



# THE ROLE OF EDUCATION FOR SUSTAINABLE DEVELOPMENT WITH TECHNOLOGY INTEGRATION IN EMBRACING THE INDIAN EDUCATION SYSTEM DURING POST- COVID ERA

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## Abstract

*This paper pursues the inter-relationship between technology integration and education for sustainable development in the education system in India. Only a few years back, the world confronted the dangerous outcome of transmitting the infectious novel coronavirus. Covid-19 had a disastrous effect on the Indian education system. All educational institutions were closed due to the lockdown, and classroom teaching was unimaginably stopped. In the pandemic era of COVID-19, it was only possible for teachers to generate students efficient learners at home because technology was integrated into education. In this pandemic situation, the necessities of technology are being realized. The COVID-19 situation has institutionalized the implementation of technology in education. Education for sustainable development furnishes freedom and opportunity for depurate and ameliorate the vision and pervasion to all sorts of foster quality of teaching and learning process in education. Sustainable development goals [SDGs] closely integrate development into sustainability and confess achieving higher education meetings—global sustainable development challenges and enhancing sustainability. Education for sustainable development consists of teaching and learning specific skills, cognitive knowledge, infallible thinking capacity, and best prosper wisdom. No confusion has ever been possible without technology in this rhythmic and dynamic world. Integrating technology into education makes students more dynamic, innovative, fascinating, and interested. They are learning from more convenience.*

**Keywords:** Sustainable, Technology, Education, Integration, COVID, Development

## INTRODUCTION

Education sustainable development [ESD] is a holistic, transformational, lifelong process that enhances the knowledge, skills, ability, values, and capacities necessary to propagate a sustainable world that indemnifies environmental protection and conservation, acquiring sustainability. ESD assigns learners of all generations to gain the knowledge, skills, values, and agency to address multi-dimensional challenges, including environmental changes, failure of biodiversity, unsustainable use of resources, and inequality. Education is a significant tool that furnishes feasible knowledge to people and permits everyone to acquire the knowledge, skills, attitudes, and values essential to mold the future more sustainably. Education is a lifelong process and should meet the needs of various learners; therefore, it is essential to meet this need. Virtual and augmented reality will soon become integral to the education experience, allowing students to immerse themselves in interactive 3D simulations of real-life scenarios. Education is a crucial element of ESD and is defined as an approach to

designing a better world for an upcoming generation. Education is seen as a strength that not only avails to national development but also sustainable development. It is a key to development, be it social, economic, political, or environmental. Education stimulates the developmental process of knowledge and skills, which is an indispensable part of achieving sustainable development. It exhorts the rise of economic well-being, and social welfare exercises environmental liability and potential governance. Education for sustainable development empowers learners to make informed decisions and responsible action for environmental integrity, economic viability, and a just society for present and future generations while respecting cultural diversity. We urge technology through which we perceive much of our world. There is no denying that without technology, this potential and enthusiastic world as we see it today would have never been possible. Education plus technology or edtech in India has developed exponentially, particularly after the COVID-19 Pandemic. Furthermore, we see this dramatic effect of technology in every segment of our society.

## CONCEPT OF EDUCATION

Education is the key to the global integrated framework of sustainable development goals. Education is at the heart of our exertion both to take up to change and to transform the world in which we live. Education has a long history as an international priority and the right to education in every individual. **Nelson Mandela** stated, "Education is the most powerful weapon you can use to change the world." It is a dynamic instrument of change. According to **Schultz**, "formal education is one type of investment in the human being that enables them to gain skills". Education fosters values such as cognitive abilities, empathy, and tolerance, transforming individuals into responsible citizens. Education is a catalyst for intellectual growth and societal advancement. **Swami Vivekananda** said, "Education is the manifestation of the perfection already in man." Understanding the multifaceted nature of education is crucial in designing educational systems that foster holistic development, empower individuals, and create a better future. **Albert Einstein's** view, "Education is not the learning of facts, but the training of the mind to think." The scope of education is expensive, encompassing various dimensions that extend beyond the boundaries of traditional classrooms. It envisions an extensive range of subjects, disciplines, and areas of wisdom that avail to the holistic development of individuals and society.

## CONCEPT OF SUSTAINABLE DEVELOPMENT

Sustainable Development is defined as the development that meets the needs of the present generation without excessive use or abuse of natural resources so they can be preserved for the next generation. It aims to efficiently utilize resources while also meticulously planning to accomplish immediate and long-term goals for human beings, the planet, and future generations. In the present time, the need for sustainable development is not only for the survival of mankind but also for its future protection. Sustainable development is the pathway to the future; we want a framework to generate economic growth, achieve social justice, exercise environmental stewardship, and strengthen governance, and so does human well-being. A sustainable development is a development that is stable, enduring, and consistent. The human rights community says that sustainability is attainable through and supported by peace, justice, and democracy. Sustainable development can be measured by certain components such as life expectancy, low poverty level, real income per head [GDP per capita], etc. Economics educators say sustainability is living on the interest rather than the principle. The extent to which a country has developed may be assessed by considering a range of narrow and broad indicators, including per capita income, life expectancy, education, and poverty alleviation.

## CONCEPT OF TECHNOLOGY INTEGRATION

In education, technological integration is a broad umbrella that encircles many assorted tools and techniques. Technology integration is using technology to exacerbate learning and accomplish pedagogical ideals. It is the well-coordinated use of technological tools and cloud computing as equipment for problem-solving, in-depth learning, and understanding. It is an ongoing process and demands continual learning. Technology integration in education permits students to rethink and create innovative learning environments. Technology integration in education refers to the meaningful use of technology to achieve learning goals. Instead, technology integration has technological skills in connection with cabalistic activities that have cross-curricular connections. Technology integration is the blending of computer-related learning activities into the curriculum to have students acquire, organize, demonstrate, and communicate information. Teachers can incorporate computers, smartphones, virtual reality tools, and other innovative devices to help students learn. Technological devices in the classroom are explored to create meaningful learning experiences for students of all ages. Technology integration has technology skills taught in connection with meaningful activities with cross-curricular connections. Efficacious technological integration clenches the subsisting curriculum and is an inevitable part of the educational experience, apart from traditional teaching methods and collective work. It is a dynamic process that enhances skills for both students and teachers. Technological tools transform student's learning experiences and provide a range of benefits. Technology integration is the melding of computer-associated learning activities into the curriculum to have students obtain, categorize, demonstrate, and communicate information. To understand what technology integration is, it is often helpful to consider what it is not.

## **INTER-RELATIONSHIP BETWEEN EDUCATION AND SUSTAINABLE DEVELOPMENT**

Education and sustainable development are interdependent, inter-connected so we can consider that education and sustainable development are two hands of the human body. Over the past few decades, the main goal of development has been educational perception and fructification globally. Education can be regarded as a source of human capital, Cultural capital, and Social capital. Education enriches motivation, dedication, decision-making power, self-reliance, consciousness, enlightenment, and awareness of any human being in order to properly pursue their desire and voracity. Education, however, remains the instrument for achieving and attaining the target goal. Education will be the greyhound of a sustainable development agenda whose success trusts individuals through their existence, acquiring relevant knowledge, and developing an impartial attitude to address global challenges. Education is a strategic development investment that encourages social learning, life-long learning, skill development learning, etc. In the last two decades, the cartulary for human development and sustainable development have turned in parallel to each other. The sustainable development goals measure the first substantial effort by the global community to reunite and integrate these systems and the position for education is an initial step of this exertion. It is only an educated person who can take supremacy over the ability and skills that are necessary for sustainable development and a better quality of life. Education for sustainable development spreads a holistic learning pattern that improves quality education. Education sustainable development promotes educational reform towards quality education to enhance students' lifelong learning, critical reflexivity, cooperative learning relationships, and holistic interpretation of knowledge. Quality education for sustainable development requires acidity as a universal goal. A potent education perspective that comprises formal, non-formal, and informal education can frame a progressive character in confirmative prang of all sustainable development goals. Educational sustainable development contains a huge number of concepts, theories, policy prescripts, and practical methods or tools aimed at reshaping education systems to address the socio-economic and ecological dimensions of sustainable development. Execution of education for sustainable development should be culturally relevant and locally congenial, happening across all strata and sections of society. Education is also a considerable means of effectuation for sustainable development, and it takes measures to give shape where the realized disturbance between economic, social, and environmental development can be harmonized and united into a sole idea and pursuit of well-being for all. The sustainable development goal on governments to take a fresh look at the content of education.

## **INTER-RELATIONSHIP BETWEEN TECHNOLOGY AND SUSTAINABLE DEVELOPMENT**

Technological sustainability refers to many ecologically unassailable and durable facets and ethics considering extended social and economic development perspectives. Technological sustainability is based on environmental, economic, and social aspects. These outlets are cognized through an extensive use of technology in sustainability. Integrated sustainability in technological education will endue several conveniences like eliminating cost, creating new ways of conserving resources, diluting the outflow of carbon, and reducing energy consumption. After significant concerns about the environmental effect on education, the United Nations General Assembly took the resolution 57/254 in December 2002. The resolution emphasizes the United Nations “Decade of education for sustainable development” [DESD]. DESD's main intention is to change efficacious approaches to education for sustainable practices into all segments of learning. E-learning is envisaged as the greener way to learn. If we choose to nexus with online learning, it will be tracing small and appreciable efforts to help our earth. The period of green tech is on the uprising now, in recent years, there has been extensive progress in attempting to merge technology and sustainability. Technological sustainability raises awareness of their moral responsibilities toward the environment. The Stockholm Environmental Institute[SEI]open that online learning courses can reduced 90 percent emission reduction, the University of West Georgia stated that every 100 students who never comes to school they reduced 10tons carbon dioxide emissions every semester. The sustainability quest is to prosper technological education and improve quality because it can clinch long-term innovation processes while opulent society, economy, and environment. Overall, technology integration provides an excellent scope for leaving sustainability goals. In 1990, the International Association of Universities, or IAU, included universities in several parts of the world to enhance sustainable development in higher education. Following the aims of the 9th round table of the IAU on 19th November 1993, the IAU accepted a policy known as the Kyoto Declaration on Sustainable Development. In 2002, the United Nations declared '2005 to 2014" the Decade of Education for Sustainable Development in all segments of education and teaching-learning. As a part of higher education commitment, the Kyoto Declaration took the responsibility to edifice worldwide and established sustainable development [SD]. The official agenda for sustainable development received on 25 September 2015 contains 92 paragraphs, and the main paragraphs highlighted the 17 sustainable development goals. Moreover, to this for construction of educational institutions or laboratory work need mental, wood, plastic, chemical etc, online education eliminate the requirements of these raw goods which can be protect the environment. Now an era is coming to think about the next generations, a tremendously changing climate, loss of biodiversity, rapid deforestation, massive natural calamities, continuous carbon dioxide emission, air pollution, and water contaminations, all are the real challenges for future generations, therefore sustainability is the truly one of the path to overcoming this situation. Sustainable technology

development follows a few steps, such as network advancement, expert natural resources consumption, the transition from fossil fuel to imperishable force, accepting nature-related explanations, undervaluing the outflow of pollution levels, making available to economic sources, and so on. Various countries have recently organized state-level financial institutions to exalt sustainable development and follow the green industry plan. These institutions leverage PPP [public-private partnership] to simplify green infrastructure and technological innovation. Green innovation is an important acceleration for sustainable development by inquiring that green processes and green products take measures of identical value to consumers with minor social and environmental effects. Dramatic changes are happening at the social, ecological, and cultural levels; therefore, green innovation adoption [GIA] confronted cabalistic challenges in accomplishing sustainable development in manufacturing organizations due to diverse decision-making factors. Green innovation that is connected to green products contains the innovation in technologies that are adorned in energy storage, pollution preclusion, green product sketch, waste recycling, and corporate environmental directorate. All these are chief operators of long-term socio-economic progress.

## **INTER-RELATIONSHIP BETWEEN TECHNOLOGY INTEGRATION AND EDUCATION**

The important roles of technology in education lead to improved quality of studying, and better communication facilitates skills and knowledge for students. Online classes with multimedia instruments and dissertations make learning more attractive and innovative. Students receive personalized guidance based on their previous learning patterns and performance. Some benefits of technology in education include improved adaptability, more enjoyable learning experiences, enhanced feedback, better connections, improved technique skills, and reduced costs. Today, technology has become an inescapable part of our life. Technologies have an influential effect on the Indian education system. The virtual nature of this learning erases geographical constraints. The three significant roles technology plays in education are technological progress has re-defined numerous facets of our society, including education eased collaboration and communication, Personalized learning opportunities, and engaging content. We see this scenic impact of technology in every sector of our society; education is one of them. Technology helps both students and teachers to collaborate better, encourages them to be creative and innovative, and learns new things leveraging the device they love the most, their mobile phones. Technology offers a rich reservoir of information and knowledge; skills and expertise are well organized and conveyed over the internet, making using computers an iniquitous activity in the developed world. Some usefulness of technology in education includes improved adaptability, more enriched collaboration, more enjoyable learning experiences, enhanced feedback, better connections, improved technical skills, and reduced cost.

## **EDUCATIONAL CHALLENGES IN POST- COVID PERIOD**

The world will not be the same as it was before COVID-19. There will be short-term as well as long-term effects on the education system. The pandemic will give rise to new challenges as well as opportunities that need to be considered while designing new education policies

- 1] **PROTECTION:** In the COVID-19 situation, the protection of students, teachers, and staff will be the first prerogative. Keeping a social distance, using sanitizer, and wearing masks and wearing masks will be given importance.
- 2] **TO DEVELOP GUARDIAN TRUST:** Guardians are afraid to send their children to school and colleges during this period. So, to boost their mental confidence is the major challenge in that phase.
- 3] **POOR ATTENDANCE:** During COVID era, educational institutions may not continue at full capacity due to scar and social distancing norms. Therefore, student also reluctant to attend their institution so attendance is very poor in the last of the COVID era.
- 4] **EMPLOYMENT ISSUES:** Economic showdown errors in the evaluation process may create problems for jobs; evidence suggests that poor market conditions at the market entry level cause workers to accept lower-paid jobs.
- 5] **VACCINATION:** Educational institutions should take responsibility for the vaccination of students by encouraging and motivating them.
- 6] **TARIFF LOSS:** During the COVID period, the tax collection was reducing, so its impact on the institution is crucial. COVID-19 restrictions and poor collection of revenue will impact the profitability of the institution in the short run.
- 7] **ACADEMIC CALENDER:** To prepare a systematic and relevant academic calendar to handle the situation.
- 8] **FLEXIBLE TEACHING METHODOLOGY:** Until and unless most of the population is not vaccinated, there will always be uncertainty about lockdown. Therefore, teachers will have to be prepared for both offline as well as online teaching methodologies.
- 9] **LACK OF INTEREST FOR ABROAD:** The intension of students towards outside their own countries for educational purposes will be down for the coming few years.

**10] ADJUSTMENT PROBLEM:** During lockdown students are suffering some health issues. Stress, fatigue, reluctant to study.

**11] PRECLUSIVE PROGRAMS:** A remarkable gap between economically poor and rich background students is seen during the post COVID-19 period because of the unequal distribution of resources. It's the responsibility of the institution to arrange extra classes for all students under one umbrella.

**12] COMPOSITION:** India is not prepared for emergency remote learning through e-platform as rural India is still deprived of basic infrastructure facilities. We cannot provide public education through platforms provided by private players only.

### **STRATEGIES TO ASSIST LEARNING OUTCOME IN TECHNOLOGICAL INTEGRATION SETTING**

Various strategies can be used to assist learning outcomes in an e-learning setting like

- 1] Exercise attractive and enjoyable videos, and slide shows and encourage students' motivation.
- 2] Overture individual learning way such as conformation learning that shapes the student's learning pattern.
- 3] Take measures to provide daily and timely feedback on the student's improvement and an opportunity for self-assessment and cogitation.
- 4] Inspiring cooperation and peer-to-peer interaction through conversations, collective projects, and other social learning work.
- 5] Organized elements of play design like an award appeal and competition to impel learners and enhance their attachment.

### **SIGNIFICANCE OF THE TECHNOLOGICAL INTEGRATION**

- 1] To enhance the excellent learning process with the help of multiple communication channels such as email, blogs, chat, forums, etc.
- 2] Successfully put together with students, teachers, and staff, guardians from all over the world.
- 3] To acquaint educators with the cognition of how educational technology will be applied successfully for the teaching and learning process.
- 4] Constant learning for publishing and Presenting.
- 5] To apprise the students to the significant dramatic change in education, i.e., computing and digital technologies.
- 6] To introduce the learners to the elementary intent of community education.
- 7] To adorn educators with obligatory planning and inventing skills to fulfil and evaluate knowledgeable learning processes.
- 8] Learning important and authentic sources, access to open courseware, and a variety of E-learning resources.
- 9] Multimedia approach to education.
- 10] Make better communication and collaboration processes.
- 11] Prepare students how to be accountable online.
- 12] It makes the learning process enjoyable and teaching different subjects interesting.
- 13] Bett access to children with disabilities.
- 14] Access to online libraries.
- 15] Procedure of unique data collection method and educational data storage.
- 16] Technology upsurge proficient retention capacity.
- 17] Ingress to revamp former roots of material.
- 18] Technology constructs productive transmission and collusion.
- 19] Straighten up the assessment method and identify advancement dynamically.
- 20] Students take supremacy of their education.
- 21] Education nowadays is accessible to all and fulfils everyone's requirements.

- 22] Students become creative and innovative.
- 23] Encourages personalized learning makes learning more enjoyable.
- 24] Enhances the thinking capacity of students and prepares them for the future.

### DIFFERENT PERSPECTIVES OF TECHNOLOGY INTEGRATION

To accomplish every sphere of academic domain every student can gain ethos through some important perspectives such as

**A] GNOSTIC PERSPECTIVES:** It nourishes the students to keep up and be free from any tension and anxiety and is comforted with the entire strategy that makes students emphasize their concentration on their studies.

**B] ELEMANTRY PERSPECTIVES:** The unified and different types of data from several origins by physical and biological basis become boosted to the students.

**C] COMPATIBILITY PERSPECTIVES:** Technology furnishes every student with their requirements and individual satisfaction.

**D] GENERATIVE PERSPECTIVE:** This is the pathway to the comparative useful creation of knowledge-based investigation.

**E] EXPERIMENTAL PERSPECTIVES:** Students gain their virtual knowledge through laboratory-based activities, library, etc.

**F] FINANCIAL PERSPECTIVES:** Technology rapidly reduces the cost of education, so all strata of students can handle technology smoothly and easily.

### GOAL OF EDUCATIONAL TECHNOLOGY IN STUDENT INVOLVEMENT

**1] QUALITY TECHNIQUE:** Create an environment that encourages team work, skills and establish positive relationships between students and teachers. Create an enjoyable and productive environment where all students feel comfort and supported while emphasizing the significance of empathy, abilities, and understanding. Foster critical thinking and active engagement.

**2] PEDAGOGICAL TECHNIQUE:** Tech-based pedagogy includes electronic or digital tools, media, and resources to explore a student's learning experience. A teacher will maintain and coordinate instructional aides to facilitate effective learning.

**3] TEACHING TECHNIQUE:** Teachers can use technology in institution to make teaching processes more efficient. Virtual classrooms using video conferencing software is now a days best techniques and helpful for students.

**4] INFRA-STRUCTURAL TECHNIQUE:** The component of technology infra-structure include hardware system and software development tools. Digital classroom, computer use, biometry.

**5] APPRAISEMENT:** Appraisal helps the students to understand their mistakes and feedback received on their faults and helps them improve. The objective of appraisal in education is two folds. It helps the students to elucidate their learning, provide feedback on the mistakes they've been making, and take measures and opportunities to improve their performance with each appraisal.

**6] ENHANCE POWERFUL EDUCATIONAL SYSTEM:** No doubt technology has totally changed the teaching-learning Process. Across the globe technology continuously enriches a bloomy educational system.

**7] TECHNOLOGY ASSIST IMPROVED LEARNING PROCESS:** The real fact is that technology helps most students' academic improvement through technology-based learning. Students can gain from several resources without depending on the teacher.

**8] CONNECT TO IMPROVED COMMUNICATION AND COLLABORATION:** Educational technology is an important pathway through which students can make their careers and fulfil future dreams. Education technology co-ordinates communication and collaboration between teachers, parents, and students.

### TYPES OF TECHNOLOGY INTEGRATION

**1] Project-based exercises integrating technology :** The main intention is for PBL to enhance students' thinking capacity and build a problem-solving mentality and cooperation with other students.

**2] Play-oriented :** Learning with play support increase the students thinking capacity, explanation and exploration of the world, grow up new knowledge and attitudes.

**3] Learning tools :** Learning with Computers, mobile and other appliances.

**4] Blended method :** Learning Process through online and blended classroom.

**5] Digital tools :** Such as students' active participation in whiteboard, smart board for students learning and projects prepared by web.

**6] PowerPoint presentations :** Students might create videos or slideshows for projects and science fairs. Using a projector or tablet they can share their multimedia projects with each other.

**7] Social networking site:** To introduce students' social media for developing a creative idea so they can uses of Google, Wiki and another Collaborative online source.

**8] Websites visit :** Students might visit websites to conduct research for papers and projects. Museums and other non profit organizations often have interactive features and educational content on their websites which can make them helpful additions to a textbook.

**9] Communicate through video conferencing:** Students can use video conferencing platforms to communicate with mentors or students at other schools. In remote or hybrid classes video conferencing programs allow students to interact with their classmates and teacher.

**10] Digital version E-books:** Digital versions of textbooks might include online resources and allow students to highlight text and complete assignments without pencils and paper. Storing content online can also keep students from having to carry heavy books from class to class.

**11] E- content development:** E-content supports on going learning advancement and academic success among learners' by including assessment and feedback procedure.

#### FOUR LEVELS OF TECHNOLOGICAL INTEGRATION

**1] Alternative:** At the alternative level of technological integration teachers might adopt modern technological methods to replace the old methods without changing the main objective of the lesson.

**2] Enkindling:** The Enkindling level of technological integration technology can perform more than extra features like spell correction and grammar checking in word processing programs. The objective of the lesson plan might stay the same, but if students want to access extra content, then they can help with technological delivery methods.

**3]Unrivalled:**The next level of technological integration is Unrivalled or correction where students may change parts of an activity to pursue the abilities of a technological method.

**4] Description:**The highest level of technological integration is a description, where teachers can use technology.

**Mary Beth Hertz** shares four levels of classroom technology integration like

**1] SPARSE:** Students frequently use technology to prepare their notes, assignments, and projects.

**2] BASIC:** Students are rarely used in technology. They used some tools initially preparation for their project, and subject content.

**3] COMFORTABLE:** Students are very familiar with using these tools to develop their projects and content.

**4] SEAMLESS:** Students use technology on a regular basis; they use several tools and techniques for understanding content.

#### STATE GOVERNMENT INITIATIVES TECHNOLOGY INTEGRATION WITH EDUCATION

The various state governments across the country also play a crucial role in promoting online learning in the situation of COVID-19. Most of the states incorporated the initiatives of the central governments along with their methods for providing the facility of online learning.

The state of **Delhi** started several special online classes and services, like the online capacity building program, during the time of corona.

**Jharkand's :** DigiSat communicates toward stronger parent-teacher-student linkages.

**Himachal Pradesh:** HarGhar Pathshala is a unique digital education for children with special needs.

**Madhya's Pradesh:** DigiLEP provides content for students' learning through a well-constructed mechanism with over 50,000 WhatsApp groups covering all parts and secondary schools.

**Rajasthan:** The govt. of Rajasthan launched the SMILE [Social Media Interface for Learning Engagement ] Programme on 13 April 2020 to encourage continuous learning for students and teachers at home during the coronavirus pandemic.

**In West Bengal:** IIT Kharagpur has collaborated with Amazon Web Service to develop the National Resource Platform [NAIRP], the future possibilities of which include monitoring eye movement, motion, and other parameters for teaching and learning.

The Government school transformation program **Odisha** under the 5T initiative [Transparency, Teamwork, Technology and Timeliness leading to Transformation ] of the Odisha government is good in this direction.

**Uttar Pradesh :** The Uttar Pradesh government proposed the new e-learning parks in several degree colleges across the state. which will be included with a computer, internet connection, and wifi facilities, also with a digital library. The government plans to spend Rs. 4 lakh per college to make students tech-savvy. During the first lockdown in March 2020, the departments launched the Uttar Pradesh Higher Education Digital Library has launched as 77, 373 content pages that have received more than 8 lakh hits.

**Punjab:** Per year approximately 16 lakh students are using computer education in all educational institutions in Punjab. 100% internet connectivity and unlimited data facilities are available to every students. E-content [ over 10,000 episodes] completed for several subjects which is helpful for teachers and students both. Edusat is already established and 100% utilization. "Edusat Punjab" and 960 newly developed episodes of various subjects have been provided through a mobile app named ISCUEA learn. Smartphones and tablets have been provided to students to facilitate e-learning.

**Karnataka:** The education department has launched a new set of digital learning platforms. During the Pandemic, the department has converted 2,500 classrooms into smart classrooms and distributed tablet PCs to around 1.55 lakh degree, diploma, and engineering students. The tablet PCs will be distributed to students at a cost of rs 163 crore. The department is also spending on converting 2,500 smart classrooms rs 27.77 crore and the development of a Learning Management System rs 4.04 crore. The smart classrooms include projectors, whiteboards, android boxes, UPS, and the internet to facilitate the use of modern teaching and learning models, and LMS enables access to learning both in online and offline modes.

**Kerala:** Kerala has launched two projects in e-literacy; one is the Akshaya Project, whose main objective is to make at least one person in every family e-literate, and the other is the IT @ school project, which is aimed at providing basic computer knowledge to every high school student. Aksharavriksham initiative is focusing on digital edutainment to support learning and skill development via games and activities. State initiatives such as bharatNet, the Kerala state data center, and the Kerala state-wide area network have strengthened the digital infrastructure, making the internet accessible to 60 percent of the population.

**Andra Pradesh:** Andra Pradesh state govt. has introduced a fiber grid initiative in November 2015 to enable broadband connectivity to households across the state and is working in collaboration with Cisco as the networking equipment manufacturer.

**Assam:** Govt. of Assam is Provided laptops and cash awards to the brilliant students who are secured 1<sup>st</sup> division in the HSLC and High Madrassa examination of SEBA and 10<sup>th</sup> standard examination held under the State Madrassa Education board, Assam Sanskrit board Assam, under the ANUNDORAM BAROOAH CASH CUM LAPTOP AWARD SCHEME. The scheme was planned to inspire and encourage the students to better performance and to have first-hand experience with information and communication technology.

## CENTRAL GOVERNMENT INITIATIVE TECHNOLOGY INTEGRATION WITH EDUCATION

Education is on the concurrent list of the Indian Constitution. Besides, the Ministry has undertaken a proactive initiative named MANODARPAN, covering a wide range of activities to provide psycho-social support to students, teachers, and families for mental health and emotional well-being during the COVID-19 outbreak and beyond. A comprehensive initiative has been taken by the Indian government during the COVID-19 era which includes e-textbooks, NROER, DIKSHA, SWAYAM PRABHA, Extensive use of radio, community radio, and CBSE Podcast – Shikha Vani, Special e- content for visually and hearing impaired developed on Digitally Accessible Information System [DAISY] and in sign language on NIOS website /youtube.

### NATIONAL DIGITAL LIBRARY OF INDIA [NDL]

The National Digital Library of India is a virtual repository of learning resources under the Ministry of Education, Government of India, through its national mission on education through information and communication technology [NMEICT]. The objective is to collect and collate metadata and provide a full-text index from several national and international digital libraries as well as other relevant sources. The NDL provides free-of-cost access to many books, is designed to hold content of any language, and provides interface support for the 10 most widely used Indian languages. It is developed, operated, and maintained by the Indian Institute of Technology Kharagpur.

### STUDY WEBS OF ACTIVE-LEARNING FOR YOUNG ASPIRING MINDs [SWAYAM]

SWAYAM means in Sanskrit "Self." An Indian government's massive open online course [MOOC] platform delivers an enormous educational opportunity for college and university students. This platform was launched by the Ministry of Human Resource Development [M.H.R.D], under the government of India, on 9<sup>th</sup> July 2017, by the honorable President of India, Sri Pranab Mukherjee.

### DIGITAL INFRASTRUCTURE FOR KNOWLEDGE SHARING [DIKSHA]

On 5<sup>th</sup> September 2017, Vice President of India Venkaiah Naidu launched DIKSHA with the motto of “one nation, one digital platform.” Contains a school curriculum prepared by NCERT, CBSE, and also state boards.



**NATIONAL INITIATIVE FOR SCHOOL HEAD and TEACHERS' HOLISTIC ADVANCEMENT or NISHTHA**

On the glance of NEP 2020 at present, NCERT, under the supervision of the Ministry of Education [MOE], Department of School Education and Literacy [DSEANL] Govt. Of India. In collaboration with states and union territories and autonomous bodies under MoE MoD and MOTa [CBSE, KVS, NVS, AEES, Sainik School, CICSE, EMRS-NESTS, etc. NISHTHA was launched in August 2019 by Union Human Resource Minister Sri Ramesh Pokhriyal Nishank. NISHTHA scheme is to strengthen and encourage the teachers' skills in critical thinking and handling several difficult situations while at the same time enabling them to act as first-level counselors. To foster and develop a healthy and safe school environment, improving learning for students' inclusion of ITC in learning and development.

**NATIONAL EDUCATIONAL TECHNOLOGY FORUM [NETF]**

National Educational Technology Forum was suggested to be created as an independent and sovereign body that provides a virtual Platform for the free exchange of ideas regarding the usage of technology to improve teaching, learning, assessment, management, administration, etc. For all educational institutions in the country [government 2019]. NETF will help in decision-making regarding induction placement and usage of technology by providing leadership to education institutions, the government, and other stakeholders [Mitra and Singh d, 2020]. It will also provide the latest knowledge, research and the opportunity to consult and share best practices.

**NATIONAL PROGRAMME ON TECHNOLOGY ENHANCED LEARNING [NPTEL]**

The National Programme on Technology Enhanced Learning, or NPTEL, is a platform for university standard science. Seven Indian Institutes of Technology and the Indian Institute of Science jointly initiated NPTEL under the Project of MHRD. No age bar no entrance criteria for students. The largest online repository for web and video courses in engineering, basic sciences, and selected humanities and social sciences subjects are also included.

**E-ACHARYA**

E-Acharya is an integrated E-Content Portal developed under the National Mission for Education through ICT. The Portal Provides a facility to search and browse the learners; all learning materials, including audio, Video, textual materials, etc, through a single interface. The Portal covers quality learning and resources from top institutions in the country in eight subject categories viz agriculture, Chemical Science, Physical science, medical and health sciences, engineering and technology, social sciences, and arts and humanities.

**PM- E VIDYA**

The Pradhan Mantri E- Vidhya is an initiative of the government of India., The PM E- Vidhya scheme was embarked under the one nation one digital platform with the purpose of safeguarding the education of children. The scheme was launched on May 18,2020 by finance minister Nirmala Sitharaman. On 31, May 2020 the best 100 universities were authorized to start online classes through PM-E-Vidhya.

**VIDYA DAAN**

Vidya Daan is a platform by which individuals and organization can contribute to E-learning resources in the education realm to assure that quality learning continues for learners across India. Vidya daan was launched in April 2020. This scheme was introduced in Assam, in April 2020. Telangana, Gujrat, Maharashtra, Orrisa, Kerala and Chandigarh including NCERT AND CBSE. Practice questions, lesson plan, teaching video can be contributed.

**NATIONAL REPOSITORY OF OPEN EDUCATIONAL RESOURCES [NROER]**

Portal provides a host of resources for students and teachers in multiple languages including books, interactive modules and videos including a host of a STEM based games content is mapped to the curriculum for classes 1-12 including aligned resources for teachers. It has a total of 14527 files including 401 collections. 2779 documents, 1345 interactive 1664 audios 2586 images and 6153 videos on different languages.

**E-TEXT BOOK**

E- textbook is one of the most popular government preparation platform which provides courses for exams like bank govt exams, UPSC exam. It provides both website and app for recorded and live classes.

**NATIONAL DIGITAL EDUCATIONAL ARCHITECTURE [NDEAR]**

Therefore India government founded National Digital Educational Architecture [NDEAR] in the Union budget 2021-22. The NDEAR main goal is to deliver exclusive education eco-system architecture for improvement of digital infrastructure in the country and also help to foster to education planning.

**PERFORMANCE INDICATORS [PINDICS]**

Generally used to evolution of the performance and advancement of teachers. It included performance standards [PS], specific standards and performance indicators. PINDICS is consist on provision in sections 24,29 and the schedule specifying norms and standards for schools in the RIE Act 2009, NCF -2005 and SSA framework 2011. Teachers Performance

assessment should be done at least twice in a year. Teachers performance assessment should be done at least twice in a year. This app created in collaboration with NCERT to self-assess of the teachers.

#### **SWAYAM PRABHA TV**

This initiatives includes 32 channels that focus on educational programme with the objective of one class, one channel for asynchronous usages by everywhere, at any time. The curriculum and topics are organized similarly on DIKSHA. It has a close association with Tata sky and Airtel to air and telecast the educational Programs.

#### **E-ADYAYAN**

E-Adhyayan is an online platform which is very popular among student,parents and tutors. This app is included exciting features, fess management, student's homework submission,students performance reports,online attendance so on. So it is user friendly app for students.

#### **E-PATHSALA**

This is a portal for teachers that was developed in November 2015 by CIET AND NCERT in collaboration with the ministry of human resources development. E-Pathshala provides access to digital textbooks,learning material and enables participation in exhibitions, contents, festivals, workshops and more. So as a teacher you could simply notify your students. Simply explained this is a capacity building programme designed for teachers. The aim is to improve the quality of secondary education through integrated teacher training in order to boost competency.It helps train them in a manner that one is prepared for school assessments,learning outcomes,new initiatives in education,diverse needs of children and more such necessary skills.

#### **NATIONAL MISSION IN EDUCATION THROUGH ICT**

The national mission in education through information and communication technology has been taken into consideration to exertion the dynamic of ICT in teaching and learning process for the convenience of the students of higher education.The three fundamental motto such as access,equality and quality can be provided on minium low of cost in every colleges and universities. And also giving opportunities to the teachers and students in the same.NMECT also providing free of cost E-content among students and teachers.

#### **DIGITAL LEARNING INITIATIVES BY CBSE**

SARANSHI is a tool for comprehensive self-review and analysis for CBSE affiliated schools and parents. It enables them to analyze students' performance and to take remedial measures. SARANSH brings school teachers and parents closer, so that they can monitor the progress of students and help them improve their performance. It is currently available for standards 9 – 10 and provides a comprehensive overview of standard 10 performance from 2009, till the current academic session.

#### **SAKSHAT**

This educational portal was launched on october 30, 2006. Initiative has taken by ministry of education, main vision is to lifelong learning for students. This is the platform where students from any classes from basic level to higher level can access study materials. Also another facilities like e-book,e-journal,audio-visual and quizzes MCQ and discussion forum are available here.

#### **CLASSROOM CENTRIC DIGITAL INTERVENTION**

A scheme operation Digital Board [ODB] for establishing smart classrooms in class 9 to 12 of government and government aided schools is under consideration.

#### **VIRTUAL LAB**

The Virtual Labs Project is to develop a fully interactive simulation environment to perform experiments, collect data, and answer questions to assess the understanding of the knowledge acquired. To achieve the objectives of such an ambitious project, it is essential to develop virtual laboratories with state-of-the-art computer simulation technology to create real world environmental and problem handling capabilities. There are about 225 such labs operational, with more than 1800 experiments and benefiting more than 15 lakhs students.

#### **E-YANTRA**

E -Yantra is a project for enabling effective education across engineering colleges in India on embedded systems and robotics. The training for teachers and students is imparted through workshops where participants are taught basics of embedded systems and programming. More than 275 colleges across India have benefited with these initiatives. All the projects and code are available on the e-yantra web site [www,e-yantra.org](http://www.e-yantra.org) as open-source content.

#### **DOUBTNUT**

Doubtnut as the name shows is originally a pathway for learners to explicit their doubts. If you are facing some confusion, you can upload your doubt through image you can receive the answer quickly. Answer will be in the form of video to help

you understand better. Doubtnut also includes NCERT courses from 6<sup>th</sup> to 12<sup>th</sup> and ITI-JEE coaching top 1,000 ranked candidates are given fees concession. There are study materials and crash courses are available. Doubtnut is free for all.

#### UNACADEMY

one essential education app in India is unacademy. This app is useful for competitive exams. This app is comprised of JEE, NEET, UPSC, Bank exam and other competitive exams. Live face to face interaction between teachers and students mock test, daily practice and revision are available in unacademy. This app is paid but there are few free courses are also available.

#### VEDANTU

Vedantu is one of the important online learning apps which contained live classes, preparation of assignments, crash courses, coaching for JEE, NEET NDA exam. It starts from class 1 to 12<sup>th</sup> standard students. Vedantu's one of the best quality is that they have a very good quality of teachers available.

#### CONCLUSION

The technology integration into education is a dynamic and supported personalized learning, social transformation, it proved communication and collaboration, cultural heritage, lifelong learning and embrace education as a lifelong journey and prepared students for the future. It helps any person to improve the level of comprehension, fostering self-awareness and self-confidence. In recent times access to technology is necessary requirement. The integration of technology in education students can boost their capacity, expands your horizons and empowers students to make a positive difference in the world.

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