Digital Education Initiatives: A Guide to Transformative Pedagogical Practices

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This paper focuses on the Digital India initiatives aimed at transforming the country's education system into a digitally empowered one by increasing digital literacy, upgrading instructional methods through the adoption of digital tools, and promoting and incorporating digital applications. Notably, the Digital India campaign has enhanced Internet access, improved e-services, expanded digital infrastructure, and fostered innovation in adopting newer technologies in the teaching-learning practices. Visible changes had taken over educational practices because of increased focus on digitally empowered instructional methods (Thomas, 2012). Major interventions are noticeable in the domains of Information and Communication Technology (ICT) infrastructure, creation, storage and access of digital education resources, as well as networking using telecommunication or satellite-based communication to enhance learning. Major developmental components of digital education initiative include the Digital Infrastructure for Knowledge Sharing (DIKSHA web portal, mobile apps, Chatbots), ICT labs, smart classrooms, e-content resources, creation of management information systems at various levels, especially in schools, Teacher Education Institutions (TEIs) and Higher Education Institutions (HEIs). The National Education Policy (NEP) 2020 proposes to establish the National Educational Technology Forum (NETF) to facilitate the unlimited exchange of ideas on multiple aspects of digitalisation of teaching and learning, as well as the digitisation of assessment, planning and administration. This paper explores the perspectives, policies and initiatives aimed at fostering innovation in the applications of digital technology to the teaching–learning process.

Keywords: *Digital education initiatives, digital infrastructure, digital applications, learning management system, digital tools*

Perspectives of Digital Education

The slogan 'Education is for all' has evolved into 'Digital Education is for all' in the present context, reflecting the priority bestowed by the Indian Government to developmental aspects. Ensuring that no one is left behind in terms of accessibility and adaptation of digital facilities is the key objective of the government's digital education policies. The recent G-20 framework for systems of digital public infrastructure aims at developing 'a shared set of digital systems' to drive digital development, digital innovation, inclusion, trust, competition, and respect towards human rights and fundamental freedoms. This vision emphasizes that education plays a pivotal role in achieving these objectives. Digitalising education is the way forward by which all developments can be realised.

The focus on digital education, including the development of digital infrastructure and digital content, use of digital tools for capacity building to address educational needs at all levels, ensuring equitable access to technology, developing skills and competencies aiming at revolutionising education, is central to enhancing the quality of education and transforming the current educational system. The NEP 2020 envisions a comprehensive adaptation of digitalisation aimed at fostering the unique

capabilities of every student. The policy emphasizes the extensive use of technology in the teaching–learning process to remove language, accessibility and adaptability barriers, not only for mainstream students but also for physically challenged (divyang) students by the use of enabling assistive and immersive technologies which are as follows.

Extended Reality (XR): It represents the combination of both virtual and physical aspects of the setting to create immersive and interactive experiences. XR includes three main types of technologies, which are as follows.

- **Augmented Reality (AR)**: It aims at providing experiences that are interactive in nature, combining computer-generated and real-world matter. These experiences majorly use sensory modalities, including visual, auditory, haptic and somatosensory inputs. It often uses a camera or a smartphone to add digital elements to a live view (Zeimer, 2020).
- **Mixed Reality (MR)**: It consists of a mixture of digital and physical content, unravelling the spontaneously built 3D computer-generated content (Marr, 2020).
- **Virtual Reality (VR)**: It provides a simulated experience with 3D displays offering an immersive experience of the virtual domain.

Haptic technology, also known as 'haptics', creates a sense of touch through vibrations, motions, or forces (Marr, 2020).

Blockchain technology is a type of digital ledger that allows for secure information sharing and transactions across a network.

Cloud computing allows accessibility of data and computing resources on a remote basis; cloud services include storage, networking, analytics and database management (Sunyaev, 2020).

Machine learning is a major component of Artificial Intelligence (AI), which focus on constructing algorithms for computer-based systems towards efficient programming based on implicit constructs.

Fully immersive VR, Simulation is a technology that aims to transport users into a computer-generated, three-dimensional world that feels like reality (Zeimer, 2020).

Digital twin technology is a virtual model of a real-world object, system or process that can be used for simulation, testing, monitoring and maintenance.

Emphasis on Digital Initiatives

The Digital India campaign, a major flagship programme of the central government launched in 2015, focuses on transforming the society into a digitally empowered knowledge society. Its primary aim is to improve Internet connectivity and infrastructure, including 5G connectivity. The campaign concentrates on three key areas of development: (i) creating digital infrastructure for the benefit of citizens (ii) improving e-governance, and (iii) empowering citizens through digital assimilation. Furthermore, the nine pillars of the Digital India mission aim to create broadband access, universal connectivity, seamless Internet connectivity, effective e-governance and services, and electronics manufacturing with the goal of zero imports. They also focus on creating technology-based jobs, initiating e-trading platforms and partnerships, equipping citizens with digital skills, creating equitable societies through the provision of access to information (Suman, 2016).

The Digital India programme is a pioneering initiative by the Department of Electronics and Information Technology (DietY) that focuses on improving digitisation to promote national development and opening new venues at all levels of education. The DeitY's digital programme initiative, Common Service Centers (CSC 3.0), aims to enable access to government e-services across rural areas, with regard to education in schools.

Universities are brought under the National Knowledge Network (NKN), which provides upgraded Wi-Fi, improved accessibility, developed digital infrastructure, and the creation of digital tools, among other enhancements.

The NEP 2020 initiates the use of digital platforms, e-teaching and learning resources, and also encourages digital-oriented curriculum from the primary to higher education level. It envisions to transform the education system into a robust, comprehensive and adaptive system that incorporates both digital and non-digital versions of technology.

- The National Educational Alliance for Technology (NEAT), an initiative of the National Educational Technology Forum (NETF), aims to bridge the gap between education and educational technology (EdTech) companies that develop online content, learning management systems (LMSs), and blended teaching–learning solutions, to name a few.
- Another significant initiative of NETF is the National Digital Education Architecture (NDEAR). The Ministry of Electronics and Information Technology (MeitY), Government of India, launched the Digital India programme to create a digitally empowered and knowledge society, bridging digital and socio-economic divides.
- The National Academic Depository (NAD) aims to provide facilities for storage, access, and retrieval of degrees and other significant credentials for academic institutions by validating their authenticity. The National Internship Portal maintained by the All India Council for Technical Education (AICTE), an online platform that provides internship opportunities to students and youth. It has been brought under the National Educational Technology Forum (NETF).

There seems to be a substantial change in the adaptation of ICT-based teaching–learning, with learning management software being widely adopted in the educational system by institutions on a large scale and by individuals at all levels. However, issues of affordability, equitable access in adopting technology-based education—in view of the rural-urban divide, economic and sociocultural disparities, and accessibility challenges—pose major networking obstacles to its optimal adaptation.

Present Scenario of Digitalising Education

In the present scenario, the technology being adapted must support the goals of equitable educational opportunities that support sustainable development practices such as resource management, community engagement, curriculum development, artistic mediums, digital infrastructure which are founded on the values of equality, social and economic justice, and human rights (Mehrotra, 2022). Noteworthy instances of technology in previous decades aimed to expand access to knowledge and information, improve educational procedures, and enhance learning outcomes, making educational developments possible through ICT. However, these instances of development in education are often insufficient in terms of the progress occurring in related domains. Anantu (2020) highlighted that there are growing indications that the digital revolution in education comes with unacknowledged difficulties, possibly with new avenues in line with the technology revolution happening across education systems.

Here are some examples of digitalising education.

Online learning platforms: Courses are offered through online platforms across diverse subjects and levels in a flexible format, rather than conventional offline methods.

Virtual classrooms: Schools and universities are utilising tools like Zoom, Google Meet and Microsoft Teams to conduct virtual classrooms.

E-resources and libraries: These aim at substituting physical textbooks with e-books and digital resources, making them accessible through e-libraries and integrating them with platforms like digital reading devices, online book services and institutional digital repositories.

Adaptive learning technologies: Educational software and applications are increasingly using Artificial Intelligence (AI) to personalise the learning experience.

Remote assessment and proctoring: Technologies for remote assessment, such as online exams and AI-driven proctoring tools, ensure academic integrity, allowing secure testing environments outside traditional classrooms.

Collaborative tools for project management: These intend to facilitate collaborative online work culture among students and teachers with commonly available tools, namely, Google workspace and MS office, Trello, etc.,

Gamification and interactive learning: Gamified learning platforms incorporate game elements into educational content to increase students' motivation and engagement.

Remote laboratories and simulations: In fields like science and engineering, virtual labs and simulations provide students with practical learning experiences that would traditionally require physical equipment.

Digital credentials and micro-credentials: Digital badges, certificates and micro-credentials are gaining popularity as alternative credentials to traditional degrees.

In addition to increasing distinct ways of student learning, enlarging and transforming educational experiences, blending teaching and learning, undermining teacher autonomy, adverse environmental impacts, infringing on autonomy and assurance, and integrating authority and influence outside of public scrutiny are just a few of the numerous ways that technology can worsen learning inequality, as observed by policy makers, educators and stakeholders. Through PM e-Vidya, the Ministry of Education (MoE), Government of India, offers educational programmes through Direct to Home channels and other digital platforms for the benefit of students, particularly those living in remote areas. E-content for school education is offered through DIKSHA, which has recorded over 500 crore learning sessions (as on July 2023). Swayam Prabha channels in higher education are functional with nearly 22 channels. SWAYAM (Study Webs of Active Learning for Young Aspiring Mind) and Massive Open Online Course (MOOC) platforms aim at providing quality study courses across various streams, offering options for credit transfer at the higher education level.

Technology Adoption

Numerous benefits of open-source digital educational platforms, which are globally accessible, such as websites, gadgets and applications, are made available through the adoption of digital technology. These platforms can provide students, instructors, parents and other education stakeholders with rich and engaging information that enhances and supplements classroom instruction. Additionally, they can ensure that education remains uninterrupted and increase the number of educational opportunities for students facing obstacles because of intellectual impairments, controversies, hardships, cultural backgrounds, race, or other factors. Public digital platforms could empower educators and parents, in addition to students, and encourage more engaging, dynamic and cooperative approaches to teaching and learning both inside and outside the classroom. Though there are complexities in the implementation of digital education across the education system, the prospects seem viable with multimodal initiatives by the Central and State governments in transforming the educational process.

Optimising Digital Education

Digital education primarily refers to technology-enhanced learning, which occurs through the adaptation of technology and the innovative use of technology-enabled tools, digital platforms, systems and resources, and applications. This involves adaptive learning using social media tools, online resources, automated learning software and learning management systems that create learning opportunities beyond the traditional classrooms, thereby innovating and transforming the means, mode and process of learning.

The significant features of digital learning are content, capacity and connectivity (UN Transforming Education Summit Report, 2022).

Content: All students, instructors and facilitators must have access to high-quality, curriculum-relevant digitally instructional and learning resources employing digital learning platforms.

Capacity: To ensure that instructors, students and other education stakeholders have the required expertise and understanding to utilise digital tools for learning, it is essential to enhance the capacity to leverage digital technology to improve learning, based on research practices.

Connectivity: The implementation of digital accessibility implies that all educational institutions and individuals can benefit from high-speed Internet connectivity and related educational advantages.

National Education Policy 2020: Digital Education Perspectives

A plan for reforming the use of technology and its integration into online and digital education within the Indian educational system is outlined in Part III, Chapters 23 and 24 of the National Education Policy (NEP) 2020, with focus on technological integration, experiential learning and holistic development. The NEP 2020 recognises the importance of digital education and emphasises the need to incorporate it into the academic programme.

The NEP 2020 emphasises the importance of technology and its impact on education, highlighting the changes visible in the present-day context. The rapid pace of digitalisation and its impact in education is attributed to technological advancements across all domains of education. The policy further states that the integration and utilisation of technology to enhance various educational goals shall be encouraged and accepted, provided that these interventions remain accessible.

The NEP (2020) mentions the establishment of the NETF, which may serve as a platform to discuss aspects involving application of technology in all academic areas. The Forum will act as a bridge between educational institutions, governmental organisations and other stakeholders, thereby providing the basis for recent knowledge, and innovations in the fields of education, research and development. The NETF will also create avenues for consultation and extension by sharing knowledge on important components of digital developments and best practices in technology-based education. Additionally, it will carry out the following duties: provide impartial, fact-based guidance on technology-driven interventions to state and central government bodies; develop institutional and intellectual capabilities in the field of education technology; and provide guidelines for pedagogy, technology and content for digital and online teaching and learning. States, boards, schools, higher educational institutions, and others will be able to create e-learning guidelines using these standards. The goal is to determine which technological interventions can be used to improve the teaching–learning and evaluation processes, aid in the professional development of teachers, increase educational access, and optimise planning,

leadership and administration of education, including the admissions, attendance and assessment processes (Bose, 2007). The four principles of NETF that serve as guidelines for the adoption of digital technologies are presented in Fig.1.

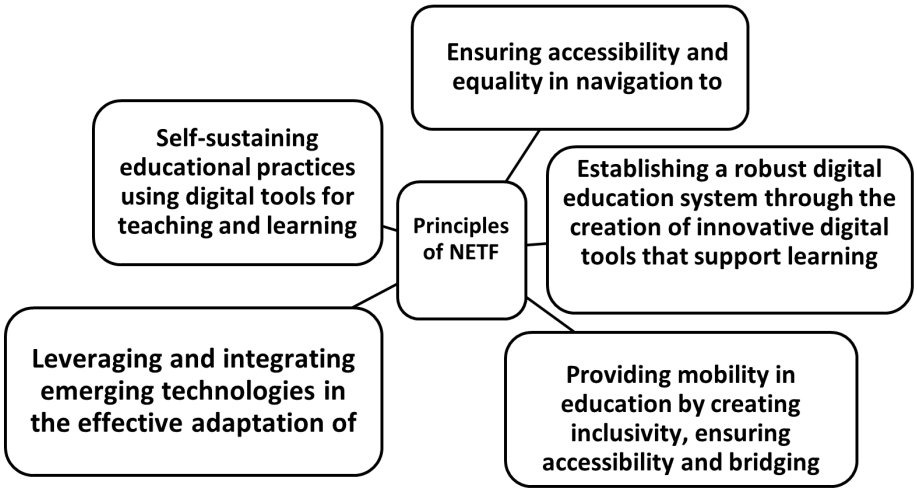

Fig.1: Principles of the National Educational Technology Forum (NETF)

Digital Learning: Empowering Learners

A key factor in the effective integration of modern technology into educational programmes is the availability of excellent, pertinent and suitable material, platforms and solutions that organise and distribute information, and open educational resources (OERs). Education and Internet connectivity need to serve purposes beyond just putting classrooms online. They should empower students and help them develop self-control and accountability needed to advance in life, as well as the resilience and self-confidence required to overcome obstacles. Empowering learners is about providing learning solutions beyond mere connectivity. Once connectivity is established, it is about making peers, resources and technical assistance more accessible, giving learners greater opportunities, choices and access to knowledge.

Along with ensuring inclusivity, supporting regional responsibility and decision-making, facilitating the integration of digital innovations for high-quality learning in classrooms and through remote instruction, and creating value for the nations creating and implementing these solutions, the notion of empowering learners also aims to assist governments in identifying, evaluating, and supporting these solutions (Thomas, 2012). Additionally, school associations need to empower students who use the Internet by giving them access to excellent, meaningful, inclusive and timely information presented via innovative instructional methods and secure, safe platforms. The principles of localisation, inclusivity, transparency, safety and security must be taken into account while creating high-quality, relevant and inclusive content. For students to have orientation towards digital education and various digital tools, the digital infrastructure, accessibility and availability of resources should be ensured. Besides, they should be provided with the necessary skills to integrate these tools and utilise them effectively.

Technology-Enabled School Model

The United Nations Educational, Scientific and Cultural Organization (UNESCO) has been working towards creating a framework of guidelines for using technology in schools

to ensure continuity and high standards of instruction for all students. The goals of the UNESCO model for technology-enabled education are as follows.

- To provide comprehensive guidance designing technology-enabled, crisis-resilient educational systems that enable students to access school curricula across a number of connected learning environments, thereby preventing emergencies or crises from impairing their right to education
- To provide strategies for mobilising resources and support to strengthen the capacities of educational organisations and stakeholders in enhancing readiness for a more crisis-responsive educational system; to establish requisite technology, content and personnel infrastructure; and to incorporate aspects of technology-enabled crisis-resilient school systems
- To ensure the direct use of technology in various learning settings to advance inclusiveness, equity, gender equality and excellence of learning in the context of attaining SDG 4 by 2030; to promote the professional growth of educational professionals and other pedagogical facilitators

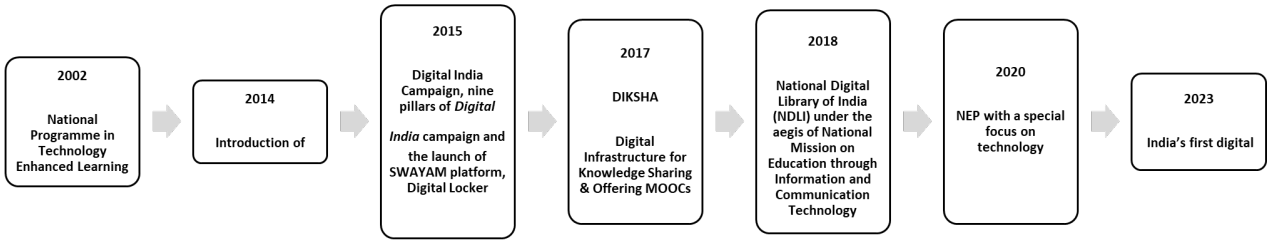

Fig. 2: Digital education development in India in the past two decades

SDG 4: Quality Education and Artificial Intelligence (AI)

Using Artificial Intelligence (AI) to achieve Quality Education (SDG 4) presents several unique challenges, despite the technology's potential in education. Beyond the general challenges, humanity needs to overcome AI's potential, minimise its drawbacks and create education systems that are future-ready. First, it remains unclear how AI will impact educators, learners and society at large. This includes questions about the effectiveness of AI interventions, the pedagogies selected for AI tools, the privacy of students, the role of instructors, and the subjects that ought to be taught in colleges and universities.

The core of contemporary approaches to AI raises a number of difficult questions about data analysis and privacy, ownership and protection. In the opinion of Jobin, et al. (2019), significant attention has been paid to these ethical challenges. Numerous studies have also been conducted on the ethics of educational data, highlighting additional concerns about informed permission, data management and differing perspectives on data (e.g., institutional vs. individual). Any use of AI in educational settings has to appropriately handle these numerous data-related concerns, as well as other challenges unique to education, such as pedagogy selection (Gulati, 2016).

Adaptation of AI-based Digital Tools for Pedagogical Practices

In order to support regional AI innovations for education, a comprehensive plan for integrating AI into education management, instruction, learning, and assessment must be developed. This plan should include pilot testing, tracking, and assessment, as well as the collection of evidence, multidisciplinary planning, and cross-sectional governance with an emphasis on equitable, inclusive policies and ethical AI use.

- Set and track quantifiable goals to ensure equity, diversity and inclusion in instruction and AI service development.
- Examine ways how AI may enhance educational management information systems (EMIS).
- Permit EMIS to undergo a comprehensive change and to be integrated into LMSs.
- Enable educators, supervisors and students to encourage the use of AI-powered LMSs and EMIS.
- Place emphasis on the social and agency needs of students when incorporating AI-based technologies.
- Examine and modify curriculum to take into account changes in evaluation and pedagogy brought about by the growing use of AI in education.
- Evaluate and implement AI to facilitate the evaluation of many aspects of competences and results.
- Examine and evaluate the responsibilities that educators play in promoting human values, higher-order thinking skills, human contactand information transmission.
- Describe the skill sets needed for educators to look for and use AI in the planning and structuring educational activities, as well as in their own professional growth.
- Consistently search for and encourage the application of AI to assist a variety of teaching pedagogies and lifelong learning approaches.
- Create AI systems and tools to track credentials and learning outcomes across academic levels and locations. Provide training and ongoing support to teachers so they can become proficient in using AI. Include AI-related skills in school curricula, vocational and technical education and training institutes.

Challenges of Incorporating Digital Technology in Teacher Education

Teacher education is one of the key areas where innovation and change in digital education can have the greatest impact. This means that teacher education programmes must first consider the societal trends and change-causing factors that have been recognised. Johns (2022) observes that the way digital technologies are increasingly influencing how people communicate, and how work and leisure are organised in society presents major challenges associated with the way the ongoing and future changes in the world. It is evident that certain obstacles and challenges hinder the effective use of digital technology in education. This implies that from the beginning of student–teacher training, teacher–educators must figure out how to integrate digital technology into their own teaching practices.

- Teacher–educators play a vital role in demonstrating the use of technology by incorporating digital tools into their own teaching to enhance learning outcomes; this may be referred to as Modelling Technology use (Gwendolyn & Spector, 2022).
- Anantu (2020) observes that in the present-day context, there is an increased adoption of digital tools in teaching and learning. The role of teacher–educators is to explore and to leverage these tools for diverse pedagogical purposes and adapt them appropriately.
- Teacher–educators, who integrate interactive and multimedia resources that make learning more engaging and relevant to students, capture and retain student interest.
- They should explore and model how to use adaptive learning platforms, digital content creation tools and data-driven applications to cater to diverse learners.
- They can demonstrate how to connect with experts, collaborate on projects and engage in professional learning communities using digital platforms.
- Teacher–educators can explore and model various assessment tools, digital portfolios and feedback mechanisms that support student growth and reflection (Pal, et. al., 2021)

The implementation of digital technologies in education appears to face challenges

and obstacles on the way to becoming more natural. Spector (2022) notes, "As with the chalkboard in the early 20th century, teacher–educators look to make it more likely that instructor's practices would use digital technology." Thus, from the very beginning of student–teacher training, teacher–educators should figure out how to include digital technology into their own teaching practices. The mediating roles of curriculum and syllabus, school community of teachers and parents, agreements and implicit regulations that influence teachers' preferences and assessments, etc., must all be acknowledged. It is important to consider the internal inconsistencies that offer opportunities for learning and the research strategies for using them, especially for student-teachers. By examining the action through a systemic framework, one can get insights into the planning and behaviour of student–teachers.

To ensure an easy transition for prospective educators from training to practice, comprehensive and systematic methods for technology implementation, involving all stakeholders must be developed. Teachers must carefully analyse the dialectical relationship between their goals and the objects they mobilise to motivate students to take initiative and actively engage in activities. Recognising teachers as professionals and equipping them for the unpredictability and challenges of teaching students requires taking into account the tasks and frameworks within which they operate.

Elements of Digital Education skills

Ribble (2021) highlights the significant aspects of digital skills that would promote learning in a sustained way while using digital tools. Digital learning requires primary skills, with its usage classified under self, others and caring both the user and the recipient of its application.

- Digital etiquette (demonstrating proper conduct and behaviour)
- Digital access (having the knowledge and access to required digital technology)
- Digital law (keeping oneself informed about and working in accordance with digital laws and rules)
- Digital communication (understanding the parameters of exchanging digital information)
- Digital literacy (being capable of selecting and utilising a wide range of digital technologies)
- Digital commerce (purchasing products and services online)
- Digital rights and responsibilities (taking the responsibility for protecting our own rights and those of others)
- Safety (taking necessary precautions to protect personal information)
- Digital health and wellness (knowing the threats and hurdles associated with digital technology)

Exponential Applications of Social Networking Sites (SNS)

According to Zeimer (2020), "Collaboration, information processing, communication, integration of resources and content interdependence are few of the significant factors of social networking sites that contribute to digital education." Social Networking Sites (SNSs) offer a variety of platforms for an individual to engage with students beyond the classroom, as well as for the students to interact with the instructional content. The SNSs that our students are familiar with and can access might be suitable platforms for developing interactive learning experiences related to the course material and learning objectives. Instructors must constantly acquire skills necessary to carry out the required tasks and provide their pupils with detailed instructions. Based on the extent to which SNSs contribute to student learning, educators should evaluate the benefits of utilising them and offer a well-thought-out

framework for selecting, integrating and using these platforms effectively throughout the teaching process.

Donaghy (2021) observes that, while exploring a certain SNS, learners come across a new set of tools that would help develop their learning skills. The LMS that a learner uses might easily support many of the features found on SNSs, such as interactive discussion boards, sharing finished assignments with classmates for peer review, publishing videos, and posting announcements and updates. The benefit is that students learn a new, organised and intentional approach to utilise SNSs in addition to complete their assigned tasks.

Digital Education: Place of Learning Management System (LMS)

The LMS is an important component of digital education, serving as a platform to manage and deliver online courses and training programmes. Here are some key aspects of how an LMS contributes to digital education. It acts as a centralised learning hub, providing flexibility and accessibility. Besides, platforms like these support a variety of learning resources, such as text, multimedia, interactive simulations, quizzes and assessments. LMS platforms include features for communication and collaboration, such as discussion forums and messaging systems, while also supporting integration with other digital tools and services like video conferencing tools, content repositories and learning analytics platforms. The following are some of the significant features of LMS platforms.

Provide integrating the subject matter: By incorporating digital technology into the classroom, an instructor can keep students curious and attentive. Digital technology offers a variety of interactive and multimedia resources like videos, animations, interactive simulations, quizzes and assessments. This variety caters to different learning styles and enhances engagement, making learning more engaging and relevant to students (Mishra & Sharma, 2005). Learners may find the course even more interesting if relevant videos and presentations are included in the content repository.

Adapting to the criteria of learning styles: Every classroom has a mix of kinesthetic, visual and auditory learners. AN instructor can prioritise various modes of instruction by using the LMS strategically. While audio recordings and instructor lectures cater to the needs of auditory learners, diagrams and presentations support visual learners. Students with sensory and perceptual problems can benefit from well-planned hands-on exercises to enhance their learning.

Personalised learning: An LMS allows students to progress through their educational journey at their own pace. With an LMS, a teacher can design many activities for the same learning objective and easily develop graded assignments using the question bank accessible within the system, making an individual's learning personalized and self-paced (Sharma, 2021).

Blended learning and flipped classrooms: According to Pal, et. al. (2021), an LMS offers an effective approach to put these educational strategies into practice. Within a scheduled period, teachers can assign students to carefully observe a video or read information on an LMS. After the stipulated duration, the instructor may conduct offline or online classes to improve on the students' conceptual knowledge of the concepts discussed (Pal, et.al (2021).

Peer participation: Teachers teaching identical curriculum and grades can work together within the school to create lesson plans, which they can share via an LMS. They can discuss or distribute appropriate subject matter contents with other educators. This type of cooperation ensures that all students at a school, regardless of the instructors, succeed. Couch (2018) observed that the primary purpose of education is to make children recognise their potential and achieve significant success.

Activity tracking: Through an LMS platform,

an instructor can track of a student's activities. The system monitors every activity a student takes, including completing assignments, reading the prescribed material, and communicating inquiries or observations. A student's performance on an assessment determines how their learning outcome is automatically generated by the LMS.

Digitalized Education System: The Way forward

The NEP 2020 policies, aimed at conducting pilot studies for online education through national agencies, have come into effect and are already proving successful, especially with online degree, certificate and skill development programmes offered by institutes like the Indian Institutes of Technology (IITs), National Institutes of Technology (NITs), Central Institute of Educational Technology (CIET), etc. The NETF, a functioning authority to enhance e-education division, works to boost digital content development, its infrastructure and capacity building.

Based on the NEP 2020 vision of developing digital infrastructure, rapid development has taken place, with systematic implementation across schooling—from middle school to higher education. AI, VR, machine learning and learning modes, such as collaborative learning, blended learning, flipped classroom and the use of AI tools for learning, have been successfully incorporated and become common practices in learning, depicting a major achievement in terms of digital initiatives. Furthermore, assistive tools and LMSs have been adopted by teachers and learners, causing remarkable changes in day-to-day educational activities.

Conclusion

Three years since the implementation of NEP (2020), visible developments and academic practices related to digital initiatives are already taking place in the Indian education system at all levels. The National Digital University, under the aegis of Higher Education of India, is a major initiative aimed at modernising the higher education system in the country. Like never before, digital tools are being widely used by students across all levels of education. Digital tools and applications, along with mobile learning platforms, have opened up global accessibility for students, ensuring access to educational resources. The optimisation of ICT resources through training across the education sector by national institutes has led to the holistic adaptation of digital resources both by teachers and students. Furthermore, digital initiatives have created possibilities for the involvement of India EdTech Consortium (IEC) and the Internet and Mobile Association of India (IAMAI) in making educational opportunities possible beyond barriers (Gohain, 2023).

Digital assessment practices through online modes have revolutionised the assessment process, which is already in widespread use and can be seen in national examinations conducted through online across India. Digital initiatives have significant results, driving the digital revolution in a short-span of time. National progress is visible and evident through digital transcendence, creation and adoption of newer digital tools for education. In the present day context, progress is prompt and instant, supported by the initiatives of the central and state governments.

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