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Digital Transformation in Education in India: opportunities, challenges and the way forward

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Abstract - In order to drastically alter how education is provided, accessible, and experienced, digital transformation in education refers to the incorporation of digital technologies into teaching, learning, evaluation, and administration. The epidemic era, the National Education Policy 2020 (NEP 2020), government initiatives under the Digital India agenda, and the growth of EdTech are all driving India's rapid transition to an educational revolution. One of the biggest developments is the widespread use of digital education by parents, educators, and students. The digital revolution in education is a noteworthy development and the new norm in India. An overview of the digital revolution occurring in the education sector is provided in this paper, along with a number of instances, advantages, difficulties, and challenges. The result of this study indicates that leveraging digital tools will not only raise the excellence level in education but could also be a true game changing experience for both students and teachers in coming years.

Key Words: Digital transformation, NEP, Covid-19, E-Learning, Modern Education, Traditional Education

1. Introduction

Globally, the education sector is undergoing a paradigm shift as digital technologies are incorporated into traditional classroom formats to provide more adaptable, customised, and scalable learning opportunities. Digital uptake in schools, colleges, and universities was sparked by the COVID-19 epidemic. Integrating digital technologies into teaching and learning procedures to improve the overall educational experience is known as "digital transformation" in education. Platforms including Google Meet, Microsoft Team, Zoom, and Cisco WebEx are being used to plan the virtual classes. In order to meet the varied demands of students in the twenty-first century, educational institutions all around the world are implementing these innovations as technology advances. By using digital solutions that promote cooperation, engagement, and individualised learning experiences, the objective is to transform conventional teaching techniques. Education is now simple and accessible because of technological advancements. Learning may be done from anywhere, at any time, and using any method thanks to online, open, web-based, computer-mediated, blended, and mobile learning. Online learning also offers flexibility for participation and connection, it has developed trust and a degree of comfort. By assisting teachers with computer-assisted learning, digital technology has improved educational quality. For their creative and cooperative learning, the instructor assists students in examining a variety of materials on pertinent subjects.

In the year 2020, the Indian education system has faced a drastic revolution in adaptation of different digital technologies. To follow covid safety norms and maintain social distancing the need for imparting education through flexible mode has been on peak. Many trends such as eLearning, Learning Management Systems (LMS), Massive Open Online Courses (MOOCs), Open Educational Resources (OERs) and Free and Open Source Software (FOSS), Mobile Learning, Gamified Learning and Learning Analytics started emerging in this period (Shokeen & Banipreet, 2021).[1]

With learning management systems (LMS) like Moodle, Blackboard, Piazza, etc., teachers and students may access their work and communicate at any time and from any location. Role of digital technologies has shaped the existing teaching performance and creating more learning methods that produce new opportunities as well as challenges itself. By incorporating digital technologies into educational processes, institutions can enhance teaching performance and improve student outcomes through detail mode. Teachers can utilize digital tools such as learning management systems, online resources, and interactive platforms to deliver engaging and customized lessons. Embracing digital technologies in education is essential for staying relevant and equipping students with the necessary skills to thrive in an increasingly digital society (Kamalakannan, 2024).[2]

2. Literature review

(Shaik, 2021) This paper examines a variety of issues, such as the need to increase effectiveness and efficiency through the use of modern technology and the notable changes in funding sources brought about by broad structural changes in the economy that call for increased responsibility at all levels. In India, online education is not a novel idea, but it is now essential. The method of delivering education has seen a significant transformation in recent months. While some colleges quickly adjusted to the shift, others found it difficult because they lacked the necessary infrastructure and technical know-how to switch to online instruction.[3]

(Sinku, 2021) According to the study's findings, utilising digital tools would not only improve educational quality but also have the potential to be a game-changer for instructors and students in the years to come. This study attempts to quantify how the Covid-19 epidemic has unleashed digital transformation in India's education sector, identifying some significant areas of change and attempting to provide a roadmap for future e-learning systems. Secondary sources, including newspaper articles, periodicals, journals, and other government publications, provided the data. According to the survey, educational activities shifted to online learning in India, where a range of virtual technologies were unleashed from primary education to higher education. The observations point to the fact that India, generally, has some pockets of excellence to drive

the education sector to the next level, which has the potential to increase access. Access to education has always been a challenge due to a limited number of spaces available.[4]

(Sommanek, 2024) The paper makes an effort to examine India's educational sectors' transition from traditional to digital. Every sector undergoes significant changes as a result of digital transformation, and the government is actively supporting the education sector through significant programs. More accessibility, inclusivity, and engagement are made possible by the educational process of digital transformation, which also contributes to the creation of more individualized learning strategies. The current study uses secondary data and is quantitative in nature. The impact of digital transformation, as well as its possible obstacles and prospects, are examined in this study. Every industry undergoes several changes as a result of the government's efforts to support this industry.[5]

(Nag, 2024) The higher education system in India has seen significant transformation as a result of government initiatives including Swayam, Swayam Prabha, NDLI, NAD, and E-PG Pathsala. Nevertheless, a few obstacles have prevented digital programs and plans from being implemented successfully. The paper offered a thorough grasp of the opportunities and difficulties associated with the digitalisation process. The main potential and difficulties in the digitalisation of India's higher education system are examined in this study using secondary sources from websites and research publications.[6]

(B.Mahadevan, 2025) Education and knowledge practices in India have undergone a change thanks to the digital transformation of education, which has established a uniform transition from traditional techniques to technology-driven systems. With an emphasis on infrastructure, accessibility, educational quality, and governmental interventions, this study investigates the effects of digital technologies on the Indian education ecosystem. To emphasise their significance in closing the digital divide and improving educational performance, input programs such as Digital India, National Education Policy 2020, and e-learning platforms are examined. There is also discussion of issues including unequal access, gaps in digital literacy, and infrastructure constraints. By examining these aspects, the study emphasises how important inclusive and sustainable digital solutions are for empowering students and teachers from a range of socioeconomic backgrounds and promoting a robust and just educational system.[7]

3. Objectives of the study:

1. To study the emerging trends and challenges in digital transformation in education.
2. To understand the digital transformation from physical classroom in higher education.
3. To study benefits of digital transformation in education.

4. Methodology

This study adopts qualitative approaches. The rationale for this design is to obtain a comprehensive understanding of how digital transformation is shaping the Indian education sector, the opportunities it creates, the challenges faced, and the potential strategies for the future.
The data for the study has been collected through relevant research journals, magazines and present available literature on websites. Various government reports have also been considered.

5. Key Initiatives & Implementation in India

Major government initiatives have been taken for digitalization of higher education in India: -

SWAYAM

SWAYAM (meaning 'Self' in Sanskrit) is an acronym that stands for "Study Webs of Active-Learning for Young Aspiring Minds.
SWAYAM initiative was launched by the Ministry of Human Resource Development (MHRD) (now the Ministry of Education) under Digital India to give a coordinated stage and free entry to web courses, covering all advanced education, high school, and skill sector courses.
It was launched on 9 July 2017 by Pranab Mukherjee, President of India. It is an Indian government portal for a free open online course (MOOC) platform providing educational courses for university and college learners. The SWAYAM platform offers free access to everyone and hosts courses from class 9 to post-graduation. It enables professors and faculty of centrally funded institutes like IITs, IIMs, IISERs, etc. to teach students.
Till date, a total of 11,772 courses have been offered through SWAYAM, and about 1182 courses are on offer in the January 2024 Semester. As per Department of Higher Education (India), about 1.21 Crore unique users/registrations have been made on the SWAYAM platform, and more than 4 Crore enrolments have been made in various courses offered on SWAYAM. It has been developed cooperatively by the Ministry of Education and All India Council for Technical Education (AICTE), with the help of Microsoft.
SWAYAM has accumulated 203 partnering institutes, 2,748 completed courses, 12,541,992 student enrollments, 915,538 exam registrations, and 654,664 successful certificates. (Wikipedia)

SWAYAM PRABHA

The Ministry of Education is launched Swayam Prabha initiative to provide 80 high- quality educational channels through Direct to Home (DTH) channels across the country on a 24x7 basis. The channels are using the GSAT-15 satellite for program telecasts and are an education learning platform available through 34 DTH channels. The channels offer educational programs on television, such as Wikipedia, with new content every four hours, repeated five times a day. The channels are uplinkeded from BISAG, Gandhinagar, and are provided by NPTEL, IITs, UGC, CEC, IGNOU, NCERT, and NIOS. The INFLIBNET Centre maintains the web portal. The channels cover various activities, including higher education, school education, curriculum-based courses, life-long learning, and competitive exam preparation. It is an educational counseling platform, started broadcasting educational counselling in Meitei language (officially called Manipuri language) on behalf of the Indira Gandhi National Open University (IGNOU) in Imphal from 2023. Live sessions for lectures are archived on YouTube, enriching resources for learners in various languages.

National Digital Library of India (NDLI)

The National Digital Library of India (NDLI) is a virtual repository of learning resources, offering a wide range of services including textbooks, articles, videos, audiobooks, lectures, simulations, fiction, and more. It is a project under the Ministry of Education, Government of India, through its National Mission on Education through Information and Communication Technology (NMEICT). The NDLI collects metadata and provides full text index from various national and international digital libraries. It provides free access to many books in Indian languages and English and offers interface support for 10 most widely used Indian languages. Launched in pilot form in May 2016, the library was dedicated to the nation on June 19, 2018 (Wikipedia).

National Academic Depository (NAD)

The National Academic Depository (NAD) is an online storehouse of academic awards, including certificates, diplomas, degrees, and mark-sheets, launched by the Indian government in July 2017. Launched by the then-president, NAD ensures easy access, retrieval, and validation of these awards, ensuring their authenticity and safe storage (Wikipedia).

E- PG Pathshala

The Indian government launched E-PG Pathshala in 2015, a portal to host high- quality curriculum-based interactive e-contents in Indian languages like Hindi, English, Sanskrit, and Urdu. The portal covers various disciplines including social science, arts, fine arts, humanities, natural and mathematical sciences, linguistics, and languages. The Ministry of Education (MoE) has assigned work to the UGC for the development of e-content in over 68 postgraduate subjects. The content and quality are key components of the system, with each subject having a team of principal investigators, paper coordinators, content writers, content reviewers, and language editors.

E- ShodhSindhu

The Ministry of Education has formed e-ShodhSindhu, merging three consortia initiatives in December 2015. The e-ShodhSindhu will provide access to over 10,000 core and peer-reviewed journals and various databases across various disciplines to member institutions, including centrally funded technical institutions, universities, and colleges. The main objective is to offer access to qualitative electronic resources, including full-text, bibliographic, factual, and legal databases, at lower subscription rates, as recommended by an Expert Committee.

E- Yantra

It is a robotics-focused by the Ministry educational outreach initiative at the Indian Institute of Technology, Bombay, funded of Education. It aims to enhance engineering and robotics higher education systems globally by developing engineers capable of solving local problems in various industries. The project aims to create the next generation of engineers with practical skills for real-world problems, providing hands-on learning infrastructure to engineering students with limited access to labs and mentors.

E- VIDWAN

It is a database that provides profiles of scientists, researchers, and faculty members at leading Indian academic institutions and R&D organizations. It includes information about their background, contact address, experience, scholarly publications, skills, accomplishments, and researcher identity. The database is developed and maintained by INFLIBNET with financial support from the National Mission on Education through ICT.

Annual Refresher Program in Teaching (ARPIT)

The National Testing Agency (NTA) is a premier, autonomous, and self-sustaining testing organization established by the Government of India to conduct entrance examinations for admission and fellowship in higher education institutions. The NTA aims to assess candidates' competence in terms of research-based international standards, efficiency, transparency, and error-free delivery. The Ministry of Education launched the online ARPIT in 2018, a unique initiative for online professional development of 15 lakhs higher education faculty using the MOOCs platform SWAYAM. The first ARPIT Test was conducted in 66 disciplines in 2019. Currently, 48 discipline-specific National Resource Centers (NRCs) are identified by the Ministry of Education, where course coordinators prepare online training material focusing on the latest developments in the discipline.

Digilocker

It is a Digital India initiative by the Ministry of Electronics and Information Technology (MeitY) that aims to empower citizens by providing access to authentic digital documents. It provides cloud- based accounts for Aadhar holders to access digital certificates like driving licenses, vehicle registrations, and academic mark sheets. Each account has 1 GB of storage for uploading scanned copies of legacy documents. Digilocker's web/mobile application serves as the student-facing interface for NAD, allowing students to access their digital academic certificates and share them with other DigiLocker partner organizations.

6. Benefits of digital transformation in education in India

- With digital education, classroom teachings have become more fun and interactive.
- Children tend to be more attentive. They are not only listening but also viewing it on the screen which makes their learning all the more effective.
- It has helped in increasing their interest and curiosity level
- Replacing pens and pencils with tablets, laptops, or notepads encourages students to finish their assignments faster. Additionally, it has increased students' comfort and familiarity with technology.
- The digitally interactive environment encourages even shy or hesitant students to participate better in classroom discussions.
- Technology enables a student to learn at his own pace and the best thing about digital education is that it is user-friendly.
- Online study materials are easily available. With online education, students can even further connect with

distant counsellors and faculty to seek guidance or resolve queries. A remote area students can get enrolled and study through online courses due to digitalization of high education.

- It has made the examination process very easy and convenient for both teachers and students. These are also called E-Exams or E-Assessment. For instance, UGC-NET, IELTS and many more exams are being taken with the help of computers only.
- E-textbooks provide the students with text, images or other content such as hyperlinks, etc., readable on the mobiles and laptop or computer.
- It offers a visual representation of the topic through which the students learn in a better way.

7. Challenges in Digitalization of Higher Education in India

The implementation of digital technology in higher education faces several significant barriers, including:

- The lack of efficient computers and its peripherals, virus threat, scarcity of educational software and insufficient broadband internet accessibility.
- Teachers find it a challenge to go with dynamic teaching techniques and use of technology. In India, higher education teachers are hardly getting any training or workshops to develop their digital literacy.
- Different languages spoken in different states across the country and the translation of all digital contents in all these regional languages sometimes becomes difficult for the agencies.
- Data security is the major challenge in higher education.
- It is also expensive. It needs proper infrastructure not only at schools but also at homes, particularly affordable broadband.
- Online learning requires much better management and rigid schedules.
- Parents usually condemn digital education as going online does not mean that children are only looking for study materials as there are many things which are restricted for children to watch.
- Continuous dependence to seek information. To complete the assignments and homework online, to prepare the notes and to submit them to the evaluator for evaluation is very harmful to the health of students due to being attached with electronic gadgets.

8. The Way Forward for India

With the advent of new technology-aided learning tools such as smartphones, smart boards, MOOCs, tablets and laptops etc. has transformed the way education is being imparted in schools and colleges. The state of education in India is depressing, especially in rural areas. The sector is currently battling with grave challenges such as outdated teaching methods, shortage of teachers, inadequate student-teacher ratio, insufficient teaching resources etc. However, with the digitalization of education, students in backward areas are being taught with the help of the latest teaching tools and methodologies. The technology is also helping teachers connect with students remotely across several locations at one time. Digital technology is also helping overcome all language barriers. Now learning material can digitally be made available in regional languages as well. To begin with, we need to promote and ensure digital literacy among the masses, primarily uninterrupted Internet connectivity and mobile network signals in rural areas. Through e-learning initiatives fostered by the government and private players, students and teachers can get access to the vast pool of knowledge content.

9. Conclusion

Students can now access information at any time and from any location thanks to digital portals, which have completely changed education. Efficiency and cost-effectiveness have increased as a result, although the difficulties are still unknown. In order to overcome the effects of internationalisation in higher education, digitalisation is essential. Quality, affordability, and accessibility must be guaranteed for rural locations in order to include ICT into education. It is essential for sustainability even though it challenges conventional teaching techniques. Teachers need to be trained in digital literacy in order to encourage digitalisation. Successful results can be attained with the support of government funding, widespread internet access, cheaper devices, high-quality content creation, and professional coaching. Digitalisation of education is given major importance in the National Education Policy (NEP)-2020. Digitalisation is crucial for higher education's quality, effectiveness, innovation, positioning, and visibility despite challenges.

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