance for driverless cars is another major problem. Many people may feel fear about the safety and reliability of driverless vehicles.

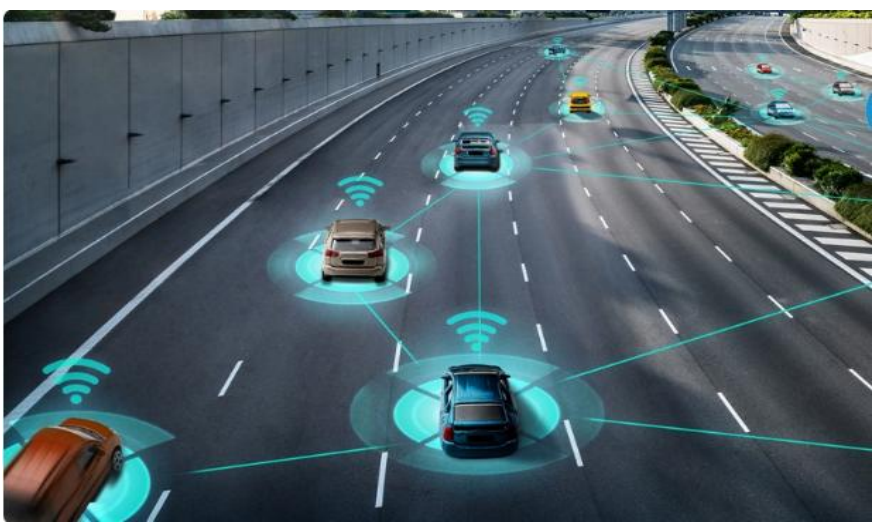

Fig 9. AI & ML technologies in a driverless car

Future Scope

The future scope of AI and ML in the field of mechanical engineering is very exciting. Product designs practically create themselves, optimised for everything from performance to cost and even environmental impact. The promise of AI-driven generative algorithm design and multi-objective optimisation will be easily analysed. With these technologies, we will be able to monitor products throughout their entire lifetime, making them better. Factories will become smarter too, with robots and automation that can learn and adapt quickly, and machines that can warn when they need maintenance, minimising downtime and keeping things running smoothly. These technologies will also help us discover new materials faster than ever before and revolutionise how we use 3D printing, potentially allowing us to create entirely new materials on demand.

Robots will become more collaborative, working alongside us safely and efficiently. Autonomous robots will navigate complex environments with ease. Even complex simulations like computational fluid dynamics will become faster and more accurate, giving us deeper information about how things work. AI will also be a key player in creating more sustainable future developments. Optimising energy

helps us harness the power of renewable energy. Finally, the way we interact with machines will change dramatically, with more natural communication. Some problems must be overcome, such as obtaining enough proper data, having the computing power to train AI and ML models, developing the correct algorithms, integrating everything, and using AI and ML technologies responsibly. Despite these challenges, the potential of AI and machine learning to reshape mechanical engineering is immense, promising a future of more efficient, innovative, and sustainable solutions.

Conclusions

This paper has explored the transformative impact of AI and ML techniques on the field of mechanical engineering. AI and ML are revolutionising how mechanical engineers work and innovate, from design and optimisation to smart manufacturing, predictive maintenance, and thermal management. These technologies offer great potential for developing efficiency, minimising costs, increasing product performance, and supporting sustainability. While challenges remain in areas such as data acquisition, algorithm development, and ethical considerations, the future of AI and ML techniques in mechanical engineering is bright. Continued research and development in these areas will open even greater potential, shaping the future of the field and driving innovation across many industries. The addition of AI and ML is not just a trend but a fundamental shift, promising to create a new era of intelligent and adaptive mechanical systems.

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21ST CENTURY SKILLS: WHAT, WHY AND HOW?

Mohini Mohan Kumbhakar* & Nagendra Kumar♦

Abstract

Unprecedented shifts in education, technology, and the global economy have occurred in the 21st century within which a shift from traditional methods of learning to 21st century skill acquisition comes into focus. Intrapersonal and interpersonal skills which are categorised as cognitive and essential for personal development and survival in a fast-paced world showcase the paradigm shift that is necessary. This paper examines what these skills are and why and how they should be acquired with the aid of frameworks from P21, OECD, UNESCO, and CBSE. The paper emphasises the importance of 21st century skills in providing solutions to unemployment, technological disruption, and rising social inequality. This paper proposes ways to address these challenges through curriculum change, digitalisation, teacher education, and partnership with industry to integrate 21st century skills into education systems. Strengthening 21st century skills enables a person to become a lifelong learner, enhances employability, and fosters responsible citizenship in a fast-moving world.

***Keywords**: 21st-Century Skills, Lifelong Learning, P21, Critical Thinking, Digital Literacy*

Introduction

Education today extends beyond rote memorisation or preparing for an exam. It has emerged as a great support for helping a person to adapt and do well in a highly competitive global village. The impact of globalisation and modernisation have affected almost everything the

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way we live, work, and communicate with one another. Countries and cultures have been interconnected as never before, with globalisation, and technology driven modernisation has redefined industries and opened up new prospects. In addition to these changes, there have also been difficulties, especially for countries like India, where there is an abundance of educated unemployed youth and inadequate education facilities.

India has a distinct set of problems related to its increasing and youthful population. According to the findings from the Periodic Labour Force Survey (PLFS) 2022-23 report, India has an unemployment rate of 6.4% which is greater for the youth. This suggests that educated youth capable of getting jobs are plentiful, yet employment opportunities abound but these educated youth do not possess the relevant skills to increase employability. An ASER report (ASER Centre, 2022) stated that amongst Indians aged 14-18 years, digital literacy is possessed by only 27% which is an essential prerequisite for most professions.

According to Statista (2024), "For individuals with a secondary education or higher, the unemployment figure was approximately 7.1 percent, while for the illiterate populace, it stood at merely 0.2 percent." For new graduates, the remedy is dicier. "As of 2022, 29.1% of graduates remained unemployed, significantly higher than the 3.4% of illiterate unemployed individuals" (Roy, 2024).

Emont (2024) avers, "A diploma does not mean one is employable since most children graduate schools without the relevant skills that employers are desperately looking for, which leads to an educational and occupational mismatch." And according to PLFS even those are slowly diminishing in some regions. "Over 47% among female and 19.3% in male youth population ranging from 15-29 in the Indian state of Kerala were unemployed" (PLFS, 2023-24). In the contemporary economy of the 21st Century, the focus cannot be exclusively on profit and economic growth: whether climate change, inequality, and social

conflict, these global issues need people who can connect humanitarian thoughts. These so-called 21st century skills include not just critical thinking, emotional intelligence, creativity and collaboration, but also how to wipe out the concern to return to the land of mutual citizenship.

1.1 Rationale of the Study

The World Economic Forum (2020) points out that in the future, problem solving, creativity and adaptability will come out as some of the most sought-after skills in workforce. In the same way, the National Education Policy 2020 of India seeks the systematic construction of NEP policies that address for these skills to help learners tackle modern-day challenges. Research like the OECD (2018a) indicates that students who possess strong demonstrative collaborative and critical thinking skills perform better academically and have higher chances of being successful in life.

The 21st century skills are defined as the abilities one requires in order to perform successfully in this rapidly changing world. Traditionally, the education system focused on rote memory, and on teaching basic skills such as the 3 R's. However, with technological advancement, globalisation, and restructuring of labour market, just being knowledgeable is minimal. People are required to demonstrate more sophisticated skills like critical thinking, problem solving, and skilful interaction (Trilling & Fadel, 2009). These skills empower people to tackle modern challenges on personal and professional front.

These are some studies conducted by researchers and organizations to assess the level of 21st-century skills:

Study/Report	Conducted By	Objective	Key Findings	Relevance
PISA (Programme for International Student Assessment)	OECD	Evaluate skills of 15-year-olds in reading, math, science, and problem-solving.	Students from Singapore, Japan, and Finland excel in critical thinking and collaboration (OECD, 2018).	Global benchmark for 21st-century skills in education.
ATC21S (Assessment and Teaching of 21st Century Skills)	Cisco, Intel, Microsoft, Universities	Develop frameworks and assessments for 21st-century skills.	Collaborative learning improves problem-solving and communication skills (Griffin et al., 2012).	Provides tools for measuring and teaching 21st-century skills.
WEF Future of Jobs Report	World Economic Forum	Analyse skills required for the future workforce.	Critical thinking, creativity, and emotional intelligence are top skills needed by 2025 (WEF, 2020).	Highlights workforce readiness and skill gaps.
ASER (Annual Status of Education Report)	PRATHAM (India)	Assess foundational and higher-order skills among Indian students.	Only 50% of Grade 5 students can read Grade 2-level text; experiential learning improves problem-solving (ASER, 2022).	Critical insights into 21st-century skills in India.
NRC Study on 21st Century Skills	National Research Council (USA)	Define and measure 21st-century skills in education and workforce.	Cognitive, interpersonal, and intrapersonal skills are essential for success (NRC, 2012).	Comprehensive framework for understanding 21st-century skills.
PIAAC (Programme for the International Assessment of Adult Competencies)	OECD	Assess adult skills in literacy, numeracy, and problem-solving.	Adults with strong problem-solving and digital literacy skills earn higher wages (OECD, 2016).	Highlights the importance of lifelong learning and adaptability.
NEP 2020 Implementation Studies	Indian research organizations	Assess integration of 21st-century skills in Indian education post-NEP 2020.	Schools adopting experiential learning report improved creativity and critical	Insights into 21st-century skills implementation in India.

			thinking (CBSE, 2021).	
McKinsey Global Institute Report on Skill Shifts	McKinsey	Analyse changing demand for skills in the global workforce.	Demand for social-emotional and technological skills is growing rapidly (McKinsey, 2021).	Emphasises workforce transformation and skill priorities.
UNESCO Global Education Monitoring Report	UNESCO	Assess progress toward global education goals, including 21st-century skills.	Countries prioritizing GCED and ESD report higher student engagement (UNESCO, 2020).	Links 21st-century skills to sustainable development goals.
NIMHANS Life Skills Studies	NIMHANS (India)	Assess the impact of life skills education on mental health and academics.	Life skills training reduces stress and improves academic motivation (NIMHANS, 2018).	Highlights the importance of intrapersonal skills in India.

The studies above clearly indicate the necessity of 21st century skills.

Research Questions

1. What are 21st-century skills and why they are necessary in the present day?
2. How these 21st-century skills can be acquired in the learners?

Research Objectives

1. To identify the core 21st-century skills and their importance in addressing modern challenges like employability and technological disruption.
2. To explore strategies for integrating these skills into education systems through curriculum design, teacher training, and digital tools.

Methodology

This study is based on an extensive literature review, which includes the collection, examination, and construction of all available work including articles, societies reports, and schemes on 21st-century skills.

To comprehensively examine the subject matter, the literature review technique was integrated, involving policy and organizational documents aside from academic studies.

1.2 Importance of 21st-Century Skills

The importance of the 21st century crucial skills is based on education, technology, and economy trends. In the findings of the research, it is noted that the traditional education systems which relied on rote learning, and standardised assessments, were not able to adequately equip learners with the required skills for modern-day challenges (Bell, 2010). Studies in Europe and in the United States indicate that implementing 21st-century skills into existing curricula improves student engagement, innovation, and application of knowledge in real life (Fullan, 2013). The digital divided as well as global competencies were marked by The Organization for Economic Co-operation and Development as pertinent for the functioning within the modern advanced economies (OECD, 2018). The World Economic Forum (2020) claimed that with the advancement of automation, emotional and critical thinking will likely be essential skillsets for employment in the future. Binkley et al. (2012) provide evidence of a widely used framework that divides 21st-century skills into cognitive, intrapersonal, and interpersonal outlined skill areas. In the same line, Voogt and Roblin (2012) point out the necessity of digital skills and versatility and argue that technology-based educational experiences are needed to be incorporated in all education systems at present to prepare students for the future. Notably, Kim et al. (2019) pointed out that the educational systems in East Asia, which historically laid emphasis on rote memorisation, are now adopting competency-based education in order to stay relevant in the global economy. In India, the demand for 21st-century skills is driven by rapid digitalisation, policy changes, and economic growth. The National Education Policy (NEP) 2020 highlights critical thinking, experiential learning, and technological literacy as key components of future-ready education (Ministry of

HRD, Government of India, 2020). Studies suggest that India's higher education sector must bridge the employability gap by integrating skill-based training (Sharma & Singh, 2018). Nair et al. (2019) found that graduates in India often lack problem-solving and communication skills, requiring curriculum reforms emphasising soft skills and industry engagement. Mishra (2021) found in his study that India's increasing reliance on technology-driven sectors, students must be proficient in digital tools, coding, and data analytics. Similarly, Kumar et al. (2022) analyse the role of ICT (Information and Communication Technology) in developing employability skills, emphasising the need for teacher training and digital infrastructure in rural education. Some very important areas for which 21st century skills are important are as follows:

Educational Outcomes and Student Development

21st-century skills enhance learning outcomes and prepare students for lifelong success. The OECD's PISA reported that students with strong collaborative problem-solving skills did far better academically and they were better prepared for higher education (OECD, 2018). A study by CBSE (Central Board of Secondary Education, 2020) reported that schools integrating 21st-century skills into their curriculum found 15–20% improvement in student engagement and academic performance. The study also noted that project-based learning and experiential activities fostered creativity and critical thinking among students.

Social and Emotional Well-Being

In the case of social capital and emotional health, resilience, empathy, emotional intelligence, and many other 21st century skills seem to be predictors of stronger social cohesion. Stress management, interpersonal communication, emotional regulation and other life skills that WHO (1999) considered invaluable with regard to promoting healthy living, are necessary for attending to mental health issues. Trained students in emotional intelligence and conflict resolution

showed higher motivation towards academic goals and lower value towards stress according to a NIMHANS (Lalitha N, 2018) study.

Global Citizenship and Sustainability

Education for global citizenship and sustainability allows learners to tackle climate change, social inequalities, and cultural integration, which are challenges of the modern world. These efforts were supported by UNESCO (2015), which noted the importance of Global Citizenship Education (GCED) and Education for Sustainable Development (ESD) in constructing a non-indifferent society. As a pioneer in promoting global citizenship through its secondary education system, India has previously developed the National Curriculum Framework (NCF, 2005) that integrates citizenship and education for sustainable development. A study by PRATHAM (2017) found that students exposed to GCED were more likely to participate in community service and environmental initiatives.

Digital Literacy and Technological Advancements

The emergence of digital technology needs technological competency for involvement in modern society. Digital literacy is considered by the National Research Council (2012) is a great foundation for information accessibility, effective communication, and problem-solving in this digital era. NITI Aayog (2019) said that Indian states with greater digital literacy saw rapid economic growth and healthcare and education accessibility. It also reported the importance of training in digital skills to bridge the rural-urban divide.

Adaptability and Lifelong Learning

In the dynamic 21st-century environment, individuals must constantly update themselves with new knowledge and skills. OECD (2018b) recognized lifelong learning to be one of the competencies to deal with the uncertainties of the evolving workforce. It recognized that people who adopt lifelong learning are more resilient and can adapt to new situations. National Skill Development Corporation also recognized

that Indian employees who demonstrated high adaptability and continuous learning were more successful at transitioning across industries and functions.

2. What are the 21st-Century Skills

21st Century skills carry a vast category of required knowledge, skills, and character traits exemplifying mastery and productivity in today's world, especially for academic programs or when searching for new job opportunities. OECD classifies 21st century skills into three groups:

- Cognitive Skills: These consist of a critical component which is thinking, problem-solving, and creativity. Alongside incorporating and utilise adapting making informed decisions, cognitive skills assist and enable one to analyse complex information and generated a new idea (OECD, 2018b).
- Interpersonal Skills: These include communication, collaboration, and teamwork. Together, these skills aid in effective partnership, be it in person or virtually, with other members of the team or group (OECD, 2018b).
- Intrapersonal Skills: Adapting and Self-regulation studies along with continuous learning is classified in this skill. Intrapersonal skills enable a person to manage their emotions, adapt in change, and train themselves. (OECD, 2018b).

Below are some popular frameworks of the 21st-century skills:

1. Partnership for 21st-Century Skills (P21)

One of the most powerful frameworks of skills for the 21st-century is P21. Integrating cognitive and both interpersonal and intrapersonal skills is emphasised, which are essential in the contemporary world. The P21 framework categorises skills into three main areas:

- Learning and Innovation Skills: Critical thinking, creativity, collaboration, and communication (often referred to as the '4Cs') (P21, 2009).
- Information, Media, and Technology Skills: Digital literacy, information literacy, and media literacy.
- Life and Career Skills: Flexibility, adaptability, initiative, social and cross-cultural skills, productivity, and leadership.

2. OECD (Organisation for Economic Co-operation and Development)

The OECD, through its PISA, focuses on skills that helps individuals to survive in a globalised and digital economy. The OECD has three key competencies:

- Cognitive and Metacognitive Skills: Critical thinking, problem-solving, and the ability to learn how to learn (OECD, 2018b).
- Social and Emotional Skills: Collaboration, empathy, and conflict resolution.
- Practical and Physical Skills: Digital literacy and the ability to use tools effectively.

The OECD also gives importance of global competence, which includes the ability to examine local and global issues, understand diverse perspectives, and take action toward sustainable development (OECD, 2018b).

3. WHO (World Health Organization)

The WHO focuses on life skills that promote mental well-being and resilience, particularly among young people. These skills are essential for personal development and health. The WHO identifies the following core life skills:

- Critical Thinking and Decision-Making: Analysing information and making informed choices.

- Interpersonal and Communication Skills: Effective communication, empathy, and relationship-building.
- Coping and Self-Management Skills: Stress management, emotional regulation, and resilience (World Health Organization, 1999).

4. UNESCO (United Nations Educational, Scientific and Cultural Organization)

UNESCO emphasises global citizenship education (GCED) and education for sustainable development (ESD) as key components of 21st-century skills. UNESCO's framework includes:

- Cognitive Skills: Critical thinking, problem-solving, and creativity.
- Social and Emotional Skills: Empathy, collaboration, and conflict resolution.
- Behavioural Skills: Responsible decision-making and action-taking for sustainable development (UNESCO, 2015).

UNESCO also underscores the importance of digital literacy and cultural literacy in promoting inclusive and equitable societies.

5. CBSE (Central Board of Secondary Education, India)

The CBSE in India has integrated 21st-century skills into its curriculum to prepare students for the demands of the modern world. The CBSE framework includes:

- Learning Skills: critical thinking, creativity, collaboration, communication.
- Literacy Skills: information literacy, media literacy, technology literacy.
- Life Skills: flexibility, leadership, initiative, productivity, and social skills (CBSE, 2020).

CBSE also emphasises experiential learning and project-based learning to help students apply these skills in practical contexts.

6. Other Frameworks

Other organizations and initiatives have also contributed to the discourse on 21st-century skills:

- World Economic Forum (WEF): The WEF identifies skills such as complex problem-solving, emotional intelligence, and cognitive flexibility as critical for the future workforce (WEF, 2020).
- National Research Council (NRC), USA: The NRC categorises 21st-century skills into three domains: cognitive, intrapersonal, and interpersonal (National Research Council, 2012).

3. Why 21st-Century Skills?

The following are the 21st-century skills and why they are necessary, with evidence derived from various studies:

Critical Thinking and Problem-Solving

Critical thinking allows people to assess information, analyse evidence, and make informed decisions in complex situations. In the era of rapid change, such abilities are crucial for addressing new problems. Critical thinking and problem-solving are the most important tools for achieving academic and work success. Such abilities allow people to adapt to changing situations and bring about innovation to combat problems (National Research Council, 2012). Critical thinking and problem-solving were among the most sought-after skills by employers across all industries by the World Economic Forum (2020) in its report, particularly with the automation of repetitive tasks.

Collaboration and Communication

With globalisation and integrated workplaces, teamwork across geography and cultures is the order of the day. Communication that is effective promotes understanding and conflict reduction. Collaborative work is no longer a skill in the modern age—it is required. Efficient communicating teams are more innovative and productive (OECD, 2018). Research by Pellegrino and Hilton (2012)

revealed that students who were trained to work together performed 15-20% better in workplace simulations than students who were not so trained.

Creativity and Innovation

Creativity fuels technological innovation, entrepreneurship, and art. It is vital for economic development and the solution to social problems. It is the driving force for the knowledge economy. Creativity enables people to generate innovative ideas and envision new things (Partnership for 21st-century Skills, 2009). A World Economic Forum report (2020) identified that creativity is among the most vital skills for the workforce in the future because industries are increasingly depending on innovation to be competitive.

Digital Literacy

Technology touches every part of life, including education and healthcare. Digital literacy enables the ability to use digital tools effectively and securely. Digital literacy is no longer a choice but an imperative to be an active agent in the contemporary era (National Research Council, 2012). According to a UNESCO (2015) survey, students with stronger digital literacy skills are 30% more likely to excel in the STEM areas and be able to keep pace with technological advancements.

Adaptability and Lifelong Learning

The quick pace at which technology is growing, it is the need for people to keep updating their skills on a continuous basis. We need to adapt to it to be able to cope with fluctuating employment markets. Lifelong learning is very important to ensure employability, especially with the shortening lifespan of skills (OECD, 2018). It is predicted by the World Economic Forum (2020) report that by the year 2025, 50% of all the workforce will need to be reskilled due to automation, underlining the importance of adaptability.

Emotional Intelligence and Resilience

Emotional intelligence fosters healthy relationships, mental health, and effective leadership. Resilience equips individuals to manage stress and recover from adversity. Emotional regulation and empathy are core life skills that form the cornerstone for the mitigation of mental disorders and the establishment of peaceful societies (World Health Organization, 1999). A World Economic Forum (2020) meta-analysis confirmed that individuals with high emotional intelligence realised a 20% boost in work productivity and improved teamwork.

Global Citizenship and Sustainability

Global issues such as climate change, social injustice, and epidemics require thinking outside the immediate context and responsible actions. Sustainable development education will enable the learner to make responsible decisions which will contribute to environmental conservation and social justice (UNESCO, 2015). Research by CBSE (2020) reported that the students who were given global citizenship education demonstrated 25% increased participation in community work and environmental activities.

4. How (to Improve) 21st-Century Skills

21st-century skills development calls for an integrated strategy that combines education, workforce development, and lifelong learning. Here is an in-depth examination of the most crucial strategies:

1. Curriculum Integration and Educational Reforms

a) Active Learning Strategies

- Flipped Classrooms: Research indicates that flipped classrooms, whereby students view lecture material before class and spend class time doing discussions, enhance problem-solving and thinking abilities (Bishop & Verleger, 2013).

- Collaborative Learning: Peer interaction and group activities develop teamwork and communication skills (Johnson & Johnson, 2014).
- Critical Digital Pedagogy: CDP allows instructors to design learning experiences that cultivate critical thinking, creativity, communication, and collaboration—what is commonly known as the 4Cs (Kumbhakar et al., 2024).
- Experiential Learning: Simulation and fieldwork experiences enable students to apply knowledge to real life (Kolb, 2014).

b) Skill-Based Testing and Evaluation

- Traditional tests primarily test for memorisation and not for competencies. Formative assessments like portfolios, case studies, and peer review provide a more comprehensive assessment for skills like creativity and critical thinking (Brookhart, 2013).
- Practical performance-based evaluations, whereby students carry out skills in real-world contexts, are being used more and more as a method to test 21st-century skills (Shute & Becker, 2010).

2. Integration with Digital and Technology

a) Artificial Intelligence (AI) and Adaptive Learning

- AI-powered personalised learning platforms recognize students' strengths and weaknesses and build individualised learning paths (Luckin et al., 2016).
- Virtual assistants and chatbots facilitate interactive learning experiences and provide academic support (Holmes et al., 2019).

b) Virtual Reality (VR) and Augmented Reality (AR) in Education

- Virtual reality-based simulations facilitate experiential learning by making the students experience real-life situations, thereby

enhancing problem-solving and decision-making abilities (Radianti et al., 2020).

- Augmented reality applications, such as digital overlays, strengthen subjects such as engineering, medicine, and history to render them more interesting and interactive (Wu et al., 2013).

c) Cybersecurity and Digital Literacy Education

- Digital competency transcends the use of computers to include ethical awareness, knowledge about cybersecurity, and online collaboration (Hague & Payton, 2010).
- Schools need to incorporate cybersecurity awareness programs to educate students about safe internet use and security measures for data (Livingstone et al., 2017).

3. Teacher Training and Professional Development

a) Continuous Professional Development (CPD) Programmes

- Online certification courses and regular workshops help instructors keep up with the latest teaching practices (Desimone, 2009).
- Courses like Planning to Teach with Technology, and Applying Knowledge of Technology to Teacher Education under the Teacher Educator Technology Competencies (TETCs) initiative provide technology-rich teaching methods training (Foulger et al., 2017).

b) Peer-Learning Networks for Teachers

- Establishing professional learning communities (PLCs) enables the exchange of the best practices among the teaching staff, reflective teaching, and the joint development of new teaching approaches (Vescio et al., 2008).

4. Industry and Workplace Cooperation

a) Industry-Based Skill Certifications

- Google IT Support, AWS Cloud Practitioner, and IBM Data Science certifications validate skills for the role and make the person more hireable (Katz & Koutroumpis, 2021).
- It encourages students to follow these certifications along with formal education to bring together academic learning with industry needs (OECD, 2020).

b) Apprenticeships and Work-Based Learning

- Practical knowledge and flexibility in the workplace are promoted by work-integrated learning frameworks like internships, apprenticeships, and cooperative education (Smith & Ferns, 2010).
- University-industry partnerships formulate joint research projects and skill development programs according to the workforce needs (Boud et al., 2018).

5. Policy and Institutional Support

a) Educational Policies at The National Level

- India's NEP 2020 aims at making interdisciplinary education, experiential education, and vocational learning important (Ministry of HRD, Government of India, 2020).
- Sahlberg elaborates how Finland's education framework favours skill development as opposed to a singular focus on standardised examinations, allowing greater autonomy and innovative thinking within student (Sahlberg, 2011).
- Policies such as SkillsFuture, which assists in funding skill development for adult learners, is one of the many ways Singapore's Future Economy Council (FEC) promotes a culture of continuous education (Ng, 2018).

b) Global Collaboration for Skill Development

- UNESCO's Global Education 2030 Agenda and OECD's Learning Compass 2030 are examples of international initiatives that promote competency-oriented education across nations (OECD, 2018; UNESCO, 2022).

Conclusion

In the contemporary age, modern education frameworks around the globe are responsive to the needs of the learners' world, shaped by advanced technologies, globalisation, as well as a multidisciplinary approach to problem-solving, information, skills, and competencies. Education systems, traditionally aimed at learning retention, must now be developed accordingly. A broad range of competencies such as critical thinking, creativity and innovation, collaboration, communication, digital literacy, and life skills has become fundamental to achieving success in addressing various objectives and complex issues like social inequality, economic disparity, technological disruption, global competition, and more.

The pupils shall be prepared for the 21st-century changes in innovation through educational advancements set forth by various organizations and institutes such as P21, OECD, UNESCO, and CBSE. The challenges of modern education can be solved; these also include the best practices of modern pedagogy, including but not limited to project-based education, IT literacy courses, as well as regular teaching refresher courses. These also provide capacity for teachers to ensure equal opportunity, allowing children to benefit from education regardless of social background. These attributes to assess children in a certain geometry should not discriminate.

Skills for the 21st-century are therefore not merely a feasible approach to meet modern education needs but are perceived as a necessity in the life of society. Through the delivery of these skills to people, we can propel innovation, attain equity, and create an inclusive and sustainable future. It will be crucial in the future to make these skills the priority

in education and workforce development to realise the potential of people and be successful in the 21st-century and beyond.

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ETHICAL CONSIDERATIONS IN THE USE OF TECHNOLOGY IN HIGHER EDUCATION

Sandeep Kumar

Abstract

Higher education is becoming increasingly dependent on technology, which is transforming the methods of instruction, the operations of the institutions, and the learning experiences of undergraduate students. Academic settings have seen major improvements in accessibility, flexibility, and efficiency as a result of the implementation of digital tools such as learning management systems (LMS), artificial intelligence (AI), virtual classrooms, and data analytics. By providing students with opportunities for interactive learning and access to a large array of educational resources, instructors are able to collect useful information that can be used to improve instructional tactics and increase student engagement. The in-corporation of technology into higher education, on the other hand, presents a number of difficult ethical concerns that will need to be addressed by institutions in order to guarantee re-sponsible and equitable utilisation. These key ethical challenges include the protection of personal data, the integrity of academic institutions, the promotion of digital equity, the re-sponsible application of artificial intelligence (AI), and the utilisation of digital communication and social media applications. The ethical implications of technology in higher education are investigated in this article, which also discusses the most significant issues and comes up with some proposals to address those challenges. The essence of this work is theoretical, and it includes both a comprehensive literature survey and an examination of critical discourse. Developing concepts and thoughts are presented in a thematic manner throughout the article, which also examines these themes and makes suggestions for viable methods to alleviate ethical concerns. When it comes to the ongoing digital revolution of higher education, it is advised that institutions should make ethical considerations a top priority, adopt

comprehensive regulations, and put in place protections that promote justice, inclusion, and respect for student rights. The purpose of this study is to investigate these ethical concerns in greater depth and to offer suggestions for the development of a digital higher education system that is strengthened and more responsible.

Keywords: *Technology, Higher Education, Ethical Concerns, Data Privacy, Academic Integrity, Social Media*

Introduction

Technology is one of the most essential aspects in higher education that has changed the positioning of institutional functioning, pedagogy of teachers and learning practices and process of learners. Learning management systems (LMS), artificial intelligence (AI), virtual classrooms, and data analytics have made learning and academic context efficient, flexible and accessible for all. While educators gain from data-driven insights that improve teaching strategies and student engagement, students have access to a wealth of materials and interactive learning opportunities through online education platforms, digital libraries, and collaborative tools. However, it is imperative that institutions thoughtfully and insightfully deal and address the ethical concerns associated with the use of technology in higher education.

A comprehensive data relating with teachers, students, their academic portfolios, personal information is stored digitally and hence the privacy of data is very important ethical concern while using technology. It is the responsibility of the institutions to provide utmost care to the data and protect from any susceptible use, illegal access and commercial use where it can be harmful for the learners, teachers and other officials. The employment of AI-powered proctoring software and monitoring systems raises ethical questions as well since, despite their good intentions, they may violate students' privacy and autonomy. So, institutions must follow the lawful procedures for collecting and storing such data.

The second concern is the availability and accessibility of digital resources. Due to different socioeconomic backgrounds, digital life is not easy for everyone. Some have more resources, whereas others do not have enough resources to meet even their daily needs. This digital divide is very high in India. Owning a mobile phone and assuming that everyone has become digitally equipped is a myth. So, despite the numerous benefits of digital education, resources are not equally accessible. Facilities such as a good internet connection and the latest modern technology are costly and not within the financial capability of everyone. Especially for pupils from low-income families or those living in rural areas, this inequality can increase already existing educational inequalities and create obstacles to learning. To address these concerns, if the state wants a digital nation, it must provide the required digital literacy to all and make sure that online learning environments are constructed inclusively.

Another ethical concern is related to academic integrity while using technology in higher education. There are various tools and artificial intelligence (AI)-supported systems which help in developing content and make it easy to access information; however, they also create issues of plagiarism, fraud and unauthentic use of available resources. In the long run, it increases dependency on digital tools and hinders creativity in developing alternatives to existing practices. AI-driven text creation, such as by ChatGPT, poses a great threat to the originality and authorship of academic writings. To address such concerns, higher education institutions must develop clear guidelines so that a culture of academic integrity can be promoted in higher education.

Significant thought must be given to the ethical ramifications of surveillance technology used in higher education. To monitor student behaviour during online tests or measure involvement in virtual learning environments, many colleges use monitoring tools driven by artificial intelligence. It is important to recognise that technology should be used to maintain transparency, reduce bias and conduct

objective, unbiased assessment, but it is observed that use of technology has given rise to worries about overzealous monitoring and biased assessment.

Ethical concerns around consent and data security also arise from the use of biometric information, such as facial recognition for authentication. To address such issues, higher education institutions must develop a mechanism for upholding academic integrity and representing learner freedom and privacy rights.

Ethical issues must continue to be at the forefront of decision-making processes as higher education embraces the digital revolution. It is the responsibility of higher education institutions to maintain academic integrity, privacy, digital equity and judicious use of technology. Universities need to work on justice and inclusive practices for students while developing a technology-savvy environment and encouraging innovation with the help of modern technological advancements. Needless to say, ethical norms must also be considered important while using technology in various spheres of higher education.

This article addresses aforesaid ethical concerns in detail with suitable suggestive measures a university can take to make its digital system more robust.

The following themes have emerged from the literature review, and critical discourse analysis is being discussed:

1. Data Collection and Student Privacy
2. Academic Integrity and Plagiarism Detection in Higher Education
3. Digital Equity and Access in Education
4. The Role of Artificial Intelligence in Higher Education
5. Ethical Use of Digital Communication and Social Media

Data Collection and Student Privacy

In contemporary times, higher education institutions have started incorporating digital tools in administrative and academic work, which makes the data available on the web and renders it more vulnerable with regard to the security and privacy of the students. No doubt, technology enhances the efficiency of the work of the university, but creates more challenges to keep the data safe and secure. The data regarding students' financial status, academic performance and other information can be dangerous and harmful if leaked from the university safety portal. Numerous moral concerns are associated with using technology in higher education. In addition to discussing best practices for ethical data handling, this study examines important concerns surrounding data privacy and security in higher education.

Data Collection and Student Privacy

Advanced technology has provided various tools and methods to be used for different functions in the university. Some of these tools are LMS (learning management system), biometric authentication, online classes and tests, and other analytical tasks supported by artificial intelligence. Ethical questions of consent, monitoring, and possible information misuse arise from these tools, even though they enhance academic performance tracking and tailor learning experiences (West et al., 2019, p. 25).

To track the progress of students and declare their results, learning analytics is used by many educational institutions. While such analytics could help educators tailor lessons and offer quick responses, the degree to which students know about and consent to this data collection remains a vital ethical issue (Slade & Prinsloo, 2018, p. 14). Students have the right to be aware of the information collected, the purpose, and who can access it, and it is the responsibility of institutions to maintain transparency and safety of the data collected. Avoiding this will surely violate the autonomy of the students.

Cybersecurity Threats in Higher Education

Cybersecurity vulnerabilities are risks associated with growing technological use in higher education. Because institutions retain highly sensitive data, hackers constantly attempt to breach the data and present a threat to the system. Some common cybersecurity threats are data breaches, phishing attacks, ransomware and other forms of insider threats (Jones & Salo, 2018, p. 310). Information about students and faculty may be compromised by a data security breach, which could result in identity theft, financial fraud, and damage to the institution's reputation. These incidents emphasise how critical it is to put strong cybersecurity measures in place, such as encoding, multi-factor authentication, and ongoing system monitoring, in order to safeguard sensitive data.

Legal and Ethical Considerations

It is necessary to develop legal rules to protect data and maintain ethical values. The General Data Protection Regulation (GDPR) is in place in Europe for this purpose. India also needs to develop such rules for better use of technology in higher education institutions. Prioritising student privacy is an ethical duty that institutions have in addition to following the law. Ethical data management is an essential aspect of safe data use. This management must guarantee that data is used only for educational purposes and collected with the due consent of the students. A routine audit of data must also take place regularly to improve safety against cybercrime.

Best Practices for Data Privacy and Security

Higher education institutions should implement the following best practices to address privacy and security concerns:

- Institutions must follow all applicable laws to protect data and set institutional rules for collecting data, storing it, and granting access to it. To guarantee the moral management of student data, universities should abide by laws.

- Strengthen cybersecurity infrastructure: Unauthorised access and online dangers can be avoided by investing in firewalls, encryption, and secure authentication systems. To prevent data breaches involving student information, educational platforms should use multi-factor authentication, encryption, and secure servers (Williamson et al., 2020, p. 355).
- Transparency in data gathering: Educational institutions must inform the purpose and process of data collection clearly and transparently. They should also allow students to opt out if they do not want to share data. Students should have control over their personal data and be made aware of their rights.
- Perform regular security audits: Regular evaluations of security procedures aid in locating weaknesses and improving data security safeguards.
- Educate stakeholders on cybersecurity: It is essential to educate all stakeholders in colleges and universities, including learners, about cybersecurity, possible dangers, privacy hazards, and other online breaches.
- Minimal data collection: It must be guaranteed that only necessary data is collected. All other data collected merely for the sake of collection should be strictly prohibited.

In higher education, data security and privacy are crucial ethical issues, especially as institutions depend more on digital platforms for administration and instruction. The prime responsibility of universities should be to protect students' information from any kind of cyber threat. This can be achieved by setting and applying strong safety measures, abiding by the law and encouraging ethical data management systems. Institutions may protect sensitive data while making sure that technology continues to improve educational opportunities by cultivating a culture of privacy awareness and openness.

Academic Integrity and Plagiarism Detection in Higher Education

Engaging in original work, moral and ethical scholarship, and working with the principles of honesty and justice is one of the essentials of maintaining academic integrity in higher education. It is important to note that the increasing use of technology in academia has also increased concerns about plagiarism and academic dishonesty because of the availability of massive resources online (Gallant, 2017, p. 1). Institutions have implemented various tools to detect plagiarism and have developed strong guidelines to address these issues. Although these actions support upholding academic standards, they also raise moral concerns about student privacy, equity, and the efficiency of automated detection systems.

The Importance of Academic Integrity

Academic integrity is one of the most important aspects for developing a culture of ethical scholarship and the academic reputation of an institution. If students and teachers commit plagiarism, cheat on content, and fabricate unauthentic data, the institution will gradually diminish quality and authentic knowledge creation (Bretag, 2019, p. 25). Therefore, universities need to put plans in place to encourage a culture of integrity and responsibility among staff and students. Lack of academic integrity can harm students, teachers, and the institution and can lead to serious repercussions, which eventually question the academic integrity of the institution. Academic credentials are used by employers as a gauge of competency, and unethical behaviour can damage the reputation of a university and its graduates (Gallant, 2017, p. 1). As a result, contesting academic deceit and plagiarism is essential to assuring that pupils gain the abilities and information required for achievement in the workplace.

Plagiarism and Its Forms

Presenting someone else's words, ideas, or work as one's own without giving due credit is plagiarism, a serious breach of academic integrity. It can manifest in a number of ways, such as:

- Direct plagiarism: when someone copies an entire text from a source without giving due credit.
- Self-Plagiarism: Publishing self- work time and again, such as same work published more than at one place.
- Patchwriting: when content is paraphrased but the ideas, concept and essence is same.
- With the growth of online essay mills, contract cheating—paying a third party to finish academic work—is becoming a bigger problem (Lancaster & Clarke, 2016, p. 4).

Plagiarism detection has become more difficult due to the accessibility of online resources and the existence of content produced by artificial intelligence (AI). Concerns have been expressed regarding the possible misuse of AI-based text generators, including ChatGPT, in academic settings (Cotton et al., 2023, p. 6).

Plagiarism Detection Technologies

Plagiarism detection programmes such as Turnitin, Grammarly, and Copyscape are used by many educational institutions for providing safeguard from plagiarism. To find possible matches, these systems have capability to compare student submissions to large databases of scholarly articles, websites, and previously submitted work.

Effectiveness of Plagiarism Detection Tools

Tools for detecting plagiarism have shown promise in detecting both self-plagiarism and straight copying. They do have certain restrictions, though, such as:

- False Positives: Common phrases and legitimate sources could be reported as plagiarism.
- Incapacity to Spot Contract Cheating: When students turn in work that has been written by someone else, tools are unable to spot it.
- Issues with AI-Generated Content: Since AI-generated content can avoid detection, new tactics for enforcing academic integrity are needed (Cotton et al., 2023, p. 8).

Ethical Concerns with Plagiarism Detection Software

Even when they promote academic honesty, tools for spotting plagiarism raise ethical issues. Some teachers and students argue that such tools create undue pressure on students and promote a society of distrust. Moreover, students often must send their work to private databases in order to access plagiarism detection tools, which calls into question data privacy and intellectual property rights (Eaton,2021,p. 4).

Promoting Academic Integrity Beyond Detection

Academic integrity cannot be guaranteed by plagiarism detection alone. Universities need to have a comprehensive approach that consists of:

- Citation and Research Ethics Education: Students are to be educated towards the values of authentic work and how this authentic work contributes qualitatively to the discourse.
- Redesigning Assessments: Developing innovative and authentic assessment practices can reduce the possibility of plagiarism and content cheating.
- Use of Plagiarism Detection Tools: Tools such as Turnitin and Grammarly can be used to locate plagiarism, but teachers should use it judiciously and with responsibility, where no student is punished unnecessarily and unfairly.

- Restructuring Online Proctoring: Care should be used while using AI-based proctoring software because overzealous monitoring may violate students' privacy. Alternative evaluation techniques should be investigated by institutions in order to lessen their need on intrusive proctoring (Holmes et al., 2019, p. 36).
- Ethical Assessment Design: Universities must think of alternative assessment and evaluation practices, where more focus must be given to open books examination, project based learning and collaborative peer learning (Simpson, 2021, p. 167).
- Encouraging Academic Honour Codes: The environment of honest and academic integrity can be developed by teaching students about the value of original work and ethical research methods.

Thus, for preventing the reputation and quality contribution of an institution, it is essential to maintaining academic integrity in higher education institutions. The plagiarism tool along cannot uphold the academic authenticity, there is also a great need to develop sensitivity towards moral and ethical responsibility in research and academic writing. To guarantee desirable learning outcomes, universities must find a balance between enforcing technology and encouraging a culture of academic integrity.

Digital Equity and Access in Education

The evolution of teaching and learning driven by increasing reliance on digital technologies in education has made knowledge more accessible than ever. Not every student has equal access to digital tools, which creates variations in the possibilities for learning. Digital equity is fair and inclusive access to technology, internet connectivity, and digital literacy, so that all students—regardless of socioeconomic status, location, or disability—may gain from digital learning (Warschauer & Matuchniak, 2018, p. 180).

Despite the fact that technology has immense potential for improving the educational opportunity and learning, disparities still exist due to

various reasons such as lack of technological devices, digital literacy, poor or limited internet connection, and other related issues. Along with this, students who belong to poor economic backgrounds, live in rural areas, and have a particular attitude towards technology also face challenges in the usage and accessibility of technology and experience inequalities. Developing a more fair and inclusive educational system requires attention to digital equity.

Barriers to Digital Equity

Socioeconomic Disparities

Digital inequality is mostly caused by the socioeconomic gap. Many low-income pupils lack access to required digital tools including laptops, tablets, and reliable internet connection (Van Dijk, 2020, p. 101). Many students were unable to engage online when schools moved to virtual learning during the Covid-19 epidemic since they lacked sufficient technology at home. This revealed the digital gap.

Various studies proved that students who do not have sufficient digital or technological support at home, their academic performance has suffered (Selwyn & Facer, 2019, p. 23). The accomplishment gap is further widened when pupils are unable to access digital learning resources, complete homework, or participate in online discussions due to a lack of technology at home.

Internet Connectivity Challenges

Digital learning calls for regular internet access; nonetheless, many students, mostly those in rural and distant areas, struggle with poor connection. The "homework gap" is the term used to describe millions of Indian students' lack of access to broadband internet at home. According to the Federal Communications Commission (FCC), the same holds true for the work in United States as well; connection with decent internet in rural area is quite low (AGL Information & Technology, 2024). Without high-speed internet, students find it difficult to attend virtual classrooms, stream instructional materials,

and submit online assignments. It is very difficult for student to engage with online engagement such as taking classes, accessing material and submitting assignment if having poor internet connectivity.

The situation becomes grimmer when it comes to underdeveloped countries, where infrastructure is a major problem with regard to accessibility, availability and approachability of digital facilities. Students in underprivileged context find it even more tough to stand in competition with people those have more approachability to resources and this widen their gap which deteriorates the educational inequality.

Digital Literacy and Technological Skills

A key component of digital equality that transcends mere access to devices and the internet is digital literacy, or the ability to use technology effectively and wisely (Resta & Laferrière, 2015). Especially for individuals from low-income origins, many students may lack the skills required to navigate digital platforms, use educational software efficiently, or do online research.

It is not only that students have problem with digitalisation, teacher too have challenges of using technology in facilitating learners via preparing student friendly lesion plans. Teachers also show lack of skills required to successfully integrate technology into their lessons. (Hargittai, 2021, p. 140). Targeted efforts are needed to address digital literacy in order to give teachers and students the technological know-how they need to engage fully in online learning settings.

Strategies for Promoting Digital Equity

Expanding Access to Affordable Technology

A collaborative effort is required to develop connection between government, educational institutions and other stakeholders so that digital devices can be made accessible to all. No doubt that state provides possible digital devices to universities, however, maintenance

is more important with regard to better functioning of the technology. The better use of technology in higher education is possible when it is affordable and accessible to all

Nonprofits and IT companies have also helped to close the digital gap. Projects such as Microsoft's "Airband Initiative" and Google's "Connected Classrooms," for example, aim to provide poor communities with access to fairly priced devices and the internet (Edwards et al., 2021; Edmond, 2020**).** Increasing these initiatives will help to guarantee that children from poor backgrounds do not lag behind.

Improving Internet Infrastructure and Affordability

Government is expected to invest in developing the infrastructure such as broadband infrastructure, particularly in backword areas, so that the gap between rural and urban areas can be bridged. Provision is to be made to provide cost-effective high-speed internet facilities to all.

Colleges and universities can also act to provide students internet access. Institutions can establish mobile hotspots or community Wi-Fi hubs to allow students to use the internet in public places such as libraries, community centres, and university parking lots. Although long-term infrastructural changes are being made, some options can provide swift help.

Enhancing Digital Literacy and Teacher Training

To make better use of technology in higher education, it is essential that teachers and students must have digital literacy. The essential working knowledge is to be given by universities, such as the use of different digital tools, effective and critical use of online resources, awareness about online threats and cybercrime, and other related matters. To achieve these, essential training of all stakeholders should be mandatory.

Teachers are expected to attend various orientation programmes and refresher courses. In these courses, the use of technology in classroom pedagogy must be an essential component. Technology integration in the classroom should be a major component of teacher professional development programmes. Many teachers require additional training to make good use of digital assessment tools, virtual classrooms, and learning management systems. Ongoing assistance and tools help teachers to create engaging and easily accessible digital learning environments.

Implementing Inclusive and Accessible Technologies

Another important concern of making technological equity is to make this technology available to students with disabilities. This can be achieved by giving students different assistive devices such as screen readers, speech-to-text software, and so on. It is a fact that many portals and digital platforms are not made with the understanding that a person with disabilities will also use them. So, this sensitivity is a must for creating digital equity (Selwyn & Facer, 2019, p. 23).

Universities and educational institutions should apply universal design concepts when they use digital learning tools to make sure that all students, regardless of aptitude, can engage with online content. Following accessibility criteria helps institutions to create more inclusive learning spaces.

Digital equity is therefore categorically important to make sure that every student has an equal opportunity to flourish in the digital age. For many students, socioeconomic inequality, internet access problems, and lack of digital literacy continue to limit access to high-quality education. Governments, universities, and the corporate sector have to cooperate to give more technology, modernise digital infrastructure, and support digital literacy projects if they are to address these issues. By giving digital equality a priority, teachers can create more competent and inclusive learning spaces that help every student to reach their full potential.

The Role of Artificial Intelligence in Higher Education

Artificial intelligence is spread in every sphere of life, such as education, market, politics, entertainment, and so on. In the domain of education, its role is very prominent in research, pedagogy, curriculum development, assessment, administrative procedures, etc. The context of education and students' interaction with curriculum has totally changed through the use of artificial intelligence-driven tools and instruments such as natural language processing, machine learning, process analytics, etc. (Luckin et al., 2018, p. 25). The decision making, automation of repetitive processes, and personalisation of learning experience can be strengthened by using efficient technology in higher education.

AI integration raises ethical questions as well, such as data privacy, bias in artificial intelligence systems, and the possible substitution of human instructors. Here we look at the benefits, challenges, and possible consequences of artificial intelligence in higher education.

AI in Teaching and Learning

1. Personalised Learning and Adaptive Technologies

One of artificial intelligence's most significant gifts to higher education is personalising learning experiences. AI-driven adaptive learning systems assess student performance and change course content based on each student's particular needs (Zawacki-Richter et al., 2019, p. 3). By use of machine learning algorithms, these systems evaluate student progress and provide tailored learning tools, so helping those who battle with particular ideas while letting advanced students grow at their own pace. For example, Carnegie Learning, Duolingo, and Coursera use artificial intelligence to change the difficulty of courses and recommend additional resources depending on a student's strengths and weaknesses (Popenici & Kerr, 2017, p. 9). This particular approach increases student involvement and enhances learning outcomes by providing targeted help.

2. Intelligent Tutoring Systems (ITS)

Driven by artificial intelligence, intelligent tutoring systems (ITS) replicate human teachers by giving real-time feedback and guidance. These systems assess student replies and offer clarifications, recommendations, and more resources to support learning (Chen et al., 2020, p. 22). Unlike traditional teaching methods, ITS may give pupils continuous and instant assistance. This reduces the burden on educators. For instance, IBM's Watson Tutor and Microsoft's AI-powered educational chatbots support students with their assignments by giving clarifications, responding to inquiries, and helping them with problem-solving. These artificial intelligence tutors make sure that students receive help when they need it and reduce the gap between teachers and pupils.

3. Automated Assessment and Feedback

AI technologies are also improving evaluation methods by means of automated grading and provision of instant feedback. AI-powered apps could evaluate essays, multiple-choice questions, and short-answer responses using natural language processing (NLP) (Baker & Smith, 2019, p. 79). When automated grading reduces their work, teachers can focus on more complex aspects of education such curriculum development and mentorship.

AI in Higher Education Administration

1. Student Recruitment and Admissions

Universities can employ artificial intelligence to speed up student admissions and recruiting. AI-powered virtual assistants and chatbots help prospective students with the application process, answer inquiries, and provide customised recommendations depending on their academic interests and credentials (Holmes et al., 2019, p. 36).

For example, Georgia State University launched "Pounce," an artificial intelligence chatbot assisting students with enrolment, financial aid,

and course registration (Baker & Hawn, 2021, p. 110). The chatbot has helped student involvement in the admission process to grow, and administrative delays to decline.

2. Predictive Analytics for Student Success

Predictive analytics driven by AI can detect pupils who are at risk of failing academically and offer early intervention techniques. AI models can identify which students might want extra help and notify professors or academic advisors by examining student performance data, attendance records, and engagement patterns (Chen et al., 2020, p. 25).

3. Campus Management and Operations

AI is also simplifying campus operations by means of improved scheduling, building management, and resource allocation. By means of AI-driven algorithms, universities can maximise course scheduling. This minimises conflicts and guarantees efficient use of classroom space (Luckin et al., 2017, p. 254). AI-powered security systems also improve campus safety by means of surveillance data analysis and prompt detection of unusual behaviour.

Challenges and Ethical Considerations

1. Data Privacy and Security

Using artificial intelligence in higher education calls for gathering and examining large amounts of student data. Though they provide interesting knowledge, AI-driven systems raise concerns about data security and privacy. Universities have to have rigorous data protection policies to stop violations and unlawful access to private student data.

2. Algorithmic Bias and Fairness

AI algorithms that inherit biases from the data they are educated on could produce unfair outcomes in student evaluations, admissions, and

personalised learning recommendations. AI prejudice could aggravate already-present educational inequalities and especially harm minority children. To solve this issue, universities have to guarantee that AI models are developed using varied and representative data sets and that they are regularly checked for openness and fairness.

3. The Role of Human Educators

AI should not take the role of human teachers, even while it improves educational procedures. AI cannot completely replace the human component of teaching, including emotional support, critical thinking conversations, and mentoring (Popenici & Kerr, 2017, p. 11). AI should instead support teachers by helping with administrative duties and provide extra learning assistance, freeing up faculty members to concentrate on higher-order pedagogical interactions.

Future Implications of AI in Higher Education

Higher education will most likely incorporate more AI-driven tools for administration and teaching in the future. Institutions have to balance innovation and ethical concerns as the technology evolves if they are to guarantee that artificial intelligence is used responsibly and inclusively. AI-driven solutions should focus on improving learning experiences, raising productivity, and promoting equitable access to education (Zawacki-Richter et al., 2019, p. 12). Universities also have to invest in projects on professor and student artificial intelligence literacy. Instructors and students need a clear knowledge of the operation of artificial intelligence, possible benefits, and limits if they are to negotiate the AI-driven academic environment successfully.

Recommendations for Ethical AI Use

- Bias-Free AI Development: To avoid biased results, especially in grading, admissions, and student performance forecasts, institutions should make sure AI models are trained on a variety of datasets.

- Transparency in AI Decisions: To ensure that instructors and students can comprehend and contest automated assessments, AI-driven systems should clearly explain the decision-making process.
- Human Oversight in AI-Based Grading: To avoid unjust treatment, human instructors should have the last say when assessing student work, even though AI can help with grading.
- AI Literacy Education: To assist students and teachers comprehend the advantages and dangers of AI-driven learning, universities should include AI ethics in their curricula.

Ultimately, one may contend that artificial intelligence (AI) is transforming higher education by changing teaching strategies, cultivating administrative efficiency, and offering personal learning experiences. Though they raise ethical issues around algorithmic bias, data privacy, and the role of human teachers, AI-powered products have certain benefits. To maximise the potential of artificial intelligence while addressing these concerns, universities have to adopt ethical AI policies, protect data, and promote staff and student AI literacy. With the right use, artificial intelligence might be a powerful tool for improving education by expanding access to, efficacy of, and enjoyment of learning for everybody.

Ethical Use of Digital Communication and Social Media

By improving access to information, collaboration, and student involvement, social media and digital communication have changed higher education. While teachers and students can network and exchange knowledge via social media platforms like Facebook, Twitter, LinkedIn, and YouTube (Manca & Ranieri, 2016, p. 225), online learning is made possible by tools such as Zoom, Microsoft Teams, and Google Meet.

Digital communication tools have changed the connection between students and professors. Online learning systems allow students the freedom to attend recorded lectures at their convenience, engage in

virtual group projects, and hold asynchronous conversations (Al-Kandari et al., 2021, p. 452). Moreover, academic networking and knowledge sharing depend on social media. Platforms like ResearchGate and LinkedIn allow scholars to work together on projects, talk about research results, and follow developments in their fields (Veletsianos, 2020, p. 170).

By creating informal learning environments, social media also increases student involvement. Students can follow industry leaders, engage in real-world debates, and join intellectual talks outside the classroom via social media platforms such as Facebook and Twitter (Dabbagh & Kitsantas, 2012, p. 5). Universities have also used social media to promote events, disseminate institutional knowledge, and develop a sense of community among faculty and students. But as digital platforms for social and academic interactions expand, ethical concerns such as online abuse, misleading information, and inappropriate social media use in educational settings emerge.

Recommendations for Ethical Use of Digital Communication

- Universities should have clear standards on courteous online communication covering cyberbullying, hate speech, and false information. These policies should be included in the creation of online behaviour guidelines.
- University programs should include courses teaching students how to use social media responsibly, how to act properly online, and how to be aware of their digital imprints.
- Though universities are required to offer safe online environments, it is crucial to note that too much monitoring of student interactions could violate students' right to privacy and restrict their capacity to express themselves openly. Selwyn (2016) claim that ethical monitoring policies should be limited in their reach and transparent to public examination (p. 60).

Summing up

Technology is progressively shaping education, so educational institutions have a duty to give ethical standards top priority to protect student rights, maintain justice, and promote responsible digital participation. Among the most crucial suggestions are improving data privacy regulations, guaranteeing equal access to technology for all, including artificial intelligence in a responsible way, maintaining academic integrity, and promoting ethical digital communication. Following these guidelines can help educational institutions create a digital learning environment that is not only safe but also moral, thus benefiting all teachers and students. Given its capacity to change the learning experiences of students completely, the ethical consequences of technology in higher education must be meticulously regulated. Smart policies and institutional responsibility are needed to handle the aforementioned ethical issues. By using ethical principles and a focus on justice, educational institutions can use technology while honouring academic and moral standards.

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ROLE OF ONLINE EDUCATIONAL APPLICATIONS IN PROMOTING LITERACY AND LIFELONG LEARNING FOR ENGLISH AS SECOND LANGUAGE LEARNERS

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Abstract

As aspirant educators and researchers, we witness the way that innovation or the power of technology is reshaping the scenario of training, making information more available to everybody. We intend to explore the capability of all stream of second language learners. These imaginative devices go past classic limitations by making accessibility with customised opportunities for individual growth and experience that advanced education and a deep-rooted obligation to getting information. In the present competitive world, having strong proficiency abilities and a pledge rooted learning is necessary for both individual and cultural turn of events. We view intuitive instructive applications as powerful application that make openness, personalised, and engaging learning open doors that take special care of different learning essentialities. In this era of digital equity, learners' capabilities stand as the bedrock for individual strengthening and social advancement. At present some trending language learning applications are Duolingo, Rosetta Stone, Babbel, FluentU, Memrise and Busuu. These apps enforce learners with fundamental abilities to grasp, expand, and analyse data successfully. This results in opening pathways to quality education, satisfying professions, and dynamic contribution in local area undertakings. Regardless, obstructions to

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education persevere, affecting learners across different age groups. Intelligent instructive applications educational apps: Interactive educational apps appear as assuring futuristic solutions to bridge the gap in many ways. The following popular educational apps express the central idea of this paper vividly.

***Keywords**: Intelligent Instructive Applications, Educational Applications, Literacy, Lifelong Learning, Accessibility, Inclusivity, Digital Equity, Personalised Learning, Motivation and Worldwide Reach*

1. Introduction

As aspirant educators and researchers, we (teachers or trainers) usually witness the way that innovation or the power of technology is reshaping the scene of training, making information more readily available to everybody (Kukulska-Hulme, 2012). We are intending to explore the capability of all streams of second language learners. These suggestive (imaginative) devices go past classic limitations by making accessibility with customised opportunities for individual growth and experience that advanced education and a deep-rooted obligation to getting information (Beatty, 2010). In the present competitive world, having strong proficiency abilities and a pledge rooted learning is necessary for both individual and cultural turn of events. We view intuitive instructive applications as powerful applications that make openness, personalised, and engaging learning open doors that take special care of different learning essentialities (Godwin-Jones, 2011). In this era of digital equity, learners' capabilities stand as the bedrock for individual strengthening and social advancement. At present there are some trending language learning applications such as Duolingo, Rosetta Stone, Babbel, FluentU, Memrise and Busuu. These apps enforce learners with fundamental abilities to grasp, expand, and analyse data successfully (Godwin-Jones, 2011). This results in opening pathways to quality education, fulfilling professions, and dynamic contribution in local area undertakings. Regardless, obstructions to

education persevere, and they affect learners across different age groups. Intelligent instructive applications educational apps: Interactive educational apps appear as assuring futuristic solutions to bridge the gap in many ways (Tavakoli et al., 2019).

The following popular educational apps evidence the central idea of this paper vividly. Moreover, many prominent institutions around the world are known to incorporate app-based learning for language students, like University of California, Berkeley, University of Edinburgh, and King's College London. Moreover, carrying forward these methods actively as an integral part of the learning and teaching process on a regular basis is highly essential for the benefit of students' and teachers' futuristic standardised professionalism (Peters, 2007). The following (case-study) analytical approach determines the practical experience of potential usage of these methodologies for almost all the levels of education generally and uplifts the result.

2. Methods Applied to Research and Execute these Apps

2.1. Literature Review: The authors initially carried out a comprehensive literature review to understand existing research on interactive educational apps, literacy development, and lifelong learning (Beatty, 2010; Kukulska-Hulme, 2012). This method involves the analysis and synthesis of relevant academic articles, books, and other scholarly sources to gain insights into the topic.

2.2. App Evaluation: Secondly, they evaluated various interactive educational apps mentioned in the paper, such as Duolingo, Rosetta Stone, Hello Talk, BBC Learning, Cambridge Assessment App, FluentU, Busuu, and Phonetics App. This method involved the assessment of the features, functionalities, target audience, and effectiveness of each app based on available data and user reviews (Godwin-Jones, 2011).

2.3. Questionnaire Development: Later, they designed a questionnaire to gather feedback on the explored language apps. This

method includes key features, potential benefits, challenges, comparison, usage considerations, recommendations, and additional insights (Tavakoli et al., 2019).

2.4. Data Analysis: After they collected responses from the questionnaire, they analysed the data to identify trends, patterns, and insights related to the usage of language learning apps across different age groups. This method involved the summarisation and interpretation of the findings to draw meaningful conclusions.

2.5. Result Presentation: Eventually, they presented the findings of their research in a structured manner. This included the organisation of the information logically and clearly to communicate the research findings effectively to the readers (Peters, 2007).

3. Results

These methods collectively contribute to the research process and help in understanding the capabilities of interactive educational apps in promoting literacy and lifelong learning for second language learners (Beatty, 2010).

Table 1: Teaching Method Analysis

Educational Streams	Teacher-Student Ratio (S: student, T: teacher)	Positive Response%	Negative Response%
High School Level	(S)27:1(T)	100%	0%
Intermediate Level	(S)40:1(T)	96%	4%
Under graduate Level	(S)25:1(T)	85%	15%
Post Graduate Level	(S)10:1(T)	75%	25%
Specific Language Learners Level	(S)35:1(T)	75%	10%
Private institutions: spoken English training centers, IELTS, TOFEL, etc.	(S)18:1(T)	85%	3%

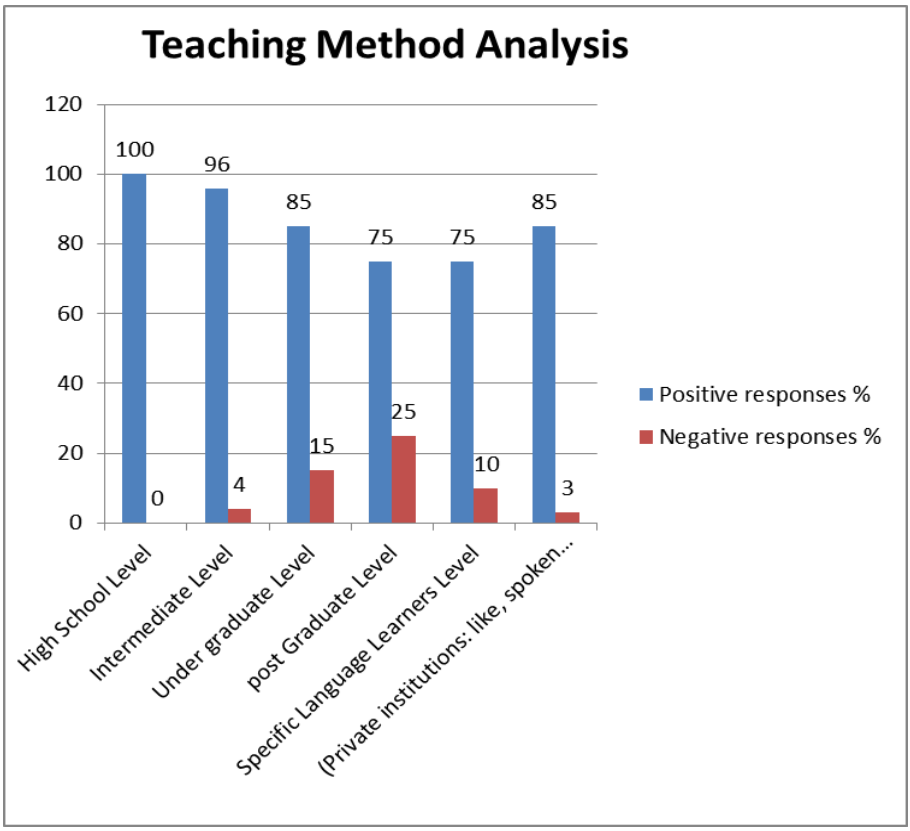

Fig.1. Representation of teaching techniques for various grades of educational levels

4. Discussion: Some Suggestive Apps

4.1. Duolingo: This app provides LSRW modules: Listening Speaking, Reading and Writing skills. It utilises gamification techniques to keep learners immerse and motivated (Godwin-Jones, 2011).

4.2. Hello Talk connects language learners with native speakers for language exchange. Users can chat, voice call, and even video call to practice English in a real-world context.

4.3. British Broadcasting Corporation (BBC): This app assists students to improve their vocabulary, reading skills, etc.

4.4. Cambridge Assessment App customises learners' language learning ability of all level (Basic, Intermediate and Advanced level).

4.5. FluentU introduces real-world videos like music videos, movie trailers, news, and intellectual talks and transforms them into personalised language lessons (Godwin-Jones, 2011).

4.6. Busuu offers courses designed by language professionals including various proficiency levels. It also gives opportunities for learners to communicate with native language speakers through its community feature.

4.7. Phonetics App is an effective handy tool to improve or catch the accurate accent through videos of native teachers in it. This is useful for all native and non-native learners.

Additional Explanation

These apps offer varied approaches to learning English, catering to different learning styles and preferences. Users of any age can select the best match to their needs and requirements to improve their language learning skills productively (Tavakoli et al., 2019). They mainly promote accessibility and engagement in several interactive activities, like gamification elements. In fact, adaptive technologies assist learners by using captivating content and pacing that match specific needs (Godwin-Jones, 2011) and learning styles. This allows for efficient progress and addresses specific gaps. These apps offer phonics instruction as a solid base platform as an early literacy development and lifelong learning tool. To prove the above statements, the following research questionnaire and analysis report/table is practical evidence to confirm the research over these apps thoroughly.

5. **Questionnaire on the Explored Language Apps**

The below given questionnaire clears the details regarding: Targeted audience, Main objective / purpose, Methods used to know the value of usage, key features/ functionalities of the apps, potential benefits and drawbacks while using this apps and challenges, comparison, usage consideration and recommendations, additional insights and so on.

5.1 Target Audience

- Who is the primary target audience for the app?
- What age groups does the app cater to?

5.2. Main Purpose

- What is the main purpose /focus on this App?
- What Skills or knowledge does the app aim to develop or enhance?

5.3. Methods

- What methods or techniques does the app employ to achieve its goals?
- How are the learning materials presented or delivered to the users?

5.4. Key Features

- What are the standout features or functionalities of the app?
- How do these features contribute to the user experience or learning process?

5.5 . Potential Benefits

- What are the potential advantages or benefits of using the app?
- How might users improve or benefit from using the app?

5.6. Potential challenges

- What are some potential drawbacks or challenges conjugated with usage of these apps?
- Are there any limitations or shortcomings that users should be aware of?

5.7. Comparison

- How does this app compare to similar apps in the market?
- What sets this app apart from others in items of target audience, focus, features, etc.?

5.8. Usage considerations

- What factors should users consider when deciding whether to use this app?
- Are there any prerequisites or specific conditions that might affect the user's experience?

5.9. Recommendation

- Based on the analysis, would you recommend this app to the target audience?
- Are there any specific scenarios or situations whether this app would be particularly Beneficial or effective?

5.10. Additional insights

- Is there any additional information or insights about the app that users should know?
- Are there any notable updates or developments for the app that might impact?

Table 2: Analysis of Results

Age group	Primary target audience	App usage considerations	Potential benefits	Potential challenges
Primary students	Yes	Parental guidance may be needed	Introduction to basic vocabulary and grammar interactive learning activities	Limited of depth of content may require assistance from parents or teachers
Middle school students	Yes	Self-directed learning – regular practice encouraged	Intermediate vocabulary and grammar, interactive exercises, speaking and listening practice	Busy academic schedules, distractions from others activities
High school students	yes	Self- directed learning, preparation for exams	Advanced vocabulary and grammar, exam preparation materials, writing practice	Increased academic pressure, time management challenges
College / University students	yes	Integration with academic curriculum, flexibility in study schedule	Academic English proficiency, specialised vocabulary, essay writing support	Balancing coursework with extracurricular activities, varying levels of English proficiency
Post-Graduate students	No	Advanced language skills for research and professional purposes	Specialised vocabulary and language skills for academic and professional	Time constraints due to research or work commitments, need for advanced language support

For added clearance, the above given result analysis could give a lot of clarity about how all age language learners used and benefitted. We emphasise the critical importance of continuous learning in our rapidly evolving world. We explore how mobile apps can meet varied learning needs and interests, offering accessible and flexible learning opportunities throughout life. In fact, this is life learning for all. Moreover, this table gives a general overview of each app. Experience may vary from person to person. It is crucial to consider the specific needs and learning styles of each student when choosing an app. A combination of different apps and approaches can often be the most effective way to support literacy development. Parental involvement and guidance are essential for young children who use educational apps.

6. Conclusion

Interactive educational apps have the potential to revolutionise literacy learning by making it accessible, engaging and personalised. By offering varied learning pathways for people of all ages and skill levels, these apps can empower users, unlock social mobility, and contribute to building a more literate and informed society. While challenges around equitable access and content quality remain, continued development and research hold immense promise for the future of literacy education. Research and reviews can help you choose apps that are appropriate, high-quality, and engaging for your target audience. We believe this detailed analysis report enables readers to understand the strengths and weaknesses of each app and to make informed decisions about their potential use in promoting literacy and lifelong learning.

In the futuristic aspect of the educational context, institutional and educational policy makers continue to invest in digital learning initiatives to keep equal access and to maintain a standardised high-quality education system globally. Majorly incorporating these learning platforms must also be effective teaching tools. Preferably, this process

should be the foremost advanced level teaching technique for the betterment of professionalism. In fact, this process allows a sophisticated teaching and learning atmosphere in this competitive advanced era. This kind of approach should reach maximum implementation as early as possible. In overview, the integration of digital educational tools represents ESL learners who grow academically, socially, and professionally in an increasingly interconnected world.

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TECH-DRIVEN HIGHER EDUCATION IN 21ST CENTURY INDIA: BEYOND CLICHÉS, REFLECTING ON INSTITUTIONAL AND PEDAGOGICAL READINESS

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Abstract

At the outset, one must acknowledge how Digital Technology and the consequent Virtual Existence have turned the world into experiencing both the real and the virtual/unreal in a way—simultaneously. Conducting and experiencing of any acts including those of vital and crucial importance for human life have become simultaneously real and virtual and/ or unreal. Against this backdrop, though it may appear almost superfluous to discuss the ubiquitous role of technology and digital technology, it is still worthwhile to critique it and thereby to come to terms with it. As is well-known, notwithstanding the envisioning of the significant role of digital technology in NEP-2020, in the thick of Corona times, digital technology made, though all of a sudden, a deep incursion into the domain of higher education, across India, and perhaps all the stakeholders of higher education—students, faculty and higher education institutions' administrators—without much expertise and understanding of the full potential and implications about digital technology came to 'use' it (digital technology) in view of the then prevailing compelling conditions. While being conscious of this backdrop, the present article attempts to be reflective of the implied clichés and assumptions and further somewhat candidly verify our readiness—the readiness of the establishment and the pedagogical of HEIs at ground zero level.

Keywords: *Higher Education, Digital Technology, Marginalised Sections, Online Teaching, Real and Virtual and/or Unreal, Establishment and Pedagogical Readiness*

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Teachers require suitable training and development to be effective online educators. It cannot be assumed that a good teacher in a traditional classroom will automatically be a good teacher in an online classroom. … There are numerous challenges to conducting online examinations at scale, including limitations on the types of questions that can be asked in an online environment at scale, including limitations on the types of questions that can be asked in an online environment, handling network and power disruptions, and preventing unethical practices. … *Further, unless online education is blended with experiential and activity-based learning, it will tend to become a screen-based education with limited focus on the social, affective and psychomotor dimension of learning* **(**Emphasis mine) (Government of India, 2020).

The quote flagged above as epigraph shall indicate the overarching objective and the pedagogical shift that are required for before venturing into full-fledged digitalisation of higher education scenario of India. Accordingly, the conceptual paper in the first place recalls and reviews the state of play of higher education in Indian context, and secondly, keeping in view with the conviction that 'policy formulation' cannot be done in an isolated manner either by the government or by the establishment alone since it (the establishment) is one of the stakeholders in the making of policy of education. Further, it is believed that it is the responsibility of the other stakeholders to join hands and come forward with tangible proposals to assist the Government in making a policy, presently, with regard to policy of online teaching-learning and digital education.

Fortified thus this conceptual paper attempts to verify the readiness of the eco-system and the role of the stakeholders in a candid manner with special reference to the challenges to meet with, the sacrifices to be made and the metamorphoses to be undergone without which the success of the online learning-teaching will be doubtful and partial.

A Recap of Higher Education in the Indian Context

Though sounding to be stating the obvious and appearing conventional, it must be proudly acknowledged that education has been always accorded high position and importance by the culture of our nation. However, as an ancient nation, understandably, India has had its own rich yet complex history of education and higher education in particular. Inevitably and prominently, one would get reminded by the once-world-famous higher education destinations, like, Nalanda and Takshasila which were centers of knowledge and excellence of various disciplines and nuances in times of ancient India. But the vagaries of history did witness the downfall of the same which fact could never be undone completely later on, like any other historical developments. Subsequently and through the Middle Ages and into the modern times, the presence and spread of education was found to be limited and selective.

In spite of the hoary past of education and excellence thereof in India, over a period of time—to reiterate, through the Middle Ages and into the beginning of modern times—education acquired more of the nature of 'literacy-level' education, was founded in religious and/or philosophical studies, and was accessible only to a minuscule minority of the population. Perhaps the turning point in this long yet winding journey of education of India, especially in the field of higher education in the modern sense, the colonial administration of the British indeed did make a reckonable contribution though not totally without ulterior motives and of the reasons of colonial administration. But the real and positive and proactive contributions had emanated from the successive administrations of free India.

Accordingly, the expansion of higher education has proceeded relentlessly, aiming to meet the nation's developmental needs, respond to globalisation, and play a pivotal role in leveraging its opportunities. More importantly, it seeks to fulfil the aspirations of the Indian people, particularly the marginalised communities, who have historically been

denied access to higher education. In fact, at times, one can't help feel that the expansion of higher education has taken place more in the 'spirit' of democratisation of higher education which resulted in the establishment of new universities in both the public sector (state government and central government) and the private sector.

'Democratization' of Higher Education in the Indian Context vis-à-vis Marginalized Sections and the Consequences Thereof

Since acquiring Education and specifically Higher Education, as has been pointed out and considered as so taking the ground reality into consideration, has remained more as a means for launching on to higher social status/job/profession/enterprise, and even as a means to surpass social discrimination than as a sole means for passion for it (higher education):

> To take a historical perspective of higher education in Indian context, one has to concede that education in India in the past had a limited access, and was proved to be a prerogative of select sections of society. Further, education always had been associated with the ensuring and enhancement of status in society. Perhaps the point to be reckoned is education in most instances has been pursued more as a means to having a hike in socio-economic conditions than as a means to fulfilling a passion and/or to innovate. This is not to mean to dilute the high-end intentions of higher education and research, especially in the post-independent India. But it is a practical and down-to-earth stand on the matter of higher education in India. (Prasad, 2016, pp. 16–17)

Further to speak candidly about the politics of governance of India, it always has been proved to be doing the art of doing the possible *a la* Bismarck's way: "politics is the art of the possible, the attainable—the art of the next best." Speaking democratically this shall not be questioned and even not to be doubted since in any democratic context

the same shall happen. As is well-known, India, having woken up to independence with the burden of the past which was found to be soaked in anarchy, monarchy, feudalism, colonialism, for all practical purposes the nation made a big leap to democracy. This situation motivated/compelled the successive governments of free India to be indulging in practicing the doing the art of possible to meet the aspirations of the millions of the people of the country whose aspirations for education and the consequent benefits otherwise which had been thwarted for centuries prior to the attaining of independence:

> The rapid expansion is to meet the demand of the large populace who were denied opportunities and status—social, economic and political due to lack of higher education. Expectedly, this resulted in at least to a substantial extent, uplifting the masses, and meeting the aspirations of the marginalised classes who in turn have become resources to the ever-burgeoning polity and economy of the nation (Prasad, 2016, p. 18).

Before foraying into the prospects and challenges of digitaliaation of higher education in Indian context, the implications of the 'democratiaation of higher education' needs to be evaluated in a pragmatic manner. As has been mentioned above, democratisation of higher education, carried out in a conventional mode indeed has brought in empowerment to the marginalised sections by way facilitating access to the campuses of higher education institutions where face-to-face mode of imparting and learning of education has happened, and thereby these sections of the people have had the pleasure of learning/getting trained in experiential manner and in real time/context.

Implications of Digitalization of Higher Education for the Marginalized Sections of India

Since candidness as the governing principle for developing this conceptual paper, a vital aspect like the impact of digitalisation of

higher education which includes online teaching and learning on the marginalised sections could not be taken as a non-issue and/or taken-for-granted in the light of the reasons like the historicity of the issue and comparatively the late entry of these sections into higher education which otherwise had remained as a privileged domain. At his juncture it must be clarified explicitly that this is not an attempt to take lightly the potential adverse impact of digitalisation of higher education on other sections. But just to highlight, comparatively speaking, there is a higher vulnerability of the aspirants hailing from these sections.

Maybe it is warranted to make explicit the potential vulnerability especially with reference to the marginalised sections, incidentally whose means of acquiring higher education are always constrained, when they get into the means of digitalisation of higher education:

a. As has been visualised by NEP-2020, the possible missing of 'experiential learning' will have left a feeling of hollowness in their acquisition of knowledge. Perhaps this loss will remain unfilled.

b. Though it might be of common knowledge to state that exclusive online teaching-learning will take its toll especially in the areas of practical(s)-based subjects like sciences and technology. Perhaps this does not even require to be mentioned. Hence the consequent learning/getting trained will not be sound enough, which may ultimately leave them 'half-educated.'

c. On top of these, whatever be the teaching-learning domain, be it languages, humanities, sciences and technology, exclusive online learning will take away the benefit of personal interaction between the teacher and the taught which at times will lead to the generation of new knowledge since knowledge is not constant but dynamic.

d. Notwithstanding the near-compelling situation of adapting to online teaching-learning which ultimately take away the phase of

campus life in one's life will remain as a big loss—as it removes the opportunity of 'growing up' in life learning the essentials of life, like socialisation and working in a peer group in real time and three-dimensional manner.

e. A more pertinent reason would be if not all, many of the students coming from the marginalised sections, when they enter higher education, they are found to be entering the higher education domain with a sense of shyness, hesitation and diffidence and at times raised on weak foundations of basic education as they hail from remote and rural areas.

Against this backdrop, while being swayed in favour of digitalisation of higher education in Indian context, one has to be concerned about the implications of digitalisation of higher education for these sections. Since, as has been apprehended, and rightly also, by the NEP-2020 whether the readiness of pedagogy is available for implementing online and/or digitalising of higher education.

To put it more pertinently, unless proper preparatory care is taken, the implications of the digitalisation of higher education could be disastrous for the marginalised sections whose aspirations have already risen and been sustained to some extent—and rightly so. Considering the expression of apprehension as 'rightly' is justified as what are at stake could be 'equity' and 'quality' of education.

To reiterate and to speak candidly, unless the equity and the quality of the higher education received by the marginalised sections is ensured, there would be reversal in their participation in furthering the cause of the development of the nation. Further, the late and the recently facilitated and achieved scholarly, academic and professional accomplishments of the marginalised sections needed to be sustained, and thereby their contribution to the overall growth of the nation may not get hampered, and in turn the nation's growth will not be hampered.

Digitalisation of Higher Education in the Indian Context: Challenges and Prospects

Smart and pragmatic are the watchwords of the 21st century in the light of technological advancements including online/virtual, and digital technology at global level. It will not be exaggerating to state that all walks of human life have been affected by the paradigm shift caused by the technological advancement, perhaps across the globe. 'Reality' has doubled up as 'virtual.' Perhaps this comprehension of the 'reality' is already obvious and common experience, if not commonplace experience.

Set against this, India which is rich in human resources should sustain its effort to turn the vast human resources read as population in common parlance as really human resources—who are skilled, informed and contributing to the economic, social and cultural advancement of the nation. Thus, tertiary level/ higher education domain have come to face-to-face with the reality of virtual and/or blended mode (virtual and face-to-face combined) mode of teaching and learning. In fact, this development induced by the paradigmatic technology-based changes that have come into the core of our life, has compelled us to think about the new norm and the new reality that has forayed into the domain of higher education of Indian context.

In view of this compelling urgency and the incursion and invasion of the technological changes and more importantly the aftermath of the global calamity, and perhaps, the unexpected offshoot of globalisation, the Covid-19, have cornered us and compelled us—the stakeholders of the Indian Higher Education—to find a way-out from the then-stasis of the Covid-19.

What might have started and become a practical means and a professional way-out in the times of the aforementioned crisis has ultimately proved to have become a mainstay of the teaching and learning of higher education in Indian context. Accordingly, one of the stakeholders, the Establishment represented its strong plea for

advocating and ushering in the much-avowed and stated 'Online and digital education' in higher education domain of India through its visionary document, NEP-2020.

Against this backdrop, the present conceptual paper, in the first place, sees space and validity for online and digital learning. In continuation of this affirmation, the proposal will attempt to make a candid approach to the vital and paradigmatic shift that has been taking place in the teaching and learning in higher education scenario of India by way of incorporating and strengthening Online and Digital Education and the implications and ways and means of fully realising the potential thereof.

However, as has been stated, a pragmatic verification of the factual position and roles of the stakeholders shall be carried out for identifying and realizing the major shifts in the attitudes and means for effecting the efficient functioning of online and digital teaching and learning. Accordingly, the following are to be realized on the part of all the Stakeholders of Higher Education—the student community and the parents/ society thereof, the teaching fraternity, the society/cultural environment/industry/ the NGOs and the establishment including the government of India and various state governments and other functionaries at various levels of higher education scenario. Specifically speaking, all the stakeholders of higher education, enumerated as above must engage themselves in:

A. Challenges to Cope with by the Teaching Fraternity as a Stakeholder

(i) *The Challenge of making the online classes and digital learning as student-centered*

The pitfall/temptation waiting for the teachers in online teaching and digital learning is the legacy of teacher-centeredness. in fact, speaking frankly, the lot of undoing that happened in higher education domain is due to the teacher-centeredness.

(ii) *The challenge of trusting students' comprehensions and integrity, and apportioning time and space in the online teaching-learning for students*

The legacy of distrust of students' comprehension and integrity that was conspicuously present in the face-to-face mode should not pass on to online teaching-learning and digital education. Hence enough space and time should be apportioned for students in the online learning mode.

B. Challenge to be Met with by Student Community is its Readiness to be in the Centre-Stage of Online Learning and Digital Education

The legacy of student dependency and passivity is understandably anathema in the higher education sector and represents a deep-rooted and persistent malaise. Readiness to take up the mantle of active participation and contribution in the online learning on the part of students since the meaning and comprehension and acquiring skill for the students will happen only through this means.

C. Sacrifices to be Made by the Teaching Fraternity and Metamorphoses to Undertake by all the Stakeholders

The teaching fraternity has to overcome being narcissistic means being in love with their preferred ideology and fancy ideas and including, though unfortunately, being in love with one's own voice.

The legacy that negatively affected the face-to-face mode should not creep into online teaching-learning. Since online learning and digital education has the potential to accord personalised attention on the student, the same shall be utilised to its full extent, and thereby individual students can be nurtured to promote their perceptions and expressions. In fact this shall be the spirit of higher education.

D. Challenge to Meet with by the Establishment Including Government of India and Various State Governments/Society /Culture/NGOs and Educational Administrators at Various Levels

Providing the necessary eco-system including materials /equipment and skilling ambience and ensuring acceptance for the credentials acquired through online and digital mode: In view of the obvious paradigm shift in imparting and learning higher education through online and digital mode, the necessary ecosystem has to be created in a proactive manner by the Establishment of all nuances for creating and sustaining quality higher education through online and digital mode.

Thus, the responsibility for ensuring that online and digital education is functional, high-quality, and equitable lies primarily with all the stakeholders in the higher education sector, and this should be realised in the long-term interest of Indian society as a whole. In view of the foregoing argument, more done in the spirit of playing devil's advocate, it is warranted on the part of the author to clarify that digitalization of higher education can take place but with necessary development of ecosystem and with a concern for sustaining social justice and equity for reasons that are best known to all concerned.

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THE MORAL IMPERATIVE OF TECHNOLOGY INTEGRATION IN HIGHER EDUCATION: BALANCING INNOVATION AND ETHICAL RESPONSIBILITY

V Temuzion Kumuja,* Pedaveti Julia,♦ & Roshan Jameer MD♣

Abstract

The incorporation of technology in the educational realm at the higher level of education presents a dual challenge: to incorporate innovation to improve learning and do so with ethical responsibility. The innovation processes are broken down into relevant moral considerations to introduce, namely, artificial intelligence (AI), e-learning environments and adaptive technology. The paper presents a historical context to educational technology which offers the potential for transformative practices of access to and experience of education, which come with ethical dilemmas around privacy of data, potential harms of algorithmic bias, and inequities in access to technology. Educational technologies also offer promise for benefiting learners in ways of increased student engagement and personalised educational learning options. The paper further acknowledges the pressing need for ethics, accountability, and other strategies to stabilise potential innovative practices with ethical responsibility. The paper identifies stakeholder collaboration, ethics training, and accountability systems as possible strategies to ethically hold technology accountable through stakeholder engagement while encouraging innovation. In calling for social responsibility, the paper urges higher educational institutions to be more socially responsible, fair and transparent as they incorporate new technologies in ways that focus access as a conditional good available for all members of the educational community.

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Keywords: *Technology Integration, Higher Education, Ethical Responsibility, Artificial Intelligence, Student Engagement, Data Privacy*

Introduction

The integration of technology in higher education is a complex and evolving phenomenon that underlines an ongoing need for fostering balance between innovation and ethical responsibility. Educational institutions are increasingly adopting and experimenting with advanced digital tools—such as artificial intelligence (AI), e-learning, and adaptive learning technologies—and this has sparked increased interest in the discussion regarding whether education has a moral responsibility to incorporate ethics into these technological integrations. The conversation surrounding the roles of technology in education is multifaceted and unwinds into topics ranging from student engagement, personalised learning, ethical use of data, and privacy, a forward-looking gaze into the societal considerations of technologies might only reproduce and amplify inequities with regard to access and representation in education (Malan, 2023; Herane, 2024; Niyaz, 2024).

For some context, technology in education has evolved from basic computer literacy, and to a range of sophisticated e-learning platforms that have created varied and individualised learning experiences (Burns, 2023). However, there are new ethical issues that arise with fast-paced innovation, such as questions surrounding informed consent, data privacy and security, accountability in the context of AI, and the balance to move initiatives focused on justice (Hannah, 2024; Moquin, 2024; Libbin, 2024). All stakeholders' constituency must come together, student, educator, policy maker, etc., to balance these competing values in order to promote successful technology use that promote teaching and learning (Stone, 2025; Velasquez et al., 2021).

The effectiveness of technology, when incorporated into learning, is not merely a function of its technological advancement, but instead requires defining an all-encompassing, coherent, and ethical

framework wherein fairness, transparency, and social accountability are prioritised. Following from this, education organizations will need to create environments that reflect the diverse perspectives of stakeholders, in order to help alleviate bias and promote equity regarding the teaching and reliance upon technology (Barnes et al., 2024; Speicher, 2022). In order to develop environments that encourage fair and equitable use of technology, an emphasis on academic integrity, potential bias in AI systems, and the assurance that instructional technologies have a positive impact on the knowledge ecosystem will need to be paramount concerns addressing technology (Julia et al., 2024; Jumadinova, 2025; Chan, 2023).

As technology continues to drive advancement in higher education, it is possible to consider these innovations as conditional goods, in which the consequences are dependent on the responsible and ethical use of the technology. A well-defined agenda for preparing students for the future of technology in higher education will need to consider ethical decision-making regarding integration of technology in the classroom, addressing social responsibility of engaging with technology, and the implications that technology integration has on society as a whole (Vallor & Green, 2018; Gallego-Arrufat et al., 2024; Glover, 2023).

Background

The amalgamation of technology in post-secondary education has transformed remarkably over the years as a result of advancements in digital tools and pedagogical approaches. At the beginning of technological use in education, the focus on technology was trivial, mainly consisting of basic computer literacy programs and a handful of online resources both aimed at improving traditional teaching modalities. Changes in post-secondary education began to change dramatically towards the end of the twentieth century due to the internet becoming more common and personal computing devices being utilised more often.

The appearance of online-accessible e-learning platforms in the early

2000s caused a notable shift in higher education. This allowed access and flexibility for learners to use learning materials and resources outside of traditional learning behaviours. Higher education institutions began increasingly to adopt Learning Management Systems (LMS) to support the online delivery of courses and content management. This shift also involved growing student-centred learning. The use of technology gave individualised learning paths and interactive content that met different learning styles (Malan, 2023; Herane, 2024).

As the change of technology continued to move forward, we began to experience trends with emerging technologies and educational practice that embraced virtual reality, augmented reality, blockchain, and artificial intelligence. These changes in technology led to new opportunities for engagement and collaboration, but also led educators and researchers to explore how technology affected pedagogy and learning outcomes (Malan, 2023; Niyaz, 2024). Nonetheless, the rapid change of technology has often outpaced the ability of educators and researchers to evaluate new technologies visually for effectiveness. This has led to debates about the role of technology in post-secondary education (Burns, 2023; Herane, 2024).

When everyone began to adopt a more balanced perspective on technology in post-secondary education, there began to be an understanding of the importance of ethical considerations when the use of technology became part of education. The questions of equity, access, and the possibility of technology being a factor within inequity and the acknowledgement of the moral obligation to integrate technology in a responsible and ethical way into the educational space emerged (MacCabe, 2024; "Strategies," 2025).

Benefits of Technology Integration

The integration of technology into higher education provides many benefits that improve teaching and learning experiences. By utilising digital tools and applications, institutions of higher education can build

more engaging and effective learning environments resulting in positive student outcomes.

Increased Student Engagement.

One of the most apparent benefits of integrating technology is the increased engagement of students. Digital tools offer interactive, multimedia, and game-based learning experiences that grab students' attention and encourage them to engage with the material (Bates, 2019). For instance, an instructor can use an interactive whiteboard to display complex problems in an engaging way. This allows students to interact with the material physically. It then makes understanding difficult concepts easier. When students interact with the content, learning becomes fun and enjoyable. This gives students a deeper understanding of the content (Bates, 2019).

Facilitated Individualised Learning

In addition to the student engagement benefits of using technology in the classroom, technology provides a personal learning experience to meet the needs of students. Educators can provide instructional support that reflects the learning styles and paces of their students through adaptive learning technologies. Adaptive support of learning helps enhance effective learning by allowing students to have and use the support and resources they need to succeed in their educational journey (Bates, 2019).

Ethical Training and Industry Collaboration

Moreover, the current demand for a technology education provides a timely opportunity for colleges and universities to incorporate ethics into their programs. Colleges and universities have opportunities to collaborate with industry partners to ensure that their curricula have the most up-to-date technical training while also addressing ethical considerations and social responsibilities associated with technology. Such collaboration will develop the technical skills of the workforce, while developing the skills of college students to address the

complexities in the field of technology that include both technical and ethical challenges (Bates, 2019; Dubbs et al., 2024).

Ethical Considerations

When considering the incorporation of technology into higher education, it is clear that ethical considerations are paramount. There are many ethical considerations, including data privacy, informed consent, and the impact of artificial intelligence (AI) on individuals and communities (Hannah, 2024). As colleges and universities use AI for everything from teaching support to hiring, accountability and transparency become especially critical in developing trust with students and stakeholders (Green, n.d.)

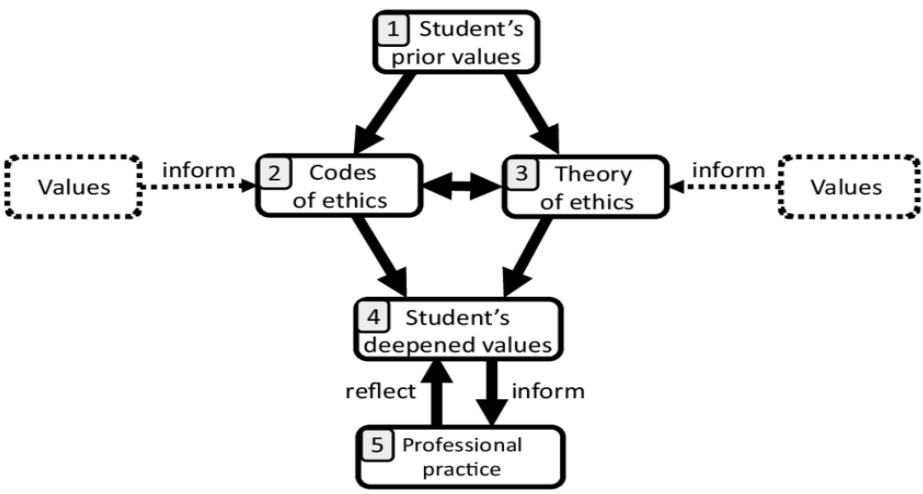

Fig 1: Diagram of different levels of ethics education and the connection of values

Data Privacy and Informed Consent

It is essential to prioritise the privacy of students and the protection of their data. Clearly articulating how institutions collect, store, and use student data makes privacy practices more explicit and aligns with the

notion of informed consent (students and/or guardians need to be adequately informed about what is being done to their data and the implications of their privacy) (Moquin, 2024; President, 2023). Institutions should also establish reasonable data protection measures to create trust and establish a code of ethics in dealing with sensitive information (Libbin, 2024)

Recognising Bias for Equity and Fairness

Seeing biases in AI systems is another important ethical issue. Historical data utilised to inform, create, and develop AI algorithms and human decision-making are a few sources of possible biases. For example, a business school the school may see a disparity of gender in enrollment demographics and should consider the factors at play and recognise how AI may be utilised to resolve access barriers toward equity (Julia, 2024; Trust, 2025). It is important that institutions should identify and establish approaches that provide clear, actionable, and informed solutions to be more equitable and fairer (President, 2023).

Accountability in AI Decision-Making

As artificial intelligence (AI) systems increasingly function as a source of decision-making support in the educational context, accountability of AI must be established. Stakeholders need to see and accept the risk that AI can exacerbate ethical concerns including disproportionate harms stemming from its use. As such, educators need to be encouraged to actively audit AI systems to assess their ethical acceptability and to anticipate the consequences created by their use on different populations (Jumadinova, 2025).

Fostering Ethical Academic Integrity

Additionally, inculcating academic integrity among students also promotes ethical behaviors in academia. In addition, institutions should provide opportunities for students to develop ethical reasoning and moral behavior in their academic work, which are needed for responsible citizenship and professional ethics (President, 2023; Trust,

2025). Through a culture of ethics in education, institutions can help students think about how to responsibly engage with technology while creating a culture of integrity and responsibility in the educational community.

Balancing Innovation and Responsibility

The use of technology in higher education provides opportunities for innovation while embodying ethical responsibilities. Institutions are adopting various tools, particularly advanced tools including web-based technologies such as AI and, for the purposes of this discussion, it is important to think about the ways in which technologies have an effect on teaching learning experiences. It is important to think about the ways in which technology has impact on teaching learning experiences along with a more collaborative approach involving several stakeholders (higher education institutions, teachers, students, and external entities including accreditation and quality assurance organizations) can be effective to use technology to achieve educational goals without compromising ethical approach (Stone, 2025; O'Brien, 2020).

Ethical Frameworks in Technology Adoption

The ethical considerations involved with technology necessitate that fairness, transparency, and the well-being of all actors within the educational ecosystem be at the forefront. This entails the design, implementation, and governance of AI-enabled tools that can positively influence learning while protecting against biases and preserving data privacy (Dauchess, n.d.; Niyaz, 2024). Educators must also take a holistic approach in institutional policies that address the technological, human, and social dimensions with the result of promoting an equitable and trustful environment for both students and educators (Nam et al., 2023)

Stakeholder Engagement

Engaging all stakeholders is paramount to attempt to respond to the

complexities involved with technology implementation in higher education. Stakeholder groups each have a distinct contribution to the design and implementation of AI initiatives that may allow them to share responsibility for the shared outcomes of efforts to enhance teaching and learning in university settings (Stone, 2025; Velasquez et al., 2021). Engagement and collaborative discussions develop more inclusive practices to support responsible innovation in educational technology and stakeholder engagement to address ethical issues, particularly in the context of technology use in higher education.

Stakeholder Perspectives Diverse Stakeholder Input

Stakeholder consultation is necessary to minimise 'groupthink' while addressing the ethical dialogue of technology integration in higher education. While consulting different stakeholders is fundamental to the institutional mission, they should not simply be invited to represent existing perspectives within the group or department. Their selection should reflect a range of viewpoints that offer broader motivations. This is particularly important because research fields predominantly attract individuals from similar higher education backgrounds and economic statuses, resulting in the statistical underrepresentation of various demographics, including gender, race, ethnicity, age, disability, and others (Barnes et al., 2024; Speicher, 2022). Including diverse stakeholders helps mitigate the risk of organizational monocultures within a group, ensuring that blind spots are minimized and poor design decisions—especially those that overlook ethical implications—are avoided (Trust, 2025).

The Role of Academic Leaders

Crisis management is essential to be understood by academic leaders and policymakers in the broader context of STEM research and higher education development. They must sufficiently address conflicting interests that can arise from institutions and technology that can limit scientific research development and student capital development. These leaders proactively address crises in their communities by

identifying potential risk factors and incidents. They also serve as key mentors and mediators in their communities ("Strategies," 2025; Libbin, 2024). Their involvement in conversations with stakeholders contributes to the strategic planning process and develops a more dynamic culture with ethical values concerning the use of technology.

Implications for Higher Education Professionals

With the rapid development of technology, professional roles in higher education are also changing (such as, in our example, admissions counselors). AI tools such as ChatGPT can support prospective students and their parents in researching admissions practices and independently develop an admissions plan. As a result, admissions professionals may lose their traditional role (or need to adjust the assessment of their value) (Chan, 2023). This example demonstrates the need for admissions counselors to shift their practice and engage with prospective students in innovative ways, even in an increasingly digitised experience.

Governance and Ethical Concerns

Higher education leaders must take charge of overseeing AI implementation, both in practice and in policy, with a focus on establishing effective policies to promote ethical considerations, including the aspects of data privacy, academic integrity, and accountability. The role of leadership will help to create a learning environment that values ethical obligations and aims to support both fairness and inclusion in the use of technology (Nam et al., 2023).

Future Directions Technology as a Conditional Good

As higher education continues to adapt and the introduction of more advanced technologies becomes a reality, it must be acknowledged that technologies must be viewed as a conditional goodness. The implications that arise from the use of newer technological advancements, including Artificial Intelligence (AI), do not generate positive outcomes by virtue of their presence. We must consider the

intentions and the way we use these technologies to observe effectiveness and ethical consequences through deductive reasoning. For example, we know that tools such as ChatGPT can benefit users in automating processes or in customising learning experiences. We must also consider the concerns around ethical implications involved in using these tools, including concerns around privacy and social inequities they may cause (MacCabe, 2024; Vallor & Green, 2018).

Promoting Ethical Decision-Making

In order to address the ethical dilemmas that are created as technology is integrated in higher education, it is critical to cultivate skills for making ethical decisions in students. This can be achieved through practice activities that will support recognition of ethical dilemmas and consideration of ethical dilemmas in the decision-making process in order to inform the decisions that are consistent with their values and ethics. It is also important to create sound assessment practices to indicate that the implementation of this practice is effective (Dubbs et al., 2024).

Fig 2: Data Privacy in Education: Protecting Student Data in the Digital Era

Social Responsibility in Education

Future technology integration decisions should pay attention to the need to develop social responsibility in students' educational development, whether in the context of the institution or in their personal lives. As higher education institutions use new technology, they should encourage a sense of ethics with a focus on social responsibility in their use and application. Educating students about the importance of social responsibility will allow students to utilise technology and think critically about its implications on society as a whole (Gallego-Arrufat et al., 2024; Stone, 2025).

Addressing Environmental Impacts

A discussion of the environmental impact of AI and technology is also important because higher education institutions are using these technologies when they make transformations. Educators can support ways to understand the ecological footprint of different technologies and support sustainable practices to help a more mindful approach to technology integration in higher education institutions (Glover, 2023).

Conclusion

The infusion of technological tools in the higher education context is not simply a technological endeavour but a moral undertaking, which must balance ethical responsibility with that of innovation. The paper has shown that although technologies such as AI and e-learning tools may afford powerful advantages to the learning context, such as personalisation and increasing engagement, they also present ethical challenges, such as data privacy, algorithmic bias, and inequitable access. The ethical challenges require collaboration by educators, students, policymakers, and industry to strengthen policies that support fairness, accountability, and transparency. Looking ahead, higher education institutions must develop a culture of ethical decision-making and accountability, whether through curricular, programme, or institutional responsibility to law and policy, to build

social responsibility into the general operation of the institution. In this way, technology supports higher education institutions in equity and inclusion, rather than a worsening of gaps. The success of technology in higher education communities depends on the responsible use of technology by educators, who use language and ideas of virtuous practice, social justice, and the common good within society. The moral goal of the infusion of technology into higher education lies in the empowerment of teaching and learning while maintaining the ethical principles necessary for educational goals.

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DIGITAL TRANSFORMATION IN HIGHER EDUCATION: OPPORTUNITIES AND CHALLENGES IN THE AGE OF AI

K. Bhaskar*

Abstract

Digital transformation happens in higher education due to rapid advancements in artificial intelligence (AI). The applications of AI in educational institutions require changes in both instructional methodologies, academic research processes, and administrative functions. Adaptive learning platforms, virtual tutors, and automated grading tools allow personalized information in the educational experience, improved by providing better information according to the individual student's needs. Using AI tools effectively, faculty members are set up to perform robust academic research by utilizing data analysis and international collaboration to generate innovative knowledge. Although AI offers the potential advantages, several barriers prevent its application in higher education. Different ethical problems, including algorithmic bias and representing students' data, complicate the use of AI within educational settings. Even more, AI technologies are not equally accessible to different socioeconomic groups. Likewise, faculty members are reluctant to embrace AI tools, fearing the pitfalls of digital fluency and the risk of being displaced from their jobs; cybersecurity threats are a serious risk to the institutions' integrity. For the sake of sustainable development of AI in education and integration in general, it is fundamental that the authority applies and provides the tool to every student and also keeps training the faculty every day. Institutions have to draft strategic guidelines to ensure equitable access to AI resources. A standardized AI system could be established through fully implemented policies and recommendations within the academy. There is a need to invest in

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collaborative efforts where a socio-conscious educational system, which will accommodate all stakeholders, will be emphasized, and the benefits gained from AI will be maximized.

Keywords: *Artificial Intelligence, Digital Transformation, Ethical AI Implementation, Higher Education Policy. Personalised Learning*

I. Introduction

Artificial intelligence is starting to pervade the various disciplines, including higher education pedagogy, research methodologies, and administrative functions (Selwyn, 2019). The speed with which AI technologies are integrated creates an opportunity for the effective integration of AI technologies into teaching and learning processes. Adaptive learning platforms, virtual tutors, automated assessment tools, and other AI-powered solutions have been designed to provide an educational experience to some extent with the help of personalised learning environments (Luckin, 2018). This advancement has given hope for customising learning experiences for students to learn as and when they want.

Artificial intelligence (AI) also empowers educators to create easier administrative work, grade quickly, and have a handle on student performance in advance. These have freed up more time for educators to implement new and interactive teaching strategies (Aoun, 2017). Moreover, AI has revolutionised academic research by advancing advanced data analysis, predictive modelling, and facilitating interdisciplinary cooperation for faster and intrinsically profound, more likely efficient research (Mustafa et al., 2024).

However, the fact that AI offers multiple opportunities for higher education comes with a few pitfalls that prevent it from being used in its entirety. Institutions must face questions about the ethical use of AI, questions that relate to algorithmic bias and data privacy (Dwivedi et al., 2021). Because of these ethical issues, governance frameworks

must be formulated to handle them, and AI-based decision-making processes should be transparent (Miao et al., 2021).

Digital divide exacerbates inequalities in access to AI technologies, especially between institutions with varying levels of technological infrastructure. AI-enhanced education generates harsh inequities among students from underprivileged backgrounds, and hence, targeted intervention based on such inequities is needed (Hasa, 2023).

Faculty resistance is another substantial hindrance to adopting AI in higher education. They are frightened of being made to feel superfluous when pursuing potential job obsolescence and ideas of giving up our subjective control of ways of teaching (Bessen, 2018). In addition, the lack of appropriate training in AI tools leads faculty not to fully use these technologies to formulate their teaching practices (Tu & Dung, 2024). This paper investigates the myriad opportunities and challenges of introducing AI in higher education. It provides insights and guidance for a balanced, ethical application of AI.

II. Objectives

The objectives of this research are the following.

1. To analyse how AI can transform higher education and its role in teaching practices, research methods, and administrative processes.
2. Learn how AI can help develop opportunities for personal learning, easing efficiency and institutional choices.
3. To identify Principal challenges and ethical concerns associated with following a digital transformation path through AI.
4. To study case studies and best practices of AI implementation in large universities worldwide.
5. To give policy recommendations for establishing responsible and inclusive paths of AI adoption in higher education.

III. Opportunities in AI-Driven Higher Education

1. Personalised Learning and Adaptive Education

Between personalised learning and higher education, the first to make them AI-powered has been redefined. Platforms such as Coursera, edX, or Udacity employ machine learning algorithms to customise the learning experience by meeting individual students' needs. These platforms show how students learn at their own pace by assessing learning patterns, tracking their progress, and suggesting personal content, motivating and encouraging students to learn.

AI-driven tutoring systems and chatbots, such as IBM Watson Tutor and Squirrel AI, provide real-time support. These tools can answer student queries, explain complex concepts, and generate academic support resources, particularly beneficial for remote learners who may otherwise lack access to individual assistance (Chinnasamy et.al., 2025). As a result, AI integrates continuously into the educational landscape, promoting equitable access and active learning opportunities for all students.

2. Automation and Administrative Efficiency

AI greatly helps administrative efficiency in higher education. By automating repetitive tasks, AI-powered grading systems relieve educators of burdensome grading processes, allowing them to allocate more time to student engagement (Luckin, 2018). Tools like Turnitin and Gradescope utilise AI to ensure academic integrity through plagiarism detection and fair assessment practices.

AI also cuts through the admissions process, class scheduling, and student services. Using automation, screens can be handled by the application, registration processes handled, and resource allocation (Saini, 2025). The result is that institutions can gain operational efficiency by directing more energy towards improving student outcomes, as per the World Economic Forum (2020).

3. AI for Research and Academic Collaboration

AI can process vast amounts of data, find patterns, and, in a way, revolutionise academic research (Aoun, 2017). Literature reviews, citation analysis, and study identification are possible using an AI-powered platform such as Semantic Scholar

and Scite (Stanford HAI, 2025). AI also facilitates virtual academic collaboration, allowing researchers from various institutions to collaborate, share data, engage in writing projects, and work as a team in research.

Such a collaborative approach promotes knowledge transfer from one border to another and from one discipline to another, which helps achieve better quality research outcomes. This enabled the ability to manage and analyse data even better than before, and thus, the pace of discovery is also improved.

4. Immersive and Interactive Learning

When the Augmented Reality (AR) and Virtual Reality (VR) technologies are integrated into education, it results in an interactive, immersive learning environment (Zawacki-Richter et al., 2019). AI-enhanced simulations transform STEM and medical education by allowing students to experiment in virtual labs, reducing safety risks and resource limits (Chauhan et. al., 2024). For example, Labster offers a platform where students can undertake virtual experiments, which makes the concepts much more helpful.

AI-generated surgical procedures and diagnostic practices simulations help medical training, as they are trained without the constraints of physical resources. This integration helps develop practical skills and prepares students for real-world applications (Shet et al., 2023).

5. Data-Driven Decision-Making

Higher education utilises AI to perform predictive analytics that monitor and analyse students' performance. AI-based early warning systems can identify at-risk students based on their attendance records, academic progress, and behavioural data (Long & Siemens, 2011). Institutions use Brightspace Insights, Blackboard Analytics, and other tools to monitor student engagement and retention rates to engage with students on time.

AI also enables resource management by campus educational institutions to allocate budget, employ optimal faculty workloads, or fulfil space utilisation. It is data-driven decision-making that helps

augment institutional effectiveness and an effective use of educational resources (Dede & Richards, 2020).

6. Student Support and Well-being: AI's Role

Using AI can change student support systems to improve students' overall well-being. For example, 'Pounce' at Georgia State University and 'Lola' at the University of Murcia are initiatives that provide students with virtual assistant capabilities to help with the admissions process, financial aid application, course selection, and mental health resources (Luckin, 2018; Selwyn, 2019).

AI applications have also rationalised administration procedures; their effectiveness has been explicitly focused on first-generation students and those with signs of academic disengagement. AI-based mental health technologies like Woebot and Wysa offer another form of emotional support services, available through their applications for those seeking free mental health resources (Dwivedi et al., 2021). AI and human counsellors work together in this collaborative approach, supporting student well-being and mental health resilience, especially for larger institutions with limited human resources.

7. AI in Curriculum Design and Competency-Based Learning

AI is also very valuable in predicting workforce needs through market analysis and assisting education institutions in designing appropriate curricula by matching industry standards (Bessen, 2018). Universities can proactively respond to emerging labour market trends by employing AI algorithms to determine what the students need in terms of skills and which topics need to be modified to address those needs.

Competency-based learning (CBL) models supported by AI technology have become common in higher education. When CBL platforms use the power of AI, students' progress towards acquiring specific skills and competencies can be monitored, and personalised learning experiences can be created (Lamarre et al., 2023). Western Governors University and the University of Wisconsin System have

implemented AI-driven CBL and had a positive influence on the student success rate and employment readiness (Aoun, 2017).

8. The Impact of AI on Higher Education Accreditation and Quality Assurance

Higher education accreditation processes are dramatically changing due to AI and blockchain technology. AI, using data obtained through institutional performance assessments and student feedback, can provide timely insights about teaching effectiveness. By creating a data-driven approach, the accreditation body's decisions will be better, and areas for improvement can be identified.

Integrating AI into academic credentials can also improve their security and integrity. MIT and the University of Malta have used blockchain-based digital diplomas to avoid diploma fraud and reduce the need for diplomas to be globally recognised as academic qualifications (Stanford HAI, 2025). Consequently, better reporting and auditing processes can be achieved when AI is used to facilitate compliance with accrediting standards and simplify compliance oversight.

9. AI and Inclusive Education: Supporting Diverse Learning Needs

From the perspective of AI, there is active support for the delivery of inclusive education because it addresses the different needs of students with disabilities. For instance, Microsoft Immersive Reader or Google Live Transcribe supports speech-to-text and text-to-speech, which help students with hearing and visual impairments learn.

AI-powered personalised learning platforms also incorporate training based on neurodiverse learning, such as students with disabilities, including dyslexia, ADHD, and autism spectrum disorder (Barua, et al., 2022). Language translation tools such as Google Translate and Duolingo limit otherwise present barriers by allowing students to access academic material in their native language. Such advances ensure that the educational environment welcomes and is equitable for all students, regardless of their backgrounds.

10. AI-Powered Career Guidance and Workforce Readiness

AI technology heavily influences these students' work towards workforce readiness and career guidance. According to Mitra (2024), tailored career recommendations can be provided on platforms such as LinkedIn Learning or Coursera Career Academy based on students' academic records and skills. VMock and HireVue are applications that offer real-time feedback on resumes and interview performance to help both students and job seekers prepare for the job better.

The trend and method involve colleges and universities teaming up with AI-based employment matching platforms to connect students with suitable job opportunities, and talent analytics helps find appropriate talent for organizations (Government of India, 2020). Integrating predictive analytics into the curriculum design is one way institutions can better prepare graduates for the evolving labour market.

IV. Challenges and Concerns

Despite AI's potential in higher education, several challenges remain to be overcome to maximise potential of the technology.

1. Ethical and Privacy Issues

The inclusion of AI in higher education raises ethical and privacy issues. If developed on flawed training data, AI-powered systems may perpetuate biases in student evaluations, which will not be equitable assessments. Algorithmic biases more heavily affect some demographics to the point that they exacerbate social inequalities in educational institutions (Binns, 2018).

Using AI surveillance tools also raises valid privacy concerns because large amounts of data and continuous student surveillance could violate individuals' rights. The risks involved in using AI can be mitigated by adhering to ethical guidelines and transparency in misuse of AI (Floridi & Cowls, 2019). If the ethical framework is not set clearly, distrust and disturbance of the educational environment may happen, especially if an AI application is considered.

2. Addressing the Digital Divide

It further exacerbates the inequalities related to AI-generated education. AI-assisted learning resources are often only available for the privileged or urban areas, exacerbating existing socio-economic gaps (Selwyn, 2010). First, many students lack the devices and internet connectivity needed to participate in AI-enhanced educational opportunities (Van Dijk, 2020).

In order to bridge this divide, governments and educational institutions must invest in providing digital infrastructure, subsidised technology, and inclusive policies to reduce the barrier for all students, regardless of their socioeconomic backgrounds (Warschauer & Matuchniak, 2010).

3. Faculty Readiness vs. Resistance

Faculty members must be ready to embrace the new technologies for AI to work among faculty in higher education institutions. However, many educators are not adequately acquainted with digital literacy or technical skills that will facilitate using AI tools within their pedagogy (Su, 2024). However, there is widespread resistance to change, and faculty members resist the idea that AI will supplant the job of a traditional teacher.

Institutions must invest in professional development programmes that help educators use AI in their teaching to enable the widespread use of AI in education (Miao et al., 2021). These workshops and training sessions will equip faculty with AI literacy to incorporate AI projects without sacrificing their educational control.

4. Cybersecurity and Data Protection

According to Papernot et al. (2016), the prevalence of cybercrimes, data breaches, and academic fraud is exacerbated by the large volumes of sensitive student and institutional data stored by AI-based educational platforms. Safeguards such as the Information Technology

(IT) Act of 2000 and the General Data Protection Regulation (GDPR) are vital to preserve the privacy of pupils.

Strong cybersecurity measures (such as encryption, multi-factor authentication, and AI-based threat detection systems) are necessary to protect academic data from cyberattacks (Tırpan, 2024). Additional or continuous monitoring and adjustment of AI-driven platforms will reduce further AI-driven risks and bolster data protection.

5. The Rise of Displacement of Jobs and Redefinition of Roles

While faculty and administrative staff (FAS) fear job displacement with the increasing encroachment of AI into educational roles, this needs to be anticipated (Floridi & Cowls, 2019). Tırpan (2024) states that AI might replace grading, administrative tasks and advising functions and decrease the need for traditional educators. Instead of considering AI a threat, institutions are advised to consider it a tool to empower human potential. AI can allow teachers to focus on mentoring, critical thinking, personalised engagement between students, and the educational experience itself (instead of replacing it), as Aoun (2017) has proposed. This necessitates a redefinition of educational roles, consistent with the ever-changing context, namely the role between human and artificial intelligence.

V. Case Studies and Best Practices

Various higher learning institutions have embraced AI in improving educational quality and outcomes.

1. AI Initiatives in Leading Global Universities

In recent years, AI has been part of the curriculum of several premier universities such as MIT and Stanford, with courses in AI ethics, machine learning, and it is employed to generate personalised learning experiences for students (Lamarre et al., 2023). AI research is led by the Indian Institutes of Technology (IITs), which have developed

virtual labs and adaptive testing systems to involve the students and improve their performance (Kumar et al., 2025).

2. AI-Driven Assessment Models in India's National Education Policy (NEP) 2020

One of the aspects of the Indian government's National Education Policy (NEP) 2020 is AI's capabilities of making education more continuous, based on competencies, and graded evaluation (Government of India, 2020). AI-assisted tools use the assessment tools and track students' progress, identify the learning gaps, and suggest customised interventions. This initiative aims to make the assessments transparent and promote critical thinking instead.

3. AI-based Trending EdTech Companies of the World.

EdTech companies like Byju's and Unacademy use the power of AI algorithms to build a personalised learning experience through interaction with video lessons and real-time performance analysis (Shet et al., 2023). These platforms lead by using AI to suggest courses and predict learning outcomes for the future of online education, which will happen in India and abroad (Hasa, 2024).

VI. Policy Recommendations and Future Directions

The integration of AI in higher education necessitates the establishment of responsible principles and guidelines for effective implementation.

1. Responsible Principles of AI

Higher education institutions should develop ethical guidelines for the responsible deployment of AI while attempting to minimise bias, protect data privacy, and address intellectual property concerns. Regular auditing processes should be in place to detect and eliminate biases based on transparency, which should be a guiding principle in AI governance policies (Floridi & Cowls, 2019). The ethical use of AI

must become part of institutions' policies to safeguard student and faculty rights (Floridi & Cowls, 2019).

2. Bridging the Digital Divide

Higher education institutions should develop ethical guidelines for the responsible deployment of AI while attempting to minimise bias, protect data privacy, and address intellectual property concerns. Regular auditing processes should be in place to detect and eliminate biases based on transparency, which should be a guiding principle in AI governance policies (Floridi & Cowls, 2019). The ethical use of AI must become part of institutions' policies to safeguard student and faculty rights (Floridi & Cowls, 2019).

3. Structured AI Adoption Roadmap for Higher Education Institutions or any other type.

Higher education institutions should coordinate the systematic adoption roadmap to integrate AI smoothly. This can involve developing phased implementation strategies and pilot programmes to prepare for broader adoption among colleges and universities (Luckin, 2018). Steps that would enable successful integration into educational settings include establishing AI research centres, encouraging interdisciplinary collaboration, and offering incentives for AI-driven pedagogical innovations (Barua et al., 2022).

4. Continuous AI Training for Educators and Administrators

This brings us to the point where appropriate digital skills should be in place for the faculty and administrations to promote the successful integration of AI in higher education through regular training programmes. To fulfil these initiatives, the focus should be on AI literacy, professional development, and workshops for educators to transition into AI-enhanced pedagogy (Floridi & Cowls, 2019; Su, 2024). Another way to emphasise is that AI technology should complement, but not replace, traditional teaching methods, so

educators still play an important role in promoting the student's learning process (Aoun, 2017).

VII. Conclusion

Integrating AI in higher education implies an unprecedented radical break with past practices, where new opportunities in personalised learning, administrative efficiency, improved research collaborations, immersive experiences in education, and data-driven decision making are opened. While PMI offers many opportunities for adopting responsible AI in education (Miao et al., 2021), ethical concerns, digital divide, faculty resistance, security issues, and job displacement will likely hinder responsible AI adoption.

A balanced approach is required, which supports but does not force the responsible and ethical application of AI technologies. Where AI exists, regulatory standards need to be set by policymakers and enforced in the datafication space to promote fairness, transparency, and accountability, balanced with a prioritisation of data protection and preventing biases in AI algorithms. Investment in infrastructure, such as reaching out to rural and underserved communities and using affordable technology and comprehensive digital literacy programmes, will be necessary to secure access to AI-driven education (Mustafa et al., 2024).

At the same time, continuous opportunities for educators and administrators to teach and learn are crucial for effective integration in the educational sphere. Institutions must collaborate with academia, government, and industry in an AI-driven future to develop policies and innovations that support inclusive and high-quality education (Saini, 2025).

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PODCASTS IN HIGHER EDUCATION: EXPLORING AUDIO LEARNING, ENGAGEMENT, AND ACADEMIC SUCCESS

Roshan Jameer MD,* V Temuzion Kumuja,♦ & Pedaveti Julia♣

Abstract

This article investigates the empirical perspectives on podcasting in higher education, and analyses the intersections of audio learning, student engagement, and student achievement. In terms of educational value, podcasts have emerged as a dynamic learning tool, enabling learners to access content on-demand while increasing motivation that leads to deeper learning. Established in 2004, podcasting has initiated a vast adoption for educational use particularly in higher education learning contexts. Thus, podcast utilisation also coincides with motivational theories, specifically Self-Determination Theory, as it shares congruence with the tenets of autonomy, competence, and relatedness. The current article reviews literature and proposes the following themes regarding audio and podcasted learning in higher education: the affordances and advantages for the audio learner, the impact on student engagement, educational experiences, academic performance, and retention, and the social emotional implications and challenges of audio learning. The review of podcasting literature demonstrated the value and benefits of audio learning for certain learners, including: accessibility for diverse learners, e.g., learners with neurodiversity, languages, academic challenges, and affordances such as differences in learning preferences. In light of these challenges, the potential of audio learning as a pedagogical tool to enrich the learning experience, while being equitable for all students, are discussed as

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opportunities for educators. The discussion highlights the potential for students and audio learning to have a substantial impact on collaborative learning while enhancing student learning achievement overall. The authors outlined some important suggestions for institutions and modern educators to consider when evaluating and implementing the use of podcasts for student benefit in their classroom. The article concludes with an overview of the complexities and challenges surrounding audio learning as an emerging pedagogical strategy and a lens into classroom practice for institutional learning.

Keywords: *Podcasts, Higher Education, Audio Learning, Student Engagement, Academic Success, Pedagogical Tool*

Introduction

Empirical Perspectives on Podcasts in Higher Education investigates the effects of podcasting as a new pedagogical tool that connects audio learning, student engagement, and academic achievement. Podcasts are a dynamic medium providing on-demand access to learning about educational content. They have been embraced as a teaching tool across the higher education landscape since 2004, creating opportunities for deeper learning and enhancing student engagement in face-to-face teaching and learning environment (Araújo & Rodrigues, 2019). The use of podcasts in the curriculum also aligns with theories of motivation in adult learners, such as self-determination theory, emphasising autonomy, competence, and relatedness to understanding the efficacy of learning contexts (Perry, 2024).

Research has indicated that educational experiences involving audio learning strategies, including podcasts, can meet the wide range of learning preferences from students associated with their configuration preferences to increase accessibility for students including neuro diversity and those experiencing language barriers (Makina, 2019). The research reflects a growing trend among students, who express their preference for audio formats when suggested a choice, underscoring

benefits of audio formats including comprehension and focus, and multitasking, all of which surround a college experience (Locke et al., 2024). The potential for audio formats in the educational space depends on values and supports, including institutional technological capacity and access, institutional staff training practices and support for staff training opportunities, especially as potential impacts surround time usage as well as whether an audio space traverses or conjuncts with learning space on learning focus (Koçak & Alagözlü, 2021).

Research in the educational field indicates podcasting enhances student engagement, knowledge retention, and student academic performance (Paul, 2024). The audio context provided by podcasts allows students the freedom to become more engaged in their learning while having the ability to also engage with others collaboratively (Perry, 2024) . Yet, some concerns have been raised about students relying too much on these audio materials rather than predominately relying on classroom experiences when learning. These considerations beg the need to weigh the possibility of podcasts—audio pedagogy—in higher education (Makina, 2019).

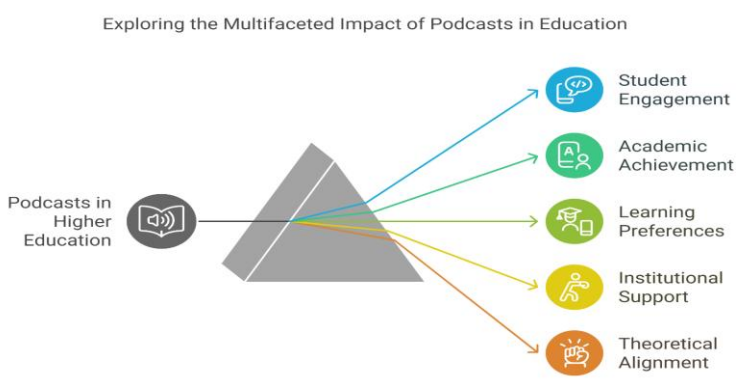

Fig 1: Exploring the multifaceted Impact of Podcasts in Education

Source: Compiled by the researcher

In the discussion of the role of podcasts in higher education, researchers have emphasised the need for continual systematic research to assess the effectiveness of podcasts along with pedagogical approaches to maximise their success (Kay, 2012). In addition, as institutions try to adjust to shifting educational contexts, it remains vital to understand the nuanced relationship between audio learning, engagement, and academic achievement and to examine this complex terrain from a research perspective (Rahman et al., 2024; "Using Podcasting," 2022).

Background

Podcasting has become a new way to engage in higher education. It serves as an effective mechanism for creating content and increasing student engagement. Podcasts can be described as a series of audio and/or video files. These have been developed and maintained over time. Some of these materials are updated in the same way as a blog post or magazine (Araújo & Rodrigues, 2019; McGarr, 2009). Podcasts allow students to consume educational materials at their own pace. This approach helps to reduce the time and spatial limitations that exist in a formal classroom learning environment (Araújo & Rodrigues, 2019). Since the beginning of podcasting in 2004, the use of podcasts has grown at a rapid pace. This trend suggests that the podcasting modality can serve as a medium for entertainment and, at the same time, as an instructional resource that improves the learning experience (Merhi, 2015).

Using podcasts for learning activities and educational purposes fits within well-established motivational theories such as self-determination theory (SDT) developed by Ryan and Deci ("Using Podcasting," 2022; Makina, 2019) or educational theories that suggest that intrinsic motivation and fulfilling the three basic needs of human motivation—autonomy, competence, and relatedness—are critical to creating a meaningful context for learning. Relevant research indicates that supportive teaching practices such as formative assessments,

feedback, and praise directed at students can increase students' self-efficacy and engagement in educational activities ("Using Podcasting," 2022). This aligns with the findings in a university seminar in Tokyo. New ways to assess students, such as podcasts, encouraged self-expression and critical thinking ("Using Podcasting," 2022).

Educational opportunities connected to podcasts do not stop at presenting content. They also allow collaborative learning experiences in which students can interact in meaningful ways with one another (Araújo & Rodrigues, 2019). The theory presented in this paper has been made available to academic developers and course designers as a resource that supports a systematic approach to using podcasts in teaching spaces. It considers the context and limitations that exist in traditional education, such as using podcasts to improve the curriculum (Makina, 2019). As educational institutions begin to study the benefits of podcasting, researchers must carry out empirical studies on the effectiveness of pedagogies based on this medium. These approaches can then be refined as educators and scholars learn more about the nature of podcasting (Merhi, 2015).

Fig. 2: Podcasting in Higher Education: Engagement and Motivation

Source: Compiled by the researcher

Audio Learning

Importance of Audio in Higher Education

Audio learning has developed as a high-value trending area of learning, providing valuable aspects of learning that are not available through print. In investigations focused on undergraduate students, it was noted that a number of students with divergent learning styles expressed an interest in more audio materials in their learning, which suggests that using audio materials would diversify their learning experience. As evidence to support this trend, one survey indicated that 53% of survey respondents would use more audio options if available (Locke et al., 2024). Recorded lectures and tutorials were the most two popular options which could be used to engage and learners' understanding of content.

Accessibility and Personalisation

What stands out most about audio learning is its accessibility for a range of students, including those who experience neurodiversity or language barriers. In separate studies, many students stated that experiencing some form of information orally—through podcasts or audiobooks—makes it easier to process the information. All students found it to be a format that supported their ability to multitask and learn at the same time (Locke et al., 2024; Koçak & Alagözlü, 2021). All students also showed a sensitivity of self-awareness to their own learning styles and expressed a desire for different learning formats. Several students specifically requested audio learning options as a part of their learning experience (Hew & Cheung, 2012). This uniqueness of student interest also creates a motivation to think through the inclusive learning opportunity that audio offers. These learning formats match specific pedagogical practices such as Universal Design for Learning or UDL (Locke et al., 2024).

Implementation Challenges

Although audio learning clearly has many advantages, there are a

number of challenges associated with accessing and implementing audio learning in higher education. Barriers include poor communication about what audio resources are available, challenges related to outdated technologies, and lack of opportunities for institutional training for staff to build new audio pedagogy skills (Locke et al., 2024). Some students noted that the university's existing infrastructure does not adequately support audio learning-based approaches, which might create a mismatch between student expectations for learning and the institution's capabilities to support them (Pimmer et al., 2016).

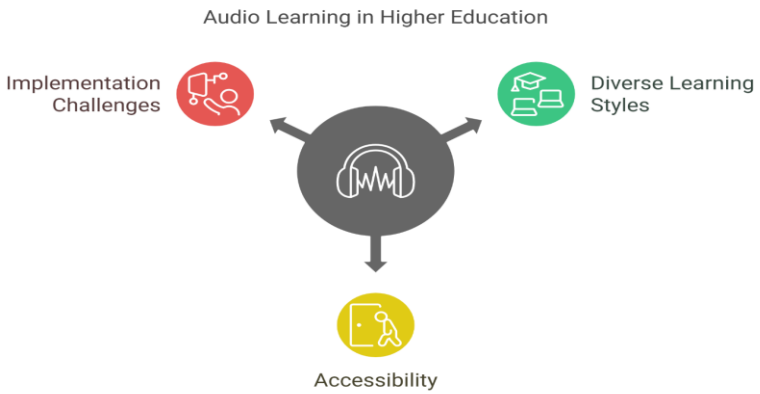

Fig 3: Audio Leaning in Higher Education

Source: Compiled by the researcher

Innovative Audio Learning Strategies

With the rapid growth of digital platforms, and the increasing popularity of podcasts (one of many forms of media that can be consumed in audio format), higher education has begun investigating the use of audio learning approaches. Specifically, educators are tasked to develop lesson plans that are audio-content focused while considering the accessibility of resources for students, learning objectives, and suitability of the content (Koçak & Alagözlü, 2021).

Emerging scholarship and public interest in podcasts suggest contextualizing audio content via a lens based on an educational framework for quality use of podcasts, is an effective strategy for educators to consider, as they engage with audio learning in their course curriculum (Bond et al., 2020). This framework guides educators to employ podcasts as an educational opportunity for many kinds of cognitive effectiveness such as understanding, application, deeper learning experiences, and student engagement (Makina, 2019).

Engagement

Podcasts have come to the forefront as a new way of learning in higher education, creating a uniquely interactive way of learning and giving students opportunities for meaningful engagement. In the context of meaningful engagement, podcasts help create a positive behavioural, cognitive, and emotional space for student engagement with a commentary-based speaking task (Traphagan et al., 2009). Evidence suggests that a competence-supportive pedagogy leads to higher levels of student engagement, while a relatedness-supportive environment in an unbalanced context has a negative influence on engagement (Lee & Lui, 2024).

The Role of Autonomy and Choice

An essential component in engaging students in podcasts is the amount of choice or autonomy given to learners. When learners have the space to choose their topics of assessment and can create "need-supportive contexts", this more effectively promotes intrinsic motivation and a greater depth of interest and learning about the content (Perry, 2024). Learners consider their own control over learning, in many instances, in relation to their academic experience as improved, as one learner stated, "deciding the topic was fun" (Perry, 2024). This sense of ownership is important in keeping students engaged and can exist even in an approach that is structured, as long as there is some degree of flexibility in the process (Conde-Caballero et al., 2019).

Impact of Technology and Social Media

The interaction between using technology, mainly social media platforms like Telegram, and student engagement has been a major area of research. Evidence has suggested that the use of social media for educational purposes has a positive effect on students' engagement and academic success, showing that such platforms can be effective tools in the educational experience (Parween et al., 2024a). On the other hand, it is important to maintain a mindful and healthy balance with technology use, because excessive use will deter academic achievement. There are various interventions, such as phases of digital detox and mindful use, that can support students in dealing with the challenges of using social media while creating a positive learning environment for students (Parween et al., 2024a).

The Power of Audio in Learning

The continued rise in the use of audio formats, such as podcasts, is associated with more personalised learning experiences, especially in online learning environments. During the transition to remote teaching occasioned by the Covid-19 pandemic, audio was used to engage students from different backgrounds while also offering an equitable and inclusive alternative to printed materials (Locke et al., 2024; O'Flaherty & Phillips, 2015). The collaborative nature of podcasting contributes to learning and supports the community, which has implications for student engagement and retention. Student-generated content through podcasts has been found to improve collaborative learning and problem-solving skills, which improves the learning experience (Kay, 2012; Paul & Paul, 2024).

Academic Success

The process of podcasting in higher education has developed into an important tool for improving student academic success. Podcasting, both as a teaching device and as a way of creating classroom content, has a positive influence on engagement, knowledge retention, and

academic performance. Educators have shown the usefulness and effect of using technology in the learning process. They have observed that podcasts can affect not only motivation but also students' success in terms of post-secondary educational achievement (Paul & Paul, 2024; Goldenberg et al., 2023).

Impact on Student Engagement

Podcasts represent a flexible alternative resource that can suit different learning styles and preferences. They give students a chance to take part during lessons and work with others in a more interactive learning environment (Paul & Paul, 2024). Lecture podcasts also allow students to engage with the course material at their own times, which helps them learn the material better, particularly if they are not used to traditional in-class learning (Connolly, 2024; Araújo & Rodrigues, 2019).

Knowledge Retention and Learning Outcomes

It has also been shown that when students listen to podcasts as part of their studies, they show greater retention of knowledge and strengthen their understanding, particularly during exam study, when students rely on podcasts as a secondary resource (Paul & Paul, 2024; Connolly, 2024). Podcasts can also be a useful resource for non-native speakers of the instructional language, because they help with understanding. This increased familiarity can lead to better inclusivity and accessibility in learning (Connolly, 2024).

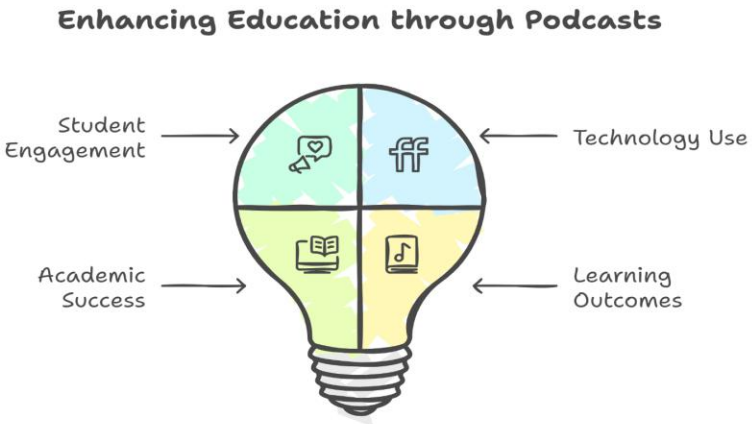

Fig 4: Enhancing Education through Podcasts

Source: Compiled by the researcher

Faculty and Institutional Support

The involvement of Faculty is crucial for the successful incorporation of podcasts into classroom practice. When Instructors perceive podcasting as part of their teaching philosophy, recorded lectures can enhance student satisfaction and engagement in the classroom (Paul & Paul, 2024). Engagement in innovative pedagogies such as podcasting enables institutions to establish a culture of student success and is likely to lead to increased retention and graduation rates among students (Goldenberg-Barbosa et al., 2023).

Challenges and Considerations

While a podcasting experience has important benefits, it also presents some challenges for education. For instance, some learners may utilise podcasts at the expense of attending lectures, which, ultimately, may reduce their classroom engagement (Connolly, 2024). In addition, educational opportunities must be equitable for all students, part of which means higher education institutions offering podcast episodes of appropriate quality and educational standards (Makina, 2019).

Methodology

Research Design

The research in this study utilised a mixed-methods approach, with both quantitative and qualitative data collection. This combination was particularly important for developing a deeper understanding of how podcasting affected an assessment of academic speaking. The quantitative aspects included questionnaire surveys, while the qualitative features were obtained through semi-structured interviews, which gave more detailed insights into participants' attitudes and experiences (Kay, 2012; "Using Podcasting," 2022).

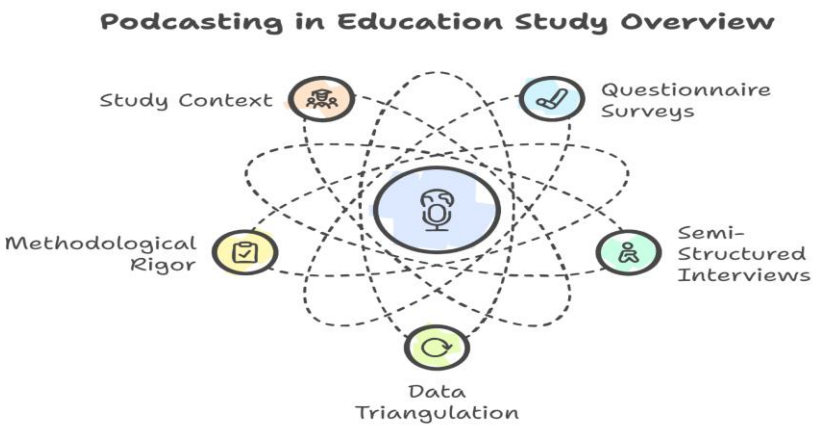

Fig 5: Podcasting in Education Study Overview

Source: Compiled by the researcher

Data Collection

Questionnaire Survey

The questionnaire surveys were developed to collect data from larger groups of participants, two classes with 23 and 16 students respectively. The questionnaires considered key themes related to student motivation and perceptions of using pod-casting to assess

students. Further, the data collection instrument was designed to acknowledge the anonymity of the student responses, hence encouraging authentic answers, while allowing for a systematic collection of data related to trends observed across the sample population ("Using Podcasting," 2022; Merhi, 2015).

Semi-Structured Interviews

In addition to a quantitative approach, the researchers interviewed nine students in semi-structured interviews. The semi-structured interviews had a thematic structure, and these thematic questions coincided with those presented in the questionnaires, but the semi-structured format ensured that students could respond in a spontaneous manner (Nortvig et al., 2018). The researchers sought to explore some of the nuances relating to a student's experience and perceptions of the podcasting format and to glean a more robust approximate qualitative understanding of how the podcasting format impacts motivation and performance in an educational context ("Using Podcasting," 2022; Merhi, 2015).

DataTriangulation

While the research employed a quantitative approach, the scholar used a triangulation approach to improve the dependability and credibility of the findings. Several case studies were created, and data were collected from several sites. The data collection included podcast assignment formats, observational notes, and feedback forms as another data collection source. Triangulation was intended to make sketches of the several case view (Kay, 2012), which gave a more complete view of the research subject and formed a foundation to share findings back to the participants to validate interpretations ("Using Podcasting," 2022; Kay, 2012).

Methodological Rigour

At every stage of the process, the study refers back to the initial research question that framed the investigation: "How effective a

means of assessing speaking ability and communication skills may podcast assignments are and, how did students engage with this form of assessment" ("Using Podcasting," 2022; McGarr, 2009). An audit trail was maintained for methodological accountability, which described what they did and when in the context of research rationales. An audit trail was also seen as vital for indicating the appropriateness, quality, and rigour while relying on assessment methods within the study (McGarr, 2009). The study also sought to assess how effective podcasting would be in validating students' education-based speaking ability and communicative skills, related to motivation of students, in this case study of a new format for the assessment of speaking ability (Kay, 2012; "Using Podcasting," 2022; McGarr, 2009).

Context of the Study

The research was carried out at a private engineering college in Hyderabad during an elective discussion workshop for third year students. The goal of this seminar was to help students improve their public speaking by engaging in realistic discussions on difficult topics. Because the instructor wanted to try something different than just assessing student learning using PowerPoint presentations, they decided to introduce podcasting as a 'new' pedagogical assessment approach that could give students an opportunity to think and express themselves in a safer, more private, more engaging context (Kay, 2012; "Using Podcasting," 2022).

Findings

Student Perceptions of Podcasts

A study involving, 130 participants in an online undergraduate course, aimed at gaining a better understanding of 'students' perception of a podcast' use, both positives and negatives. Results indicated that practical benefits related to the podcast experience, such as improved attention and note-taking were perceived as useful aspects of the use of podcasts. A significant negative noted by students was that podcast

experiences lacked interaction and visual contact with others, which in some cases was detrimental to their learning experience (Hew & Cheung, 2012; Merhi, 2015).

Engagement and Learning Outcomes

Based on the findings of research studies, when podcasts are applied in the right way, it can promote positive behavioural, cognitive, and emotional engagement from students. When authors conducted a thematic analysis using engagement and self-determination theories, it indicated that students generally showed high levels of engagement with podcast-based speaking activities. This engagement can be attributed to both the autonomy presented by these activities, and the sense of community created by the instructor's on-going dialogue with students (Lee & Lui, 2024; Kay, 2012). Students also showed a clear desire to use more audio in their university learning experiences, and 53% of participants indicated they would use more audio learning approaches if they were offered (Locke et al., 2024).

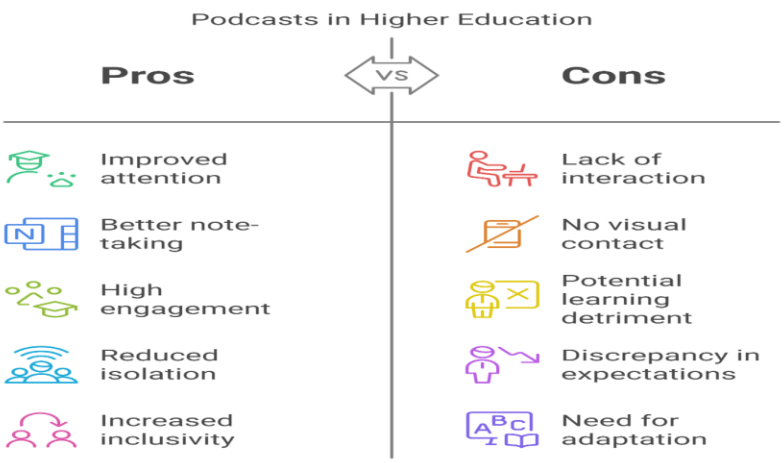

Fig. 6: Pod casts Pros & Cons in Higher Education

Source: Compiled by the researcher

The Role of Technology in Bridging Gaps

Implementation of audio technology, including podcasts, has been described as an important innovation in open distance and e-learning (ODeL) contexts. Incorporation of this technology assists in reducing the transactional distance associated with distance learning, and decreases student feelings of isolation, and increases participant inclusivity (Makina, 2019). The implications of the findings of this study are relevant to both theoretical and pedagogical contexts, and suggest that inclusion of podcasts can greatly enhance the student learning experience, and support the learning environment, in higher education institutions (Parween et al., 2024b; Hew & Cheung, 2012).

Implications for Pedagogy

Even though the demand for audio-enabled learning is on the rise, there remains a discrepancy between the expectations of the students for input variation in the format of learning and the actual instructional practice exercised by universities. This points to the need for universities to respond and strengthen their audio-based offering for their student community (Locke et al., 2024; Kay, 2012). As the educational scenario continues to develop, more work is needed to explore the effectiveness of audio-centred learning approaches and how they can be adapted to meet the preferences and developmental needs of learners.

Discussion

Podcasts as a teaching device in higher education have potential gains and challenges both for curriculum designers and educators. For example, Jarvis and Dickie (2010) note that the findings of recent studies within education provide useful data that can influence future curricular designs and may create an opportunity for a turnaround in student performance decline. This study states that the present use of its proposals has pedagogical value for university educators' teaching experiences, but a more robust pedagogical framework is worthy of

exploration (O'Flaherty and Phillips, 2015).

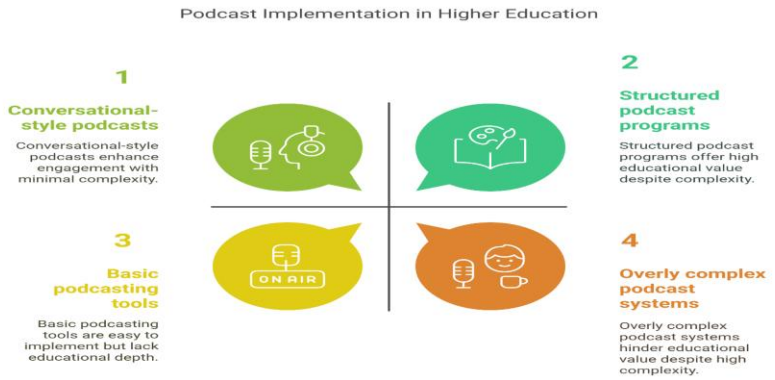

Fig. 7: Podcast Implementation in Higher Education

Source: Compiled by the researcher

While managing the efficacy of the podcasts as technologies can seem overwhelming, a properly structured approach to their implementation may assist institutions in making sure that their educational promises are maintained (Nortvig et al., 2018). Moreover, the costs of podcasts must justify investment by improving educational outcomes since the returns, when properly managed, give returns on the projections of technology investments ("Using Podcasting," 2022; Hew and Cheung, 2012).

A podcast created with a conversational style and storytelling techniques can also increase the engagement of the learner. As stated, when a subject is clear and organised, learners can take in the information, and when a subject is storied, it becomes easier for learners to process complicated concepts (Pimmer et al., 2016). For instance, inviting participation via questions or prompts builds community and creates opportunities for immediate feedback which enriches the learning experience (Mei et al., 2025).

The study of podcasting experiences used a phenomenological design to explore how students experience and engage with podcasts across

courses. The affordances of qualitative data gave a rich understanding of participants' experiences and let the study reveal ways that podcasts operate as a learning tool, especially their potential to appeal to a variety of learner backgrounds and preferences (Kay, 2012). In contrast, the study acknowledges that the current study had its limitations, including expanding the method, and equitable access to technology in order to immerse in the podcasting experience in education (Goldenberg-Barbosa et al., 2023).

Conclusion

The use of podcasts in higher education is a growth area in teaching and learning pedagogies, allowing for a flexible and engaging medium of learning. The relevant literature clearly shows the potential for educational podcasts in higher education to engage students, facilitate retention of knowledge, and create opportunities for success by catering for different learning preferences and flexible engagement with content that is accessible and on-demand. Podcasts lend themselves to motivational theories of learning, such as self-determination theory, which aims to support autonomy, competence, and relatedness to learning. On the other hand, it is important to understand other possible barriers to embedding podcasts into the curriculum. These challenges include the technological infrastructure needed for effective podcast delivery and institutional support, while also maintaining equitable access across socioeconomic lines. It is also important for educators to consider the dangers of becoming too reliant on the use, as this may prevent higher levels of engagement common in traditional classrooms. In the foreseeable future, institutions of higher education should engage in more scholarship in order to develop podcasting as a valid pedagogy, and uphold the implementation of podcasting as well as audio materials as part of pedagogical approaches that promote learning. In summary, although podcasts present challenges, educators who implement them successfully can use their potential, inclusive, engaging, and effective

learning environments by managing the complexities involved in integrating podcasts in higher education settings.

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Telangana Council of Higher Education

The Telangana Council of Higher Education (TGCHE) was formed by the Government of Telangana through the adoption of the Andhra Pradesh State Council of Higher Education Act, 1988, in line with the Andhra Pradesh Reorganisation Act, 2014. This step followed the National Educational Policy of 1986, which called for state-level bodies to oversee Higher Education in coordination with the University Grants Commission.

The Council serves as a link between the University Grants Commission, the State Government, and the universities in Telangana. Its duties fall under three main areas planning and co-ordination, academic matters, and advice to the Government.

In the area of planning and co-ordination, the Council prepares joint programmes for Higher Education in the State. It helps carry out University Grants Commission guidelines, keeps track of institutional plans, and watches progress. It also gives permission for new institutions after verifying that they meet the required conditions. It brings together universities, colleges, and industries for shared work.

In academic matters, the Council encourages changes in course content and structure. It promotes autonomy in colleges and oversees how they carry out their tasks. It takes steps to improve exams and organises teacher training. Its academic functions include curricular reforms, course restructuring, and syllabus updates in universities and colleges

As an advisory body, the Council gives advice to the Government on funding, research, and university rules. It works with technical education bodies and offers views on the plan for new institutions.

Under the chairmanship of Prof. V. Balakista Reddy, the Council has taken several steps to improve Higher Education in Telangana. They include new courses in Artificial Intelligence, Cybersecurity, and Data Science. The Council has facilitated digital platforms like the T-SAT Network to reach students across the State. It has entered into MoUs with institutions, including foreign institutions, and industries. It has also worked to improve teaching, research, and access for students from weaker sections.

The Council aims to raise academic standards in Telangana and to make Higher Education more accessible, practical, and job-oriented.

Telangana Journal of Higher Education (TJHE)

Telangana Journal of Higher Education is a peer-reviewed academic journal published twice a year, in June and December, and in print and online versions, by the Telangana Council of Higher Education. It brings together research on teaching, policy, learning and governance, with a focus on Higher Education in India. It publishes original work across fields such as pedagogy, law, technology, sociology, language, literature, architecture and curriculum reform.

TJHE accepts different forms of academic writing. They include research studies, reviews of literature or policy, theoretical papers, case studies and articles based on personal learning and reflection. All submissions must meet academic standards and follow the journal guidelines.

TJHE encourages writing that questions old models and opens up new ways of thinking about Higher Education. It supports work that draws on more than one field of study and promotes inclusivity and interdisciplinarity. It also invites work that links classroom teaching with research and practical knowledge.

TJHE pays particular attention to the role of digital tools and new technologies in education. It endeavours to bring together scholars, teachers and decision-makers who are interested in the future of Higher Education and wish to share their ideas with a wider audience.

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