

Digital Transformation in Education: The Rise of E-Learning amid COVID-19

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Received: 20-12-2025

Revised: 01-03-2026

Accepted: 27-03-2026

ABSTRACT

The worldwide lockdown during the COVID-19 outbreak has undermined the modern education system, which has automatically shifted the conventional educational setup to an electronic learning structure. E-learning is a resolution-oriented approach that increases the adoption of new technologies in a demographically diverse nation like India. The present study describes the vogue of excessive e-learning use amid an epidemic and the ways to continue the teaching-learning process through various portals and platforms. The intended purpose of this study is to present a comprehensive picture of the widespread adoption and usage of various e-learning platforms in India. This will help create awareness about e-learning applications among future generations and make it a more definitively implemented mechanism.

Keywords: COVID-19, Lockdown, e-Learning, Internet, Trends, Flexibility, Communication, Accessibility

Since time immemorial, human beings have faced various natural, social, physical, mental, and other problems. They have made their way of life easier by inventing science and technology, crossing many paths from generation to generation to overcome those problems (Tegegn, 2024). Just as the advanced medical science discovered in the changing times has found a cure for many diseases from the diverse forms of deadly diseases, the same means different technological inventions invented at other times have given a new direction to our existence. Whilst ultra-modern science and technology have improved people's lives and made more resources available, their widespread use and constant efforts to conduct individual experiments have produced a variety of undesirable adverse effects without increasing restraint (Woessner *et al.* 2021). The representations of these adversities are often natural and sometimes anthropological in multiple periods. Similarly, via natural process, a virus called "COVID-19" originated in the 21st century (Anderson *et al.* 2020). However, Covid-19 is complex, both natural and anthropogenic, owing

to the lack of proof of its anthropogenic origins, it has been determined that it arose through natural means (World Health Organisation, 2019).

The outbreak of COVID-19 in 209 more countries, including India, has created a very uncomfortable environment worldwide. To protect people from the harmful effects of this virus and to control the rate of infection, lockdown notices are issued at different times across different countries, along with recommendations for social distancing (Keni *et al.* 2020; Laxminarayan *et al.* 2020). This ultimately disrupts the education system, including the contemporary world's social, political and economic conditions.

Several terms, such as "online learning" or "virtual learning", may also be used for e-learning, particularly as a powerhouse instrument among

How to cite this article: Halder, A. and Halder, U.K. (2026). Digital Transformation in Education: The Rise of E-Learning amid COVID-19. *Educational Quest: An Int. J. Edu. Appl. Soc. Sci.*, 17(01): 95-101.

Source of Support: None; **Conflict of Interest:** None



all the learning trends, providing learners with everything they can learn at their own pace. Moreover, with the help of e-learning, pupils can access a vast body of knowledge through devices connected to the internet that replicate the physical library or physical books (Vivekananda & Ruvn, 2017). During the epidemic, e-learning proved a blessing for individuals and the community. Despite suffering mental discomfort, anxiety and depression due to being entirely under house arrest, learning is credible to achieve at a comfortable pace for the learner.

The term e-learning is connected to two dimensions: first, learning; the other is technology based on electronic gadgets. Learning is a cognitive mechanism for achieving insight, and technology is the driving force behind the learning process, utilised as every other instrument in the practice of education. Different devices, such as writing and communication technologies, are paired with e-learning tools. Researchers and scientists have attempted to transform e-learning platforms into functionally transparent vehicles for different purposes (Aparicio *et al.* 2016).

Methodology of the study

The investigators aimed to conduct the study by collecting data through various literature reviews.

Pedagogy of e-learning

E-learning is an advanced technology-driven form of learning that consistently contributes to the global quality of education by adapting to evolving educational needs in an ever-changing society. It also refers to any course, program, or degree conducted entirely online, which further specifies three main e-learning modes: online, hybrid/mixed, and e-enhancement (Johnson *et al.* 2022). In modern society, electronic learning has made the process of inclusion in education more accessible by empowering women's education. Therefore, e-learning offers an interactive learning experience that encourages our nation's people to seek other modes of study, including farmers' education, adult education, and many more (Gaikwad & Randhir, 2016).

In light of the appropriate use of modern technological tools to advance the teaching-learning process, e-learning serves as an evolving form of

distance learning. ICT is used to provide a virtual environment suitable for courses conducted entirely online and to strengthen the face-to-face instruction system. The notion of e-learning is persistently evolving, as is the essence of technology use (Sangra, 2012). Nowadays, e-learning is considered electronic learning due to its attractive popularity in educational pedagogy, governmental initiatives and corporate and social services as it is synchronous (real-time), asynchronous (self-paced), blended (mixed of real-time and self-managing) in nature, so it is used purposefully 24/7 through the proper application of ICT in the substitute form of learning based upon online, virtual, web-based, distributed and distance education (Khan & Kharat, 2015).

Synchronous e-learning creates a conducive, user-friendly environment for effective teacher-student participation in teaching and learning, organising the educative process effortlessly (Wang *et al.* 2023; Tu *et al.* 2025). In this 'synchronous' term, we see the keyword 'sync' in our daily lives, which is always used in Gmail, on Android phones, etc., to present us with hidden information at the blink of an eye online. In the same way, 'synchronous e-learning' enables proper utilisation of various educational resources. On the other hand, 'asynchronous e-learning' is pupil-centred but not time-bound or face-to-face; for example, if one uploads a video to YouTube or tweets a video on Twitter, anyone can watch those videos on their own schedule, without any time restrictions (Zeng & Jiutong, 2023). Therefore, the closed face-to-face education system above indicates that e-learning delivery trends play an essential role, just as a blind person guided by their stick.

Various e-learning Platforms

In a short period, the unprovable and uncontrolled spread of COVID-19 has severely damaged the economies of diverse countries, causing educational operating conditions around the globe to shift towards e-learning mode within a few months. Where e-learning has become a technology-based learning platform with a wide range of flexible options, such as blended learning tools, various types of freely available learning portals, Microsoft platforms, mobile applications, and video conferencing platforms like Zoom, Google Meet, and many more (Vorina *et al.* 2022; Bailey *et al.* 2022).

However, the consistency of the quality of content and resources provided on the e-learning platform often plays a significant role in customer satisfaction (Shahzad *et al.* 2020). Therefore, during and after the pandemic, e-learning emerged as a compulsory, non-discriminatory, and unavoidable platform for present and future generations, providing access to an international network of cognitive information and an easily accessible self-learning environment for the creation of comprehensive knowledge in a purposeful, satisfying, and inspiring manner.

Although offline learning was prevalent in most cases before the COVID-19 epidemic, e-learning has played a central role in digital access during the lockdown period. E-learning has been widely used on the web through various applications, such as Google Classroom, Zoom, WhatsApp, YouTube, etc., to create virtual classrooms, deliver live lectures, host online mock tests, conduct video quizzes, facilitate discussions, and share documents. Therefore, using these, learners can register and log in to their accounts to access information from their homes, providing an experience that is the best substitute (Mahalakshmi & Radha, 2020).

According to a statement of 'The Economic Times', the world's second most widely read English-language business newspaper for 59 long years, India has entered a demographic dividend of 37 years and the increase in the size of the working-age population is expected to last until 2055 (Sharma, 2025). The demographic dividend generally refers to a country's potential economic growth, which depends on its working population, specifically those aged 16 to 64 years. Meanwhile, when the proportion of productive working people in the country's total population is higher (Jain *et al.* 2025). This helps realise the need to increase the number of employees by educating the masses through various e-learning tools and by improving the country's technology infrastructure. Moreover, to develop web-based technology in the Indian education culture, there is a need to raise awareness of the positive growth in e-learning amid the critical COVID-19 pandemic. Therefore, the various digital platforms that have indeed helped maintain Indian Education systems during COVID-19 are listed below:

(a) edX: edX is an American Open online course provider, a non-profit organisation with both paid

and non-paid online university-level courses created by Harvard & MIT. In the e-learning industry, edX was developed as an open-source software platform in June 2013 and is freely available in various higher education institutions (Shi *et al.* 2024). To increase the accessibility of high-quality education and research, RDX-Research Data Exchange was launched by edX in 2014 to advance online and offline teaching and learning and to bring together the best universities around the world (edX, 2021). According to data from AICTE, "edX is offering up to 5000 free licenses to every university that allows unlimited certifications from edX Online Campus Essentials catalogue of 100+ courses" (AICTE, 2020).

(b) Udemy: Similar to edX, Udemy is an American MOOC provider platform founded in May 2010, spreading its wings worldwide by offering 155,000 paid or unpaid courses in more than 65 languages. It helps improve job-related skills, technical skills, health and fitness, business skills, entrepreneurship, and more (Patra *et al.* 2022). During the COVID-19 epidemic, the Udemy platform raised 50 million dollars to maintain the online teaching-learning process in the e-learning industry smoothly and to meet global educational demand amid constant workplace changes and uncertain economic conditions (Qiu, 2020).

(c) Diksha: The DIKSHA- a platform for school education, the initiative was launched by the NCERT with the support of the Ministry of Education, Government of India, to provide appropriate educational materials related to the prescribed school-based curriculum for teachers, students, as well as parents (Shokeen & Kaur, 2025; Karthikeyan, 2025). In addition to helping teachers gain experience in classroom activities (such as lesson plans, question bank, assessment aids, worksheets, classroom resources, teacher training modules, etc.), and for students to avail an enjoyable classroom experience, the revised lesson provides flexible learning through free-of-cost digital textbooks, various courses, and a variety of TV classes in more than 18 languages, DIKSHA includes different curricula of NCERT, SCERT, CBSE Board of India (Diksha, 2018; Roul & Mohalik, 2025). Also, to help students, it provides training modules on extracurricular topics such as mental health and inclusive classrooms, which have proved very effective during the ongoing COVID-19

epidemic. DIKSHA is available both as an e-learning web portal and as an application (DIKSHA, 2021).

(d) Unacademy: Unacademy is the most sensational platform for new-generation e-learning technology in the Indian higher education sector, established in 2015 as an education company in Bangalore. 18000 academics support it and offer special facilities for paid subscriptions as well as the opportunity to study through thoroughly freely available live classes for various educational and professional entrance exams, such as NTA CSIR NET, UGC NET, UPSC CSE, IIT JEE, NEET UG, SSC exams, CBSE class 12, etc (Ashfaque & Bawa, 2022). Therefore, it is an e-learning platform aimed at creating an online knowledge base that benefits the world by partnering with bright minds to provide courses in every possible subject, in multiple languages (India Today, 2020; Huang *et al.* 2023).

(e) BYJU'S: In Edtech, distance education, and the m-learning industry, BYJU's is a free and premium online tutoring provider learning application for students between the ages of 4 and 18, providing an adaptive learning environment to improve student performance through short, engaging animation videos. The platform also provides study material for CBSE, ICSE, IAS, and Government exams, as well as various courses to prepare for other competitive exams such as JEE, NEET, CAT, etc. (India Today, 2020; Raizada & Sinha, 2025). Furthermore, during the ongoing COVID-19 health crisis, BYJU'S m-learning application provides free access to learning programs until the end of April to help students continue their preparation for end-of-year exams (Hindustan Times, 2020; Sathyan & Prasad, 2021).

(f) Vedantu: It is an interactive online tutoring portal and an Indian application that realistically provides virtual learning environments using gamified approaches to CBSE, ISCE, NTSE, Olympiads, IIT JEE, NEET, grades 1-12, and more. It was launched in October 2014 to enable students to learn and browse with enjoyment, engage through discovery, and easily learn every topic in a safe online climate with a peer at home through available online tutors (Vedantu, 2021; Bansal & Mehra, 2021; Gupta & Pratik, 2023). Vedantu is a live learning application that offers one of the best live learning experiences, providing platforms in India during the pandemic.

(g) Swayam: SWAYAM is a MOOCs-based ICT initiative by the Ministry of Education, determined by the Indian Government. The Study Web of Active Learning for Young Aspiring Minds application provides all courses at no cost in several regional languages from various prestigious institutes. It offers many opportunities to achieve desired learning goals through a systematic approach, easy credit transfer to academic programs, on-time weekly assignments, and many more (Swayam, 2021; Singh *et al.* 2021; Amitharani, 2022).

(h) Swayam Prabha: On the other hand, Swayam Prabha is a school and higher education-related MHRD project under the Government of India's National Mission on Education through ICT. The INFLIBNET Centre maintains the INTER-UNIVERSITY CENTER (IUC) part of UGC, where high-quality educational programs are telecast through free 34 DTH channels using the GSAT-15 satellite (Swayam Prabha, 2021; Jampani & Rongali, 2022). It has not been very successful in gaining popularity.

(i) e-Pathshala: It is a jointly advanced website and platform by CIET and NCERT, to provide digital textbooks, audio-visual information, flipbooks, teacher training modules, PDFs, print materials, periodicals, supplements, etc., to teachers, students, parents, researchers, and educators in a completely free manner. Launched in November 2015, this application provides multilingual resources for classes 1 to 12 and is easily accessible on laptops, desktops, tablets, and smartphones (ePathshala, 2020; Bansal, 2022; Shokeen & Gupta, 2025). The ePathshala platform is built as a mobile application to meet the SDG-related objectives of equal standards, inclusive training, lifelong learning for all, and bridging the digital divide.

(j) YouTube: It is an American online video-sharing platform created in 2005 and has always played a vital role in e-learning in the Internet industry. Where everything from elementary to higher-level education-related subjects can be learned at any time through any uploaded or ready-to-watch videos, or live classes (Dehghani *et al.* 2016; Roy, 2023). It is the most demanding and preferred easy-to-access application for the new generation of learners. The most positive aspect of YouTube is that the learning materials of all the e-learning platforms mentioned above are available on

YouTube as one of their educational channels. All platforms first start their walk on YouTube. Due to the stress of the COVID-19 pandemic, all candidates for national-level competitive examinations rely solely on freely available YouTube content for learning (Breslyn & Green, 2022; Sobaih, 2022). However, the only restriction and main difference between YouTube and other e-learning platforms is that it does not provide any degree or certificate courses (Roy, 2023). A business app is loaded with an entertainment package that distracts learners. Therefore, just like the recently developed YouTube Kids app, Google should also develop YouTube as a learning application.

E-learning during the COVID-19 pandemic

Every human being is a creature of such an endearing, positive nature that, no matter how big the problem may be, they fight it and leave, having found a specific way to live a healthy life. Nevertheless, during the pandemic, selecting the core aspects of e-learning and applying them effectively has successfully built a positive bridge amid the sudden change in the educational culture (Li *et al.* 2022). Therefore, to hold down earth productiveness, the benefits of using e-learning are a simple way of participation, mild and feel free to use, economize time, individually conducted, get-at-able to encouraging all types of learners through open discussion, diminish subjectivity via e-assessment and possible to provide Problem-based learning, which boosts up metacognitive skill and in resolving issues, for trainers, e-learning tools also support to fabricate technological skill through live streaming, and conquering the narrowness of fixed audience participation (Elzainy *et al.* 2020).

At present, e-learning has strengthened the foundations of modern education amid changing learning environments and the needs of contemporary learners, thereby making the world entirely reliant on ICT. Students and instructors have turned to various e-learning platforms to maintain continuity in learning during the COVID-19 pandemic (Soni, 2020; Radha *et al.* 2020).

CONCLUSION

In a developing country like India, various experts once planned to put into practice the appropriate use of technological strategies; the COVID-19 epidemic

has taken us one step further in that direction. Due to the lockdown conditions worldwide during the pandemic, not only learners, teachers, and teaching faculties, but also individuals are already motivated to raise their awareness of various e-learning aspects and to adopt technology in education voluntarily. Because of the heavy lockdown resulting from the COVID-19 epidemic, every education system around the world became a hub, where distance education, open education, conventional or formal education, every educational sector depends upon computers, laptops, mobile phones, Android phones, etc., all running only over the internet connection, broadband, modem, or Wi-Fi connection.

The COVID-19 Pandemic taught us just how important e-learning is in our lives as a technological component. During the strict lockdown, when everything was completely stopped, technology was the only tool that helped us realise the lesson. No matter how bad the situation is, the learning process does not stop. With the proper use of technology over time, everything from the education system to the economy, commercial organisations, and governmental organisations has continued to run online. In contemporary times, scientific equipment such as calculators, computers, and laptops is necessary for technical and engineering subjects in science or higher education. However, the COVID-19 situation taught us a vital lesson that e-learning, in its various modes, aspects, and initiatives, is equally crucial across all educational spheres. In particular, the utilisation of its tools is essential for coping with a rapidly changing society.

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