Enhancement of Digital Revolution in Higher Education in India

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1. Introduction

India is rapidly moving towards the educational revolution fueled by the pandemic era. So, what awaits education-related people? One of the most important developments is the widespread **acceptance of digital education among students, academicians, and parents**. Digital transformation of education in India is the new normal and a phenomenal breakthrough. Education facilitators' steps in the digital space will change learning for decades. Moreover, we have a large rural population who would like to access to higher education. They hustle to do so and yet many miss out on higher education under the traditional system. In order to ensure quality higher education for everyone, the digital infrastructure is under more pressure than ever before. Digitization of education is advancing all over the globe. Therefore, it becomes necessary to critically analyze all aspects of digital learning both advantages and disadvantages. All around the world, the digital classroom has been transformed. The education process, creates unique universal interaction between teachers and learners. This global interactivity causes mutual understanding between the teacher and the learner. In addition to reducing the gap between students in various geographical areas, digital classrooms have also reduced the knowledge and qualification gap

for eligibility. In most areas of the country, with a computer and internet access, one can access a digital classroom and use the same materials and teachers as those living in large and developed cities. Moreover, the blended learning strategy, one of the pedagogies of digital learning was found to be more effective than the traditional method of teaching. This was because it enhanced critical thinking, problem solving, techniques and scientific data observation and analysis.

Digital transformation has emerged as a powerful catalyst for change in numerous sectors, including education. In India, higher education institutions all over the world have recognized the value of digital technologies and are actively embracing them. This is to revolutionize their operations and enhance students' educational experience. **By leveraging e-governance systems**, these institutions effectively integrate technology into their administrative processes, student services, and academic activities. **Technology and e-governance** integration in higher education holds immense **potential for transforming India's sector**. The digital transformation of administrative processes can be used to **optimize resource allocation**, **improve efficiency, and reduce bureaucratic hurdles by streamlining administrative processes.** E-governance systems, for example, can automate tasks such as **admissions, registration, and fee payments**, allowing for a seamless and efficient student and faculty experience, as well as enabling universities to remain competitive. It is worthwhile noting that digital platforms can also contribute to improved accessibility to educational resources by providing online learning resources, virtual libraries, and remote access to online courses. This will reach a wider audience of learners. There is a tendency to refer to the **Digital Revolution** as the **Third Industrial Revolution**. In the beginning, digital technologies were based on one fundamental idea: the Internet. In brief, here is how the Digital Revolution unfolded:

- The transistor, invented in 1947, paved the way for the development of advanced digital computers from 1947 to 1979.
- During the 1950s and 1960s, the government, military, and other organizations used computer systems. This research eventually led to the **World Wide Web**.
- As the 1980s progressed, technology became more and more prevalent, and by the end of the decade, it had become a necessity for many jobs across the world. The first cell phone was also introduced in this decade.
- During the 1990s, the World Wide Web was introduced in 1992, and the Internet had become part of most business operations by 1996. The Internet became a part of everyday life for almost half of American adults by the late 1990s.
- 2000s - By this decade, the Digital Revolution had spread all over the developing world; mobile phones were commonly seen, Internet users continued to grow, and television transitioned from analog to digital signals.
- 2010 and beyond - By this decade, the Internet consisted of 25 percent of the world's population. The connection between Internet websites and smartphone gadgets has become a standard for communication. It is predicted that by the end of 2025, tablet computers will surpass personal computers in terms of usage and sales; thanks to the Internet and cloud computing services that they provide. In this way, users will be able to **consume media** and **use business applications** on their mobile devices. It is these applications that are otherwise beyond the capabilities of such devices.
- Today, education is undergoing a significant transformation due to the emergence of digital technology, and Indian higher education institutions are positioned at the forefront of this revolution. A variety of colleges and universities across the country are redefining learning experiences through the integration of technology and innovative pedagogical

strategies. Their efforts are contributing to the development of an educational journey that is more accessible and engaging.

2. DIGITAL LEARNING

Today living in the 21st century, nearly everything around us is either digital or getting more digital as this is the age of virtual conversations, online meetings, online book shopping, virtual relationships, and virtual life. There is no doubt that as we live in a virtual world, digital learning has become the latest trend. It has cracked the age-old traditional educational system. Any type of learning that is accompanied by technology or by an instructional practice that is efficient and effective is considered digital learning. It encompasses the application of a wide spectrum of practices **including blended and online learning**. Digitalization of education keeps learners in sync with the modern world. Students can feel like they are in an online class anywhere anytime, without being weighed down by books. Digital learning also provides many extra benefits beyond convenience and monetary savings. Knowledge of the Internet functions, typing and software programs are essential skills to be digitally literate. Moreover, online learning strengthens these skills and makes learning more engaging and effective. Ahuja (2015) Digital learning is growing 19% per year, online enrollment now represents 25% of higher education enrollments.

As each day progresses, digital learning replaces traditional and recognized educational methods. Digital learning in classrooms can vary from using tablets instead of paper to using software programs and equipment instead of the simple pen. A digital learning strategy may include any of or a combination of any of the following: blended, **e-textbooks, online learning (or e-learning), mobile learning, technology-enhanced teaching and learning, virtual reality and augmented reality**. Some of the pedagogies, or practices of teaching, combine technology and **learning as blended / hybrid learning, online learning and**

flipped learning. Moreover, social networks and communications platforms can be used **to create, manage and evaluate digital assignments and programs.** Digital learning has played a vital role in education.

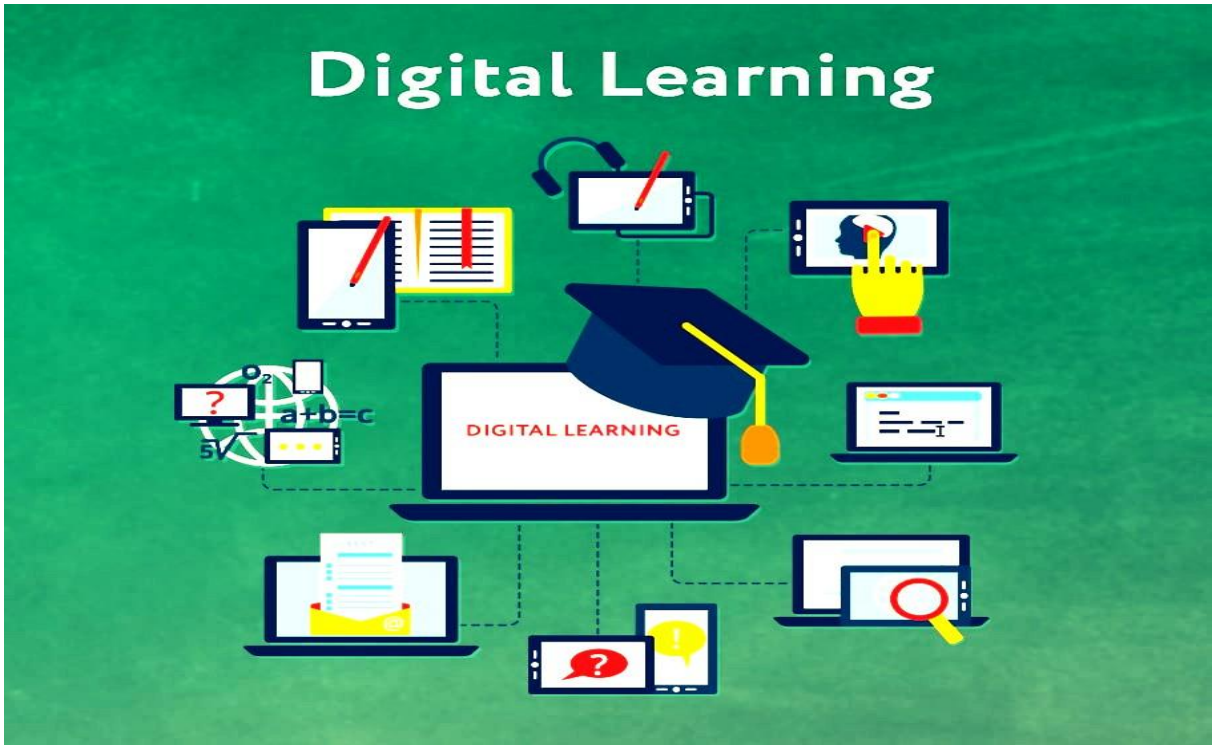

Fig. 1. https://aedu.co.in/2021/07/how-digital-learning-is-shaping-the-education-system/

The digital revolution has impacted both on education delivery and students' learning styles in all schools and colleges. Online courses are now more popular than face-to-face traditional courses. Furthermore, learners can participate whenever convenient, since the online platform is available 24x7. Moreover, online education is easily accessible across the various devices we use today. Putting an eco-friendly approach, many trees were saved from cutting for paper books.

3. DEVELOPMENTS IN DIGITAL LEARNING

The quality of education in any society forms the groundwork for society's development. Keeping in mind the prominence of education, the Digital India initiative by the **Ministry of Human Resource Development has put** together a number of online services for improving

education dissemination in society. Be it primary level, secondary level or higher education and research facilities, the various digital schemes in this sector are transforming the education system in our country.

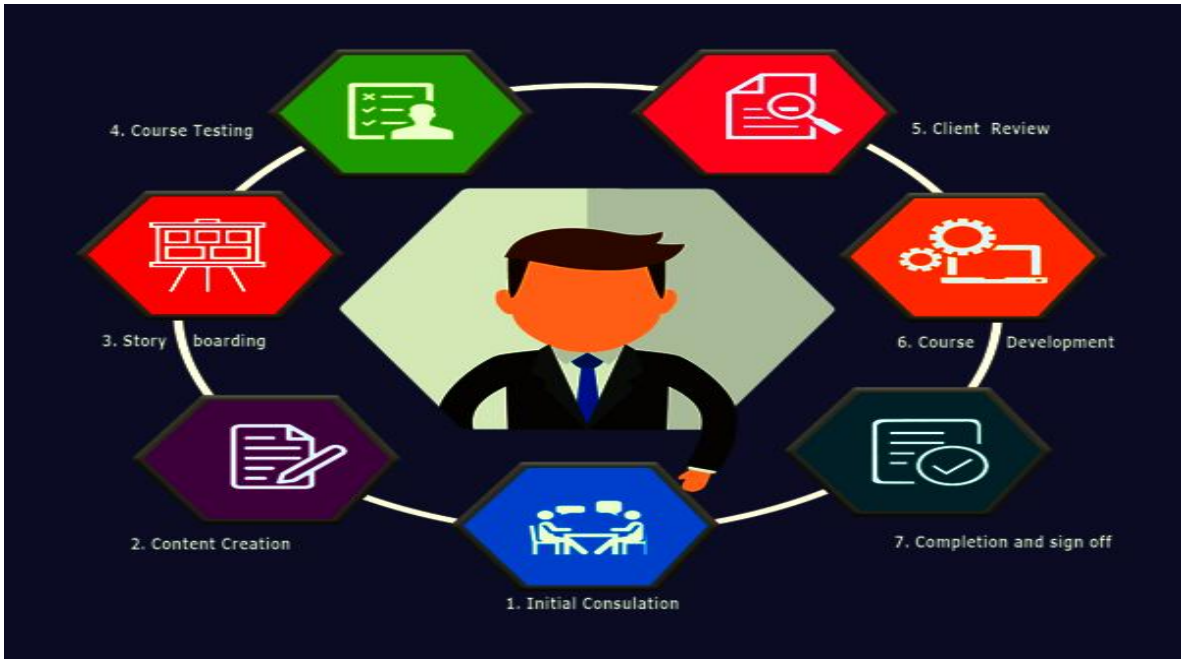

Fig.2.https://commons.wikimedia.org/wiki/File:ELearning_development_process_flow.png

A number of schemes in the education sector, including the SWAYAM program, provide an opportunity for students to participate in courses taught in classrooms from ninth standard to post graduation. These courses can be accessed by anyone, anywhere at any time. The digital scheme not only makes learning available to many students, but also to those who are not able to attend formal education. Another initiative **SWAYAM Prabha offers 32 high quality educational channels through DTH (Direct to Home)** across the length and breadth of the country on a 24X7 basis. ePATHSHALA is another digital scheme that distributes educational content to mobile phones and through a website. Schemes like **'Mid-Day Meal Monitoring App'**, '**Shaala Sidhi'** and '**Shaala Darpan'** emphasise school administration quality and also help schools and Kendriya Vidyalas improve education

quality. Furthermore, OLABS' digital scheme i.e. online labs for school lab experiments offers students ease of conducting experiments online.

In the National Digital Library of India (NDL India) project, learning resources are compiled in a digital repository with a single-window search facility. The digital library is open source software. It has helped **spread digital library technology across the world**, especially in India. Open source software has been promoted in educational institutions thanks to the Free and **Open Source Software for Education (FOSSEE) project**. The Virtual Lab project provides remote access to virtual laboratories in various fields of science and engineering. Students at all levels, from undergraduates to researchers, are welcome. In addition, schemes like the '**National Scholarship Portal'**, 'eGranthalya', '**National Knowledge Network'** not only look at the education sector but reach out to bring education to the underprivileged **(Ministry of Human Resource Development 2018**). Thus, numerous initiatives by **Government in various sectors are not only an attempt to develop society but** also focus on utilizing digital **technologies to uplift the downtrodden. They also bridge the gap between social strata.**

Technology has always had a positive impact on improving education quality, creating access and knowledge across prevailing demographic disparities. This creates a level playing field. Presently the approach from both policy and educational institutions is advantageous to the industry and we can only see upsides to this. Digital technology allows universities to offer a wide variety of courses to more students. It also provides them with a level of support that was not always possible with in-class teaching. It does so circumvents legacy problems, such as **teacher shortages and India's rigid university system.** It also makes it easier to shape curricula around what employers want in graduates.

4. LIMITATIONS AND CHALLENGES

Digitalization is the trending term, describing the contemporary period in the best manner. The term "digitalization" refers to the process of converting information from a **physical form into a digital format**. Digitalizing information makes it easier to preserve and share it. For instance, an original historical document or monument may only be accessible to people who visit its physical location. However, if the document content or images or recordings of that building are stored electronically, it can be made available to people around the globe. Every piece of significant data is being digitized through digitization. Digitalization is the **integration of digital technologies** into everyday life through the digitization of everything that can be digitized. It is the creation **of a technology-dependent** world. Digital transformation brings numerous benefits, but also poses challenges. In remote areas, access to reliable **internet connectivity and digital infrastructure remains an issue**. **The digital divide** should be bridged and equitable access to technology and digital resources should be a priority for policymakers and educational institutions.

Higher education

Higher education refers to higher secondary education for students who have completed their higher secondary school education. It consists of teaching, research, applied work training, etc. **Courses are offered as undergraduate, postgraduate, research and diploma programmes.** It also includes trade schools, vocational institutions, career colleges and institutions that provide professional courses. It offers the opportunity to study science, art, engineering, technology, medical and the environment. The World Bank's higher education report. “The Lessons of Experience” argues that “Higher education is of permanent importance for economic and social development." This indicates that **higher education is imperative to national development**. India's higher education system is the third largest in the world, following USA and China. Distance education is one of the most prominent features of the Indian higher education system.

Higher education and digitalization

Education has also slowly digitized, especially since the **World Wide Web emerged in the 1990s**, similar to other areas of society. Scores of lecturers and institutions have experimented **with web-based learning possibilities**, such as instructional videos, digital tests and exercises, and gaming. Some of these experiments were successful, while others failed or were fragmented. Technology has had a far reaching impact on the education system, starting at the primary level to university. At higher education levels, all students have relevant literacy skills and subject knowledge to undertake a specific course. Technology has become part and parcel of higher education in many ways. Students enrolled in colleges and universities and attending lectures use technology in many ways. In contrast, distance education programmes are blessed with digitalization of their entire instruction programme. Today, no education system runs independently of digital technology. Education is benefiting from technology in unprecedented ways in the present day. It has started the next phase of learning and involves advanced techniques like:

- **Online courses**

  Some universities and institutes are offering online courses. If someone wants to learn an unfamiliar language or get trained in some specific course, but have no time to cover the distance, they can easily opt for online courses developed by experts in their fields**. MOOC (Massive Open Online Course) is an appropriate example here**. In addition to providing filmed lectures, readings, it organizes for the interaction between professors and students.

- **Online exams**

  Digitalization has made examinations easy and convenient for teachers and students. These are also called **E-Exams or E-Assessments**. In these exams students demonstrate their academic achievement using computers. For instance, UGC-NET, IELTS and many more exams are taken using computers only.

- **Digital textbooks:**

  Books made available digitally fall under this category. In the e-textbook/e-text/digital textbook, the students can read text, images, hyperlinks, etc., on mobile devices, laptops, and computers.

- **Animation**

  It offers a visual representation of the topic through which students learn better. By using this technique, even the most difficult content is made easier and more interesting to learn. It is a **computer-created sensory experience** that allows a participant to believe and **barely distinguish a virtual experience from a real one.**

- **E-journals**

  Electronic journals are periodicals published electronically. These are far more superior to traditional published journals. **They provide the latest data on certain subjects**. For example, some e-journals include **Review of Educational Research, Journal of Research in Science Teaching, International Journal of Economics & Management Sciences**, etc.

- **Digital libraries**

Libraries offer a wide range of online services to their users. Students from all over the world can explore any content available in libraries without leaving home. **The National Digital Library of India works** to integrate national and international digital libraries into one single web portal. For instance, **INFLINET** is involved in modernising university libraries in India and connecting them to information centers in the country. This is done through a **nationwide high speed data network.** This is done using state-of-the-art technologies for optimal information utilization. **INFLINET is an autonomous Inter-University Centre of the University Grants Commission of India**. The following are just a few of the services provided by this digital world. Digital learning is learning facilitated by technology that gives learners control over time, **place, path and pace**. They can learn anytime, anywhere following their own style and at their own speed of understanding. Digitalization serves our higher education system in countless ways. Digitalization brings both opportunities and threats to higher **education's quality, efficiency, innovation, positioning and visibility**. This article will focus on the major issues and challenges digitalization of higher education has posed so far. It will enable us to gain a deep understanding of the importance of solving these issues.

Issues and challenges

Although digitalization is a phenomenon ruling the world, there are some hurdles to its smooth running in developing nations. Some unavoidable issues are also associated with the digital revolution in education. These can broadly be categorised in three categories:-

A. Challenges for educators

B. Challenges for students

C. Other challenges

Teachers trained in traditional teaching methods are comfortable teaching their subject using ancient methods. They hardly adopt innovations. The majority of teachers prefer to teach their students using the methods they used for their own education. They find it challenging to teach dynamically and use technology.

There is a lack of digital literacy among educators

There are radical developments in the way technology is being used in education. But the faculty lacks the expertise to implement these developments. As it pertains to handling new technology, they aren't as efficient as modern children in doing so. In India, higher education teachers rarely get training or workshops to develop digital literacy.

Data organization refers to downloading texts and pictures.

Organizing these according to the requirements of curricula, needs and the level of students is again perceived as a burden by some educators. They prefer to deliver lectures regarding the content despite exploring the internet for updated information about the subject or the topic under study. Lack of adequate ICT support, infrastructure and time Not all higher education institutes have adequate ICT support. Education's biggest challenges include providing technical support in classrooms, having access to infrastructure (computer labs, software), managing policies (whether to administer digital assignments), and finding the time to hook in new technologies.

Challenges related to students Advancing digital equity

It is still an unsolved problem and a social justice issue. Inequitable access to technology means unequal access to technology, particularly broadband internet. UNESCO reports that while 3.2 billion people across the globe use the internet, only 41% of those in developing countries are online. So, not all students have easy access to the internet and digital devices and gadgets.

Managing knowledge obsolescence

In distance education, digitalization has left little room for the educator. In the absence of a teacher, staying organised and on track is not everyone's cup of tea. They are disrupted repeatedly due to the informal environment.

Achievement gap

The Horizon reported that the **achievement gap represents a disparity** in enrolment and academic performance between student groups. This is defined by socioeconomic status, race, ethnicity or gender. Digitalization has made it easier for students from these groups to access learning resources online, but the technology cannot satisfy all learners' needs. Digitalization delivers education to a diverse student population. In order to curb this problem, more flexible plans need to be developed.

Other challenges: unrealistic expectations

These constitute the third type of risk. Mudler reported that online education is a relatively new evolution involving experimentation, where things may turn out differently than expected. MOOCs are an excellent example of this. Millions of people undertake online courses, however only a small percentage actually complete them.

Radical technology changes

It is unfortunate that technology is always changing. So institutes will not be able to use the same tools forever. They **need a plan and budget** for upgrading technology. Students enrolled in distance education also **need updated software versions.**

Failed to substitute for human interaction

Although teachers and students use virtual assistants frequently, **there is no replacement for human interaction**. As a result, teachers should never let technology take over. Digital resources should be utilized as **supplemental and complementary tools in classrooms. There are some software systems not optimized for mobile devices**. In India, not all students have computers and laptops at home, so they use mobile phones and data for internet access. Therefore, it is crucial to ensure that digital resources are optimized for mobile devices.

Lack of quality content

Institutes still need a collection of high quality digital learning content. It is necessary to conduct thorough research in this area. All the curricula developed till date must be studied with the mentoring and assistance of teachers. The self-study material to be provided to students must make them learn effectively on their own. Therefore, the above issues need quick resolution. Educators should come forward to make maximum productive use of digital support in their teaching for attaining the dynamic goals of education. Although some challenges are almost impossible to overcome, such as the substitution of human interaction, others can be resolved with the joint efforts of education authorities, educators and students.

5. THE ADVANTAGES OF DIGITAL LEARNING

An advantage of Digital Learning enables students to develop effective self-directed learning skills. They can find out what they need to learn, and the required online resources, as well as the necessary information on the problem at hand. They can **even analyze feedback.** In addition to engaging students, improving their competency digital learning tools and technology sharpen critical thinking skills, which are the basis for **logical reasoning**. Learners who explore **open-ended questions** with imagination and logical analysis learn how to make decisions as **opposed to just momentarily memorizing the textbook**. Equipping

students with the requirements of higher education and choosing a career at a young age has become one of the most significant responsibilities of school education. Moreover, digital learning tools and technology in elementary, secondary, and high schools prepare students for higher education and modern careers. This is done by helping them acquire skills including problem-solving, **familiarity with emerging technologies, and self-motivation.** Digital Learning Materials Involve educators and parents and make it easy for teachers to create and manage groups. They can keep themselves updated with the best content for their curriculum.

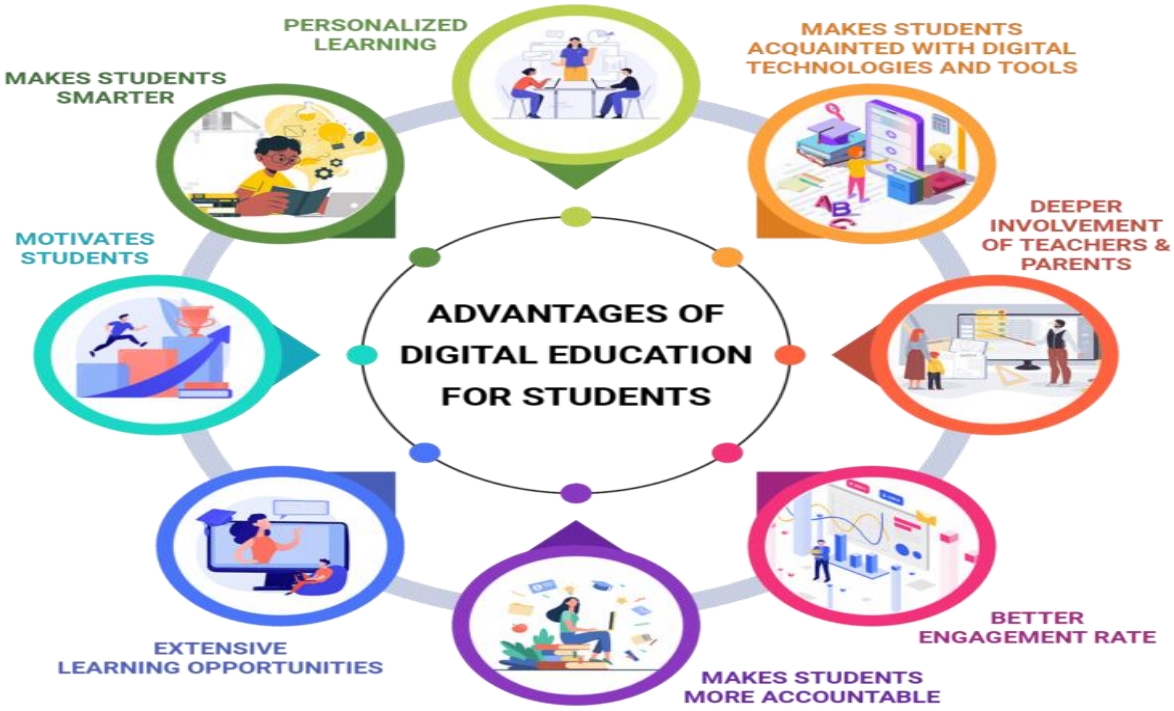

Fig.3.https://www.skoolbeep.com/blog/how-digital-learning-is-changing-the-face-of education/

The cost of education has also been affected by digital learning. In order to start a course at a desired university, students do not need to relocate to that city and pay for their travel, accommodations, and transportation. In addition, time-saving is one of the most significant consequences of digital learning in education. Educators can exchange information with other educators in real-time thanks to digital learning tools. By accepting digital devices and

connected learning, classrooms around the country and the globe can coordinate and organize to share insights. In addition, they can boost knowledge, experience, communication and employability skills. No matter where learners are located, they can access information from anywhere.

Classroom teaching has become more fun and interactive with digital education. Children tend to be more attentive. The fact that they are listening to it as well as viewing it on the screen makes their learning process that much more effective. Here, sounds and visuals come hand-in-hand which is easy for the child to grasp. Students are more likely to pay attention to details when they are exposed to interactive electronic presentations or practical sessions in educational content through interactive screen time. This enables them to complete their activities alone. With the use of engaging modules such as videos, and presentations as a medium of learning, students understand complicated concepts easily. It has helped increase their interest and curiosity level.

Children are motivated to complete their tasks more quickly when they use tabs, laptops, or notepads instead of pens and pencils. Digital classrooms have helped increase student attention; teachers maintain that absenteeism and school dropouts have decreased. Furthermore, students feel more comfortable and familiar with technology thanks to it. Digitally interactive environments encourage shy or hesitant students to participate better in classroom discussions.

Students develop language skills through **active screen time online**. By reading eBooks or accessing study materials online, they learn **erroneous words and expand their vocabulary.** It is common for students to hesitate to ask questions to their teachers during classroom training. But with digital education, even if he does not understand at one go, he can review

the recordings of the sessions to clear his doubts. Technology enables students to learn at his own pace.

Digital education is **user-friendly**. One is able to access your curriculum wherever you are. You can learn on the go. Even if you miss certain classes, you can access class notes and download files from the school website. Online study materials are available. Even if the entire education system is not digitalized, students can leverage digital content depending on their capabilities. So students can access exclusive online study modules on various subjects, which help them enhance their knowledge even without a teacher.

6. LIMITATIONS IN DIGITAL LEARNING

In Indo-Aryan "Guru" means teacher. "Gu" means darkness (ignorance) and "Ru" stands for light; a Guru is one who dissolves the darkness of content with light of information. Thus, academicians are considered torch-bearers to brighten the man.

They are considered to be less valued in educational institutions as their roles are replaced by computers. Human relations are compromised in the virtual world. As online social networking increasingly replaces face-to-face communication and physical contact, isolation can increase which may lead to social withdrawal. Since the amount of time spent on the internet increases problems such as **cyber-bullying, online stalking and cybercrime** may also become more prevalent. Moreover, radiation from computers or other mobile gadgets can have innumerable negative effects on the body. These include fertility issues for both men and women, skin burns, rashes and other serious health conditions like cancer. Computer radiation menaces come from **both thermal and low-energy non-ionizing radiation, which stalks from the computer's internal functions and Wi-Fi connection.**

Privacy matters have become huge, as it becomes harder to control personal information in the digital and internet world. It has become increasingly difficult for creative people to make any money from their work due to intellectual property theft and piracy. Digitalization and internet distribution of **media** can be very easily achieved and the process seems impossible to control. Human communication is transferred into a virtual environment through digital learning. This method of learning is not suitable for people who need **physical interaction**. Moreover, too much time spent in front of a computer screen may be harmful.

7. DIGITAL REVOLUTION AND EDUCATION

Many years ago**, the original Star Trek (the original)** told us that 'space is the final frontier'. As we live today in the 21st century, we exist in a world without boundaries. Most of us are nothing more **than a digital identity in a digital world**. Almost everything around us is digital or we are getting digital fast. This is an age characterized by **virtual conversations, online meetings, online shopping, and online relationships – a virtual life indeed**.

With the advent of virtual reality, can the education sector be far behind? Online education has become the latest trend and broken the age-old bastion of brick and mortar institutions. Online communication has become ubiquitous. Digitalization of education keeps students in sync with the contemporary world. Students can feel like they are in a virtual class anywhere anytime, without being burdened by books. Online learning also provides many benefits beyond convenience and financial savings. An independent approach to online learning teaches students to be a more effective time manager and develop the technological skills needed in their future careers. Knowledge of the Internet, typing and software programs is necessary to be digitally literate, and online learning strengthens these skills. Online education also makes learning more engaging and effective.

Fig. 4. https://elearningindustry.com/the-top-benefits-of-digital-learning

1. Online education is growing at 19% per year. In higher education, online enrollment represents 25% of all enrollments. Now, we have four main options for delivering education:
2. The traditional lecture is a monologue in which information is delivered orally to many students at a fixed time each week by one teacher.

3. Distance and online learning: Individual students work through course materials and assignments at their own pace on their own computer. This is usually a solitary experience with little interaction between the teacher and the student, and no interaction between the student and the teacher. High dropout rate.

4. In a "flipped" classroom, instead of lectures in the classroom and homework assignments, students watch and listen to the lecture at home and come to class to **work through problems, assignments, and application of lessons with the teacher and other students.**

5. Blended Learning: This approach combines the most effective of all three methods. Most (but not all) **lectures are delivered online**. The **classroom time is spent completing assignments**, testing learning, applying knowledge, and participating in discussions. In addition, technology **facilitates collaborative (student-to-student) learning via forums, etc.**

6. Blended Learning: This is a method that combines the advantages of the previous three methods. It is common for **lectures to be delivered online** (though not always). **Working on assignments, testing learning, applying knowledge, discussing, and attending special lectures** take up much of the classroom time. In addition, technology facilitates collaborative (student-to-student) learning via forums, etc. Furthermore, technology facilitates collaborative learning (student-to-student) through forums.

8. DIGITAL TRANSFORMATION IN HIGHER EDUCATION

It was held at Vigyan Bhawan, New Delhi, on 9th July 2017 as part of the **National Convention on Digital Initiatives**. During the Convention, a **17-Point Action Plan** was adopted to be implemented by December 2017. The action plan has been **submitted by the Ministry of Human Resources. wayam and Swayam Prabha (DTH Channels**) have **provided huge opportunities for improving educational** standards, but their potential has yet to be fully realized. The progress in implementation of this digital Action Plan, especially in the context of adopting SWAYAM and SWAYAM Prabha blended. This is for improving the standards of teaching/learning process. Government initiatives include **SWAYAM, SWAYAM Prabha, and the National Digital Library, e-Shodh Sindhu, FOSSEE and Virtual Lab.**

Swayam

With information and communication technology (ICT), SWAYAM is **designed to provide one integrated platform** and portal for **online courses** covering all higher education subjects and skill sector courses. More than 28 lakhs have participated in 1000+ MOOCs courses through SWAYAM. Foreign universities can also offer their courses on SWAYAM platform and examinations can be done through SWAYAM following SWAYAM guidelines.

Swayam Prabha

SWAYAM Prabha is one of the key initiatives of the government, which is designed to provide 32 high quality educational channels through **Direct to Home (DTH**) in the length and breadth of the country on a 24 x 7 basis across the length and breadth of the country.

National Digital Library

It is another government initiative to develop a virtual repository of learning resources with a single-window search facility. On NDL, more than **1.5 crore ebooks and documents have been contributed by 160 content contributors. Over 30 lakh users from 9** thousand educational institutions have been registered on NDL.

It is an initiative of the Indian government that aims to provide academic institutions with access to electronic resources including full-text, bibliographic, and factual databases at a lower subscription cost. Through the merger of three consortia initiatives, such as **UGC-Infonet Digital Library Consortium, NLIST and INDEST-AICTE Consortium, the MHRD** has designed this project.

Fossee

Designed by the MHRD, the Free and Open Source Software for Education (FOSSEE) project aims at promoting open source software in educational institutions to improve

education quality, reducing dependency on proprietary software. This project is part of the National Mission on **Education through Information and Communication Technology (ICT), funded by the Ministry of Human Resources and Development (MHRD).**

Virtual Lab

An initiative taken by the MHRD under the National Mission on Education through Information and Communication Technology, the Virtual Lab aims at providing remote-access to laboratories in various disciplines of Science and Engineering for students at all levels from undergraduate to research. This project also plans to develop a **complete Learning Management** System where students can avail various tools for learning, **including additional web-resources, video-lectures, animated demonstrations and self-evaluation.**

One of the key advantages of digital transformation in higher education is its ability to foster innovation and creativity. By incorporating advanced technologies such as artificial intelligence, machine learning, and virtual reality, institutions can create immersive and interactive learning environments. This will engage students in more creative and dynamic ways. Additionally, e-governance systems facilitate data-driven decision-making and enable institutions to gather insights into student performance, learning outcomes, and institutional effectiveness.

Several studies have highlighted the benefits of digital transformation in higher education. The positive impact of digital transformation on operational efficiency, student services, and the overall educational experience. Digital technologies and e-governance systems enable higher education institutions to streamline administrative processes, enhance accessibility, and foster innovation. Digital transformation in higher education is not limited to classroom

activities. As part of its scope, it covers areas such as admissions, student support services, learning management systems, and assessment methods. The challenges and opportunities associated with the implementation of e-governance in Indian higher education institutions. In order to drive digital transformation and improve education quality and efficiency, it is crucial that e-governance systems are effectively leveraged. Digital transformation offers numerous benefits, including improved operational efficiency, enhanced student experiences, and increased accessibility.

9. E-GOVERNANCE IN HIGHER EDUCATION

E-Governance in higher education refers to the application of electronic and digital technologies to improve administrative processes, service delivery, and decision-making within educational institutions. It encompasses a range of activities, including online registration and admission processes, digital learning management systems, e-library services, online assessment and examination systems, and digital student information management. E-Governance in higher education aims to **enhance efficiency, transparency, accessibility, and accountability in the management and delivery of educational services.**

One notable example of e-Governance in higher education is online admission processes. Institutions have developed web-based portals where prospective students can submit their applications, upload required documents, and track their application status. This has streamlined the admission process, reduced paperwork, and enabled faster communication between applicants and the institution.

Furthermore, e-learning platforms have revolutionized education delivery in higher education institutions. In addition to providing online course delivery, content management, student engagement, and assessment capabilities, **learning management systems** (LMS) including

Model, Canvas, and Blackboard also offer assessment capabilities. These platforms facilitate access to educational resources, enable interactive discussions and collaborations, and provide tools for online assessment and grading. Digital student information management systems have also played a crucial role in e-Governance in higher education. The systems centralize student data, including personal **information, academic records, enrollment information,** and financial information. This centralized database allows for efficient student information management, enables timely access to records, and facilitates data-driven decision-making.

E-libraries have transformed students' access to research materials and scholarly resources. Digital libraries and online repositories provide access to academic journals, books, research papers, and other resources. Digitalization of library services has expanded access to knowledge and reduced dependency on physical library spaces.

E-Governance adoption in higher education has been driven by various factors, including advancements in technology, the need for administrative efficiency, and the increasing demand for flexible and accessible education. Thousands of institutions around the world have adopted these digital solutions to enhance the overall educational experience for students, enhance administrative processes, and optimize resource allocation.

The National Mission on Education through Information and Communication Technology (NMEICT) Scheme meanwhile aims to leverage ICT potential for teaching and learning processes. The Mission has two major components - content generation and connectivity along with access devices for institutions and learners. In accordance with the NMEICT Mission, connectivity will be provided to 419 universities and universities-level institutions as well as 25000+ colleges and polytechnics across the country.

E-governance, the application of digital technologies to institution governance and administration, presents both challenges and opportunities in higher education. A major challenge in supporting E-governance initiatives is ensuring the availability and accessibility of infrastructure and connectivity. In many developing countries, inadequate internet penetration and limited technological resources hinder e-governance implementation in higher education institutions (HEIs). The digital divide among students and faculty members can exacerbate the challenges, as not everyone has access to technology or the necessary digital skills.

In spite of these challenges, e-governance offers significant opportunities for higher education. It can streamline administrative processes and enhance HEI efficiency and effectiveness. By utilizing digital platforms for admissions, course registration, and fee payment, institutions can reduce paperwork, minimize errors, and save time for both students and administrators. As a result, e-governance allows staff and faculty members to focus on more value-added activities such as research and teaching instead of routine tasks.

Additionally, e-governance facilitates transparency and accountability within higher education institutions. **Online portals and dashboards can provide** real-time access to information on academic programs, faculty profiles, research grants, and financial transactions, empowering stakeholders to make informed decisions. Transparency can help build trust among students, parents, and the wider community.

Higher education can also benefit from e-governance by making data-driven decisions. Through the collection and analysis of large-scale data, institutions can gain insights into student performance, learning outcomes, and institutional effectiveness. These data-driven insights can support evidence-based policymaking, resource allocation, and quality enhancement.

It is crucial to address the challenges associated with e-governance in higher education in order to maximize its benefits. Governments and HEIs need to invest in digital infrastructure, promote digital literacy among students and faculty, and establish supportive policies and regulations. Collaboration between academia, industry, and government is essential to **foster innovation,** develop scalable e-governance solutions, and ensure initiative sustainability.

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