Chapter 10
COVID-19: Creating a Paradigm Shift in Indian Education System

Kiran Ahuja and Indu Bala

Abstract With the spread of the coronavirus, an unprecedented number of students around the world are not able to go to schools, colleges and universities to stop the spread of pandemic COVID-19. The epidemic is expected to have enormous economic concerns and it is also having devastating effects on global education. With the rapid spread of the coronavirus, educational institutions around the world are making a radical decision to switch from traditional face-to-face course content deliveries to online content delivery. This is a major paradigm shift that will potentially reshape the future of Indian education system with the accelerated adoption of digital technology. The COVID-19 situation is a blessing in disguise to experiment with new tools and technologies to make education delivery meaningful to the students who cannot go to campuses. It’s an opportunity to be more knowledgeable and to be more productive while developing new skill sets and accelerated professional skills through online learning and assessment. In this chapter, we have reviewed the educational challenges and opportunities posed by the unexpected outbreak of COVID-19 pandemic followed by the discussion on the recalibration of the Indian educational system after COVID-19. Various readily available platforms for the adoption of digital/online learning are explored and discussed in detail. In the chapter end, some recommendations are made for the betterment of the Indian education system after COVID-19.

Keywords Education disruption · COVID-19 · Online learning · ICT · Digital learning management

K. Ahuja (✉)
DAV Institute of Engineering and Technology, Jalandhar, Punjab, India
e-mail: askahuja2002@gmail.com

I. Bala
Lovely Professional University, Phagwara, Punjab, India

© The Author(s), under exclusive license to Springer Nature Switzerland AG 2021
F. Al-Turjman et al. (eds.), Emerging Technologies for Battling Covid-19, Studies in Systems, Decision and Control 324, https://doi.org/10.1007/978-3-030-60039-6_10
10.1 Introduction

With the existing pandemic situation due to COVID-19 virus, most nations have closed their institutions/universities nationwide, disrupting the learning of billions of students worldwide [1, 2]. The proliferation of COVID-19 and the worldwide lockdown have led to the adoption of digital tools in various fields, including education. Universities, schools, and colleges have switched toward e-learning to continue the uninterrupted flow of knowledge. The closure of institutions/universities has not only interrupted the studies of the students worldwide; it also hampered key evaluation period, and many university exams have been postponed or cancelled. Many schools or educational governing/regulatory bodies have decided to promote students in high standards directly, while in higher education, many institutions/universities have opted for online assessment rather than regular assessments. The COVID-19 has caused a major paradigm shift in the whole education sector and heralded a new era of education for both teachers and students [3, 4]. Thus, the education system today has a dire need to shift regular teaching on distance learning programs and platforms to reach the students at different geographical locations. Schools and governments are exploring processes to permit students to get hold of education at home.

In the current scenario, it is more important than ever that education not be discontinued; otherwise, it can cause serious consequences for the mental well-being and development of students. In the hindsight of this brutal pandemic, the education sector is one of the few sectors that are on the path of being positively transformed. E-learning facilitates young learners to get indulged in studies without losing connection with subjects during lockdown.

Here, it is important to understand that e-learning is not only a platform for distance learning but also an adaptation of new and interesting digital tools to make learning more interesting. UNESCO is also facilitating many developing nations to mitigate the instant consequences of institutions closures, especially the more susceptible and deprived communities [5], and in their efforts to promote continuing education for all through distance education, as shown in Fig. 10.1.

In this chapter, we have discussed the immediate challenges faced by the educational fraternity to shift on digital education platform overnight. Subsequently, we have summarized some of the readily available online solutions that could be adopted as such to deliver online education to the students followed by the recommendation on practices that must be followed once the educational institutions may resume their working after COVID-19.
10.2 Challenges Faced by Education System Across the World

The coronavirus outbreak will have a deep and long-lasting impact on global education system. At this tough time, there are many questions that need to be addressed before jumping to the specific solution for the betterment of students. In this section, various challenges have been discussed in detail that need open discussion. The pictorial representation of challenges faced by the whole education system worldwide due to COVID-19 is shown in Fig. 10.2.

10.2.1 Educational Disruption

The educational institution provides its students with basic learning and prepares them for a better future. When institution closes, students get deprived of opportunities for growth and development. Figure 10.3 shows the statistics of disruption of studies faced by students due to school closures worldwide in February and March 2020. This educational disruption impacts adversely the underprivileged students who in general have less educational opportunities beyond schools/colleges [5].
Fig. 10.2 Challenges faced by world education system due to COVID
10.2.2 Child Nutrition

Countries around the world offer a variety of school meal programs for students. School meals are a source of nutritious foods in developed countries. But, in developing countries like India, mid day meal is the reason for many parents to send their children to school and continuing their education. For such countries, students depend on free or reduced price meals provided in institutions for food and nutrition. With existing COVID-19 situation, these students will not be able to continue their education and will also be malnourished [8].

10.2.3 Parent Dilemma of Home Schooling

The kids are sent to schools to elevate their skills. The time spent in schools promotes social competencies and mindfulness in them. The basic notion of sending a child to the school is to enhance the child’s ability. When the school is closed, parents are requested to facilitate their kids in learning at home. In a country like India, it is very challenging for parents with limited education and constrained resources to face the scenario [9]. By and large, the working parents are more likely to take leaves from their places of work in order to take care of their kids in the course of lockdown, which in many instances leads to loss of pay and negatively influences their productivity. The scenario is worst when both mother and father are in the clinical profession.
10.2.4 Social Isolation

During school time, kids participate in social activities and interact with their peers and teachers. Due to the school closure, many children lose this social connection vital for gaining knowledge and overall personality development.

10.2.5 Non-availability of Resources to the Students and Teachers

UNESCO has also pointed out that disrupting schooling can cause hardship to families and other hardships, including a decrease in economic productivity, as parents are obliged to work with their childcare responsibilities [10]. Currently, half of all students outside the classroom, or 830 million learners worldwide, do not have access to a computer. In a recent survey, it has been observed that 40% of the population do not have Internet connectivity. As shown in Figure 10.4, at many geographical locations, lack of Internet access or improper Internet connectivity is a major obstacle in online learning, particularly for students coming from deprived communities.

---

**Fig. 10.4** Represents poverty rate vs. average broadband adoption rate [11]
10.2.6 Dropout Rates Tend to Rise

With the existing COVID-19 situation, it is very difficult to predict when exactly the schools/universities will open. And it is even more difficult to anticipate that people will send their kids back to school, especially in case of extended closures. In this scenario, the chance of increase in dropout rate is very high and is a matter of great concern to most of the educational institutions.

10.2.7 Awareness Programs/Trainings to Use Online Tools

In many developing countries, schools and universities teach students according to traditional blackboard and chalk practices. With the outbreak of COVID-19, such schools and teachers have no choice but to take on online teaching learning pedagogies. However, many teachers are unfamiliar or indifferent to online education using technology-led materials. A typical online course requires content preparation and state-of-the-art audio visual techniques to connect the content with students. Converting an offline course may require additional work to bring it online. Thus, online trainings/short-term courses/FDPs are also required to train the faculty for effective online teaching [12].

10.2.8 Difficulties in Transferring Knowledge Online for Laboratory Courses

The basic notion behind a successful online course is student engagement. Knowledge components can be effectively communicated in online mode. However, the practical aspects where hands-on practices are required cannot be transferred in online mode. For example, to do design-based experiments in online mode can be a foremost challenge and sometimes may not be feasible. This issue is a major concern of the education sector that needs immediate attention and resolution.

10.2.9 Negative Impact on Campus Placement

The university graduate placements may be severely affected due to COVID-19 epidemic this year. The final year graduates this year have experienced major teaching and assessments interruptions, and eventually they are graduating in the beginning of global recession. Thus, many of them would have to accept less paid jobs and this could be the everlasting implications for them [13].
10.2.10 Assessment Procedures

The sudden closure of institutions/universities has not only adversely impacted the learning of the students worldwide; unfortunately, the school closure situation has coincided with the key assessment period of the students, and their exams are either postponed or have been cancelled this year. As a result, parents and teachers fail to assess a student’s learning capabilities which can have long-term negative consequences for him or her [14]. One potential alternative for the cancelled assessments is to use “predicted grades” [15], but generally such measurements are often inaccurate [16–20].

10.2.11 Adverse Effects on Student Health

Recent reports have indicated that people who spend more time on a computer or mobile phones have difficulty in concentrating and Internet obsession that can seriously affect their lives. It can lead to social isolation which may decrease their academic performance and sometimes depression also. Procrastination problem affects most of the students who do online courses. This sleep deprivation affects them negatively resulting in poor memory retention and academic performance. With COVID-9 outbreak, the online learning option led new E-learners to spend long study hours to take courses and complete assignments. Sometimes, it may also affect students’ health like weak muscle, joint pain, weak eyesight, etc.

10.2.12 The Digital Divide

The biggest challenge in continuing online education is unequal access to the electronic devices, such as computers and smartphones, and irregular power supply in countries like India and Internet connections. Access to electricity is important for digital education, both to power devices and to connect to the Internet. In developed countries, electricity may not be an issue, but in developing countries like India, electricity quality and the number of hours available each day are issues. Computers/laptops with good Internet courses are mandatory for online courses. Smartphones could also serve this purpose. However, smartphones are good for apps, but not for time-consuming assignments or research. Thus, the digital divide is evident across class, gender, region, or place of residence. It has been reported that in India, among 20% of people below poverty line, only 2.7% people have computer in their house and 8.9% have Internet facilities [21]. The situation is exacerbated in remote areas.
10.2.13 Gender Gap

The Internet and Mobile Association of India has reported that in 2019, 67% of the Internet users were men and only 33% of Internet users were women. The inequality is more pronounced in rural areas, with men and women accounting for 72% and 28%, respectively. General inequalities in the virtual world can lead to increased educational inequality in learners if governments continue to provide online education without the necessary support [22, 23].

10.2.14 Challenges Faced by the Telecommunication Service Providers

To continue online learning by the students, regular and predictable Internet connectivity is a must. During this lockdown period, many telecom service providers like BSNL, Vodafone, and Reliance Jio must offer additional data package and free Internet hours to the students and educational institutions. Without good Internet access, it is difficult to arrange online classes to students sporadically due to poor Internet connectivity and signal fading issues. In some cases as in J&K, due to restricted 2G network services instead of 4G, students could not access online classes [24]. To continue online learning on a regular basis has also a cost implication, and many students are not able to bear Internet services cost. So far, no communication has been made by the governments on the reimbursement of Internet bills to the students or on providing free or subsidized data packs to the students. With this prevailing situation, many students may not be able to afford these data packages as their families have lost their source of income.

10.2.15 Challenges Faced by Teachers

Bringing the classroom online does not mean effective distance learning. Interaction among students and teachers is a very crucial part in learning. The online learning requires strict discipline by the student. Teachers are also facing challenges as many of them are not digitally adept. The exposure to the online teaching is very little to most of them. Teaching courses online requires training on developing lesson plans and preparing lecture materials in the form of audio and video [25–28]. Figure 10.5 lists some of the available tools that one can use to create digital educational content.
The nationwide lockdown due to the coronavirus has led to the adoption of digital tools in various fields, including education. Universities, schools, and colleges have switched to e-learning to continue the uninterrupted flow of knowledge. Despite the current restriction, universities, schools, and colleges have switched to e-learning in order to keep up with the continuous flow of knowledge, which is expected to expand in line with the growing number of coronavirus cases in different parts of the country. The discussions about the adoption of digital technologies for educational purposes have been going on for some time. But what used to be a discussion has now become a reality due to corona breakdown throughout the world. It has now become a hierarchy of strategic actions, and the wave of digital transformation has positively affected the education sector of the industry. At times like these, it is more important than ever that education not be discontinued; otherwise, it can have serious consequences for the mental well-being and development of our students [29].

A unique educational model is anticipated to emerge from COVID-19. The pandemic has forced the educational policy makers around the world to understand the shortcomings of the current education system. To apprehend the shortcomings of the contemporary training system, the need of digital literacy is strongly felt worldwide that could draw big difference between traditional and non-traditional teaching. In this section, a number of probable solutions related to continuing the
The lockdown has accelerated adoption of digital technology by educational institutes to work in tandem. It is considered to be an ideal time to experiment with and to deploy new technologies to make online education delivery possible and meaningful. Without hampering students’ learning, digital transformation has become a new means to the educational institutions across the country. Many educationists
consider the existing situation as a chance to be more productive and efficient by adopting modern and accelerated professional skills via online learning.

E-learning provides a gateway for the young minds to indulge in learning regardless of the lockdown which continues them productive and helps them not loose connect with the subjects. E-learning is not simply a platform for training from distance these days; but it additionally means adapting new and fascinating digital tools to make learning more interesting. While the students are restricted to remain indoors and cannot go to school, the school can always come to them via e-learning platforms like illuminus itself which uses collaborative learning administration systems to make schooling seamless and interactive. In the hindsight of this brutal pandemic, the education sector is among the few domains which are on the path of being positively transformed.

By the time this pandemic will be defeated, we additionally have a chance of overcoming all the issues and cons associated with the typical and unorganized structure of schooling. E-learning services coupled with collaborative LMS providing Auto-Quiz creation, instructors’ overall performance reviews, expertly curated content material library, one-tap assignments, instant messaging, doubt-clearing sessions, etc. will turn out to be the excellent friends of the whole education fraternity [30–34]. Realizing the importance of effective teaching and skill enhancement of the instructors, the partnerships between universities, online education organizations, and tech providers may also be continued after pandemic [35, 36]. Figure 10.7 provides some of the self-directed learning tools readily available online.

### 10.3.2 Digital Learning Management Systems

The success of any online course largely depends upon the content and content delivery to keep students engaged. The subject knowledge can be delivered effectively in online mode. However, the skills cannot be transferred through online mode. For example, conducting an analog design laboratory in an online mode could be very challenging. Figure 10.8 shows some of the trendy digital learning management system tools for lab courses.

### 10.3.3 Teacher’s Knowledge Diversification

The COVID-19 situation has emerged as an opportunity to the students to learn things online from subject experts and for teachers to diversify their knowledge. The time flexibility allows students to study the course as per their convenience. For a typical online course, instructor has to prepare the contents carefully, and using audio and video facilities, delivery of these contents is made to the students. For example, in India, IITs are following this practice of use of the technology
Fig. 10.7 Self-directed learning content
infrastructure to run online courses on platforms like NPTEL. Many other similar platforms are listed in Figure 10.9. No doubt, it requires great efforts to change offline courses contents to make it online. Thus, teachers are required great efforts to convert these contents online as the trend of online education is gaining momentum with the existing pandemic situation.
10.3.4 **Collaborative LMS**

Digital India campaign launched by the Government of India will now serve as the foundation for bridging the learning gap that exists at the moment. Collaborative LMS makes the offline to digital transition simpler for the administrations as they can easily manage their institutes simply like they do on regular schooling days. The customers can set up yearly direction structures, conduct virtual classes, send notices and timetables at the click of a button, and certainly can get a bird’s-eye view of the overall institute’s performance. Virtual lecture rooms and online tools used on these e-learning platforms allow the academicians/school staff to engage students the same as in a classroom environment. These tools can also aid in organizing teachers and parent meetings and staff/management meetings and can save both time and money while offering the quintessential interactivity. This is an era of transformation no matter the harsh times and although the training industry is on the

| LMS           | Description                                                                                                                                 |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Alison        | Online courses from experts, available in English, French, Spanish, Italian and Portuguese.                                                 |
| Canvas Network| Course catalogue accessible for free for teachers in order to support lifelong learning and professional development.                          |
| Coursera      | You need select the sub shape(item of the list) to change its color.                                                                           |
| European Schoolnet Academy | Drag the yellow diamond handle to change the gap size of the items.                                                                          |
| EdX           | Online courses taught by instructors from well-recognized universities and companies.                                                          |
| Icourses      | Chinese language courses for university students.                                                                                              |
| Future Learn  | Online courses to help learners study, build professional skills and connect with experts.                                                     |
| Swayam        | SWAYAM is a programme initiated by Government of India and designed to achieve the three cardinal principles of Education Policy viz., access, equity and quality. |
| NPTEL         | NPTEL provides E-learning through online Web and Video courses of various streams.                                                             |
| Udemy         | Udemy is an online learning and teaching marketplace with over 100000 courses and 24 million students. Learn programming, marketing, data science etc. |

Fig. 10.9 Massive Open Online Course (MOOC) platforms [10]
verge of being absolutely altered for good. There is no looking back from here. The advantages of adopting e-learning services today will have a very tremendous and powerful influence on our future. Some of the collaborative platforms that support video conference are listed in Fig. 10.10.

### 10.3.5 Distance Learning Solutions

Some of the educational platforms and applications that are listed in Figure 10.11 aim to aid teachers, parents, and school administrators to help student in his studies and to provide him social care and interaction during school closure. Most of these solutions are free and available in multiple languages.
### 10.3.6 Government Initiatives

In response to educational institutions’ closure, governments and private companies have come forward with numerous initiatives for the benefits of the students. Ever since the lockdown started, the government has taken all necessary measures to avoid any kind of disruption in the studies of students. To facilitate them, a variety of e-learning portals and apps have been launched by the Indian government and educational authorities such as ePathshala, DIKSHA portal, STEM-based games, Swayam, etc. Some of the worldwide available mobile apps for reading and learning are tabulated in Fig. 10.12.

| Source | Description |
|--------|-------------|
| Brookings | A catalogue of nearly 3,000 learning innovations. Not all of them are distance learning solutions, but many of them offer digital education content. |
| Common Wealth of Learning | List of resources for policymakers, school and college administrators, teachers, parents and learners that will assist with student learning during the closure of educational institutions. |
| Education Nation | Nordic countries have opened up their learning solutions for the world for free, supporting teachers and learners during the school closures. |
| EdSurge | Community-driven list of edtech products, including many distance learning resources for students, teachers and schools, covering primary to post-secondary education levels. |
| UNHCR | An extensive list of over 600 distance learning solutions from the United Nations agency for refugees. |

**Fig. 10.11** External repositories of distance learning solutions [10]

### 10.4 Recommendations

A key aspect of coping with COVID-19 situation is to guarantee that services are being delivered in every possible manner. The IT professionals can adapt themselves to this transition phase as most of them are already working on their laptops and smart devices even in office and they can simply plug in at homes now. But students have had to make far bigger adjustments as learning has always been in classrooms which they can’t go to now. Moreover, many of them are not well equipped with technology required for remote learning. Here, the Digital India vision of the legislature is developing as an imperative instrument for settling the current emergency due to COVID-19. The lockdown has speed up adoption of computerized innovation. Business houses, educational spots, exploration, PC, information management strategies, and online education arrangements have been compelled
Fig. 10.12 Mobile platforms for online learning [42, 43]
to work fast and improve in quality and delivery time to deal with such circum-
stances [44–48]. This is a perfect opportunity to analyze and send new gadgets to
make training delivery important to students who can’t go to institutes. It’s an
opportunity to be increasingly effective and gainful while growing as good as ever
proficient abilities/information through web-based learning and appraisal.

It is additionally a reality that utilization of innovation in teaching is resulting in
various ideas in the system, for example, the move from educator-driven teaching to
student-driven education. An extreme change in point of view is required in the
mentality of policy makers, specialists, students, and extraordinarily educationists.
Teacher selection ought to continuously be connected to innovation amicability and
intelligence for innovation adoption. Correspondingly, accreditation parameters and
models need reexamination. COVID-19 has just quickened selection of innovations
to convey teaching. To beat the current bottlenecks in adoption of web-based learn-
ing, following recommendations are made to adapt to existing circumstance [49].
The pictorial view of recommendations is presented in Fig. 10.13.

10.4.1 Educational TV Programs

While a greater part of the youngsters can get access to online talks by means of
Internet on advanced cells or on work areas/workstations, there is as yet a group of
children forsaken, particularly the individuals who study in government schools.
The administration should begin with certain TV slots through which poor kids can
approach education as now the greater part of the families have TVs at home. The
TV channels ought to have bifurcation as per various classes, and talks/projects can
be broadcast during school timings.

10.4.2 Overcome Language/Infrastructure
and Technology Barrier

In the current situation, many students don’t have smart phones or workstations to
use applications like Zoom, Skype, and so forth. Moreover, many of them can’t
comprehend the lectures in English. For such students, sound recordings of the lec-
tures in Hindi can be sent to them. Those who are unable to access this facility can
be taught later on when the schools reopen after the lockdown. For future e-learning,
the government should also come forward with schemes to provide smart mobile
phones to the students at easy installments. The government should also make
e-learning mandatory for specific topics to ensure teachers and students are famil-
iarized with this digital learning process.
Fig. 10.13  Recommendations to improve Indian education system after COVID-19

- Educational TV programmes
- Overcome language and technology barrier
- Affordable Electronic gadgets and software for EWS students
- Government intervention to facilitate e-learning
- Laptop facility to the students in govt. schools
- Teachers Training
- Common, larger medium will work
- Experimentation with e-learning options for the future
- AI and ML support to Enhance e-learning Delivery
- Companies should step forward to help
- Reopening safe schools
- Sustaining safe schools and healthy communities
- Improvement in Time and Resource Allocation
10.4.3 Affordable Electronic Gadgets and Software for EWS Students

Digital distance learning is in trend these days and many Indian universities, for example, IGNOU, have started many such programmes for higher classes. With the existing pandemic situation, the focus is now shifting towards the online delivery of the digital contents at the primary level. It requires the availability of cheap handheld devices with multimedia facilities and excellent storages capacity to retain the study material within it for every class. Such devices must be distributed to EWS-kids free of cost to facilitate students further, the contact numbers of the course instructors must also be embedded in these smart devices.

10.4.4 Government Intervention to Facilitate E-Learning

In India, economically weak students join government institutions as they comparatively have less tuition fees and free food facility. Some of these schools or colleges lack in basic facilities such as boards and chalks for writing. And therefore, it is unreasonable to imagine their participation at digital learning platform. Thus, a strong government intervention is required so that government students may also be private exposed to learning that matches with the quality of education in other top institutions.

10.4.5 Laptop Facility to the Students in Govt. Schools

Keeping in view the poor infrastructure facilities in government school and colleges, the government, NGOs and private firms should come forward to arrange laptop or smart phones for the students. Laptop and smart phone manufacturing companies should design these laptops with embedded softwares for online learning. Government intervention is also required to arrange such gadgets at subsidized rates for the students.

10.4.6 Teachers’ Trainings and Other Infrastructure Requirements

To make online education equally effective as the classroom teaching, the teachers must be trained in delivering course contents efficiently and effectively. Secondly, the students as well as teachers must have PC with good configuration and smartphones. Thirdly, all villages and remote areas must have good internet facility.
10.4.7 Common, Larger Medium Will Work

Children from all strata of society can get online education if they are educated through a much common and larger medium. Schools authorities can do this by broadcasting video lectures for the students on All India Radio or Doordarshan and other similar platforms. The time table of different classes must be announced on different radio stations. In addition to this, the curriculum books like NCERT must be translated into audio and video form for primary school students.

10.4.8 Experimentation with E-Learning Options for the Future

The existing corona situation must be considered as an opportunity to experiment with available digital technologies such as, WhatsApp, Facebook, and YouTube on PDAs to access educational videos. The schools authorities must approach smart phone manufacturing companies those who are ready to provide free or cheap handsets to the needy students. The telecommunication service providers should also offer cheap data plans to the students and school authorities should help EWS students to avail these plan rather than investing in school buildings, infrastructures and equipments.

10.4.9 Artificial Intelligence (AI) and Machine Learning (ML) Support to Enhance E-Learning Delivery

Face-to-face learning allows students to interact with the instructor in the classroom. It also helps the teacher to understand the perception of the learner. The E-learning platforms and LMS systems embedded with AI and ML models can predict both teaching and learning patterns to facilitate both teacher and students to adapt the learning programs on the basis of behaviors, assessments, and understanding. The ML plays a very important role in online learning through effective data analysis and automation. It enables administrators and trainers to identify the weak areas of the learner on analytical patterns and algorithms and add new information to predict learning outcomes. On the basis of the automation and decision-making models, the AI tools can constantly monitor the alignment of the newly developed program with the learning objective. Moreover, ML also allows administrators to automate personalized training paths for individual students. It analyses patterns and trends to adjust the learners’ coursework automatically to meet training needs. In addition to this, ML can also help the faculty to understand students’ need to learn. The ML programs apply predictive algorithms to assessment of current and
past performance of the student(s) and enable the faculty to identify targeted online training recommendations.

10.4.10 Companies Should Step Forward to Help

The taxes paid by the conscious occupants of India must be spent in this social motive and for the strengthening of substantially less special understudies and instructors. To deal with the existing Covid-19 situations, both, government and private institutes would have to play a significant role in the digital empowerment of less privileged students and teachers. The handset manufacturing companies should design cheap smart phones or laptops for them. NGOs and civil societies too should also come forward to facilitate them to access digital online classes. The government must start digital classrooms for the economically weak students so they do not lack in knowledge.

10.4.11 Reopening Safe Schools

School systems need proper planning for reopening schools as quickly and responsibly as possible. The teachers must be provided with accurate information and training on the public health crisis, using schools as an opportunity to quickly monitor and trace any re-emergence, and providing any additional physical or mental health support that students may need, especially in high-incident areas.

10.4.12 Sustaining Safe Schools and Healthy Communities

Access to schools is important for implementing wider public health programs. Equally important is having a contingency plan for future emergencies. We hope that children and students in the most affected areas will be able to return to school sooner and other schools will not be affected. But don’t forget global education during or after the crisis [51]. Investment in education not only provides the normality and ways for youth to fully participate in the economy and society but also promotes the innovation and skills and talents needed to fight the next pandemic or crisis.

In the coming weeks and months, many governments will have to make tough preferences about their funding in education. The crisis will simply entice resources. Faced with this choice, it needs to be remembered that cutting-edge kids are tomorrow’s nurses, epidemiologists, doctors, researchers, and professionals in the subject of public health. We need to proceed to make investments in training these days so that the world can be higher organized for tomorrow’s epidemics and crises.
10.4.13 Improvement in Time and Resource Allocation

ML programs automate many processes in learning modules and enable instructors and administrators to spend time on other aspects of the learning process, e.g., be with the development of online modules for the creation of other subject areas or laboratory simulations and practical courses.

10.5 Conclusion and Future Scope

With the immediate closure of schools in March 2020 to stop the spread of coronavirus, many countries have opted for online distance learning platforms to continue educational services. The studies of the students must not suffer; therefore, many countries started putting their educational resources on their websites. In some of the nations, teachers are asked to prepare online digital content and to give online classes to the students. The success of running online classes depends largely on availability of the digital infrastructure and familiarity with the tools. In developed countries with robust connectivity, online distance learning is not a big challenge, whereas in developing countries like India, digital divide is more pronounced and the penetration of Internet, smartphone, or television access and reachability is not equal for all the students.

In this chapter, we have addressed various challenges that Indian education system has faced recently due to the immediate closure of the institutions. To deal with this situation, there are many online learning applications and tools available for immediate adoption by the educational institutions as an open source. However, the key challenge is to prepare the course contents in a structured way to engage students in online learning. The partnership with private corporations active in education sector can be fruitful to get already developed contents/course materials. At the same time, telecom service providers should also come forward with zero-charge data plans for downloading the contents from the Ministry of Education. Other than the infrastructure and connectivity issues, the teachers and administrators should have hands-on experience on digital tools and technologies for effective online teaching. Thus, online short-term courses and faculty development programs must be organized for them so that they have apt knowledge about the usage of tools required to make their online classes interactive and interesting to keep students engaged in learning.

References

1. Chahrour, M., Assi, S., Bejjani, M., Nasrallah, A.A., Salhab, H., Fares, M.Y., Khachfe, H.H.: A bibliometric analysis of COVID-19 research activity: a call for increased output. Cureus. 12, e7357 (2020). https://doi.org/10.7759/cureus.7357
2. Xiang, Y.T., Yang, Y., Li, W., Zhang, L., Zhang, Q., Cheung, T., Ng, C.H.: Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. Lancet Psychiatry. 7, 28–29 (2020). https://doi.org/10.1016/S2215-0366(20)30046-8

3. Spina, S., Marrazzo, F., Migliari, M., Stucchi, R., Sforza, A., Fumagalli, R.: The response of Milan’s emergency medical system to the COVID-19 outbreak in Italy. Lancet. 395, 49–50 (2020). https://doi.org/10.1016/s0140-6736(20)30493-1

4. As coronavirus spreads, the decision to move classes online is the first step. What comes next? (2020). https://www.chronicle.com/article/As-Coronavirus-Spreads-the/248200. Accessed 6 Mar 2020

5. UNESCO. COVID-19 educational disruption and response (2020). https://en.unesco.org/themes/education-emergencies/coronavirus-school-closures. Accessed 25 Mar 2020

6. https://www.npr.org/2020/03/06/812462913/6-ways-universities-are-responding-to-coronavirus

7. https://www.weforum.org/agenda/2020/03/infographic-covid19-coronavirus-impact-global-education-health-schools/

8. Wheeler, C.C., Erhart, L.M., Jehn, M.L.: Effect of school closure on the incidence of influenza among school-age children in Arizona. Public Health Rep. 125, 851–859 (2010). https://doi.org/10.1177/003335491012500612

9. Luca, G.D., Kerckhove, K.V., Coletti, P., Poletto, C., Bossuyt, N., Hens, N., Colizza, V.: The impact of regular school closure on seasonal influenza epidemics: a data-driven spatial transmission model for Belgium. BMC Infect. Dis. 18, 29 (2018). https://doi.org/10.1186/s12879-017-2934-3

10. https://en.unesco.org/covid19/educationresponse/solutions

11. https://www.brookings.edu/blog/the-avenue/2020/03/20/as-classes-move-online-during-covid-19-what-are-disconnected-students-to-do/

12. Coronavirus: universities are shifting classes online—but it’s not as easy as it sounds (2020). http://theconversation.com/coronavirus-universities-are-shifting-classes-online-but-its-not-as-easy-as-it-sounds-133030. Accessed 9 Mar 2020

13. Oreopoulos, P., von Wachter, T., Heisz, A.: The short- and long-term career effects of graduating in a recession. Am. Econ. J. Appl. Econ. 4(1), 1–29 (2012)

14. Andersen, S.C., Nielsen, H.S.: Learning from performance information. J. Public Admin. Res. Theory. 30(3), 415–431 (2020)

15. Murphy, R., Wyness, G.: Minority report: the impact of predicted grades on university admissions of disadvantaged groups. CEPEO Working Paper Series No 20-07 Centre for Education Policy and Equalising Opportunities, UCL Institute of Education (2020)

16. Burgess, S., Greaves, E.: Test scores, subjective assessment, and stereotyping of ethnic minorities. J. Labor Econ. 31(3), 535–576 (2013)

17. Rangvid, B.S.: Systematic differences across evaluation schemes and educational choice. Econ. Educ. Rev. 48, 41–55 (2015)

18. Maurin, E., McNally, S.: Vive la revolution! Long-term educational returns of 1968 to the angry students. J. Labor Econ. 26(1), 1–33 (2008)

19. Piopiunik, M., Schwerdt, G., Simon, L., Woessman, L.: Skills, signals, and employability: an experimental investigation. Eur. Econ. Rev. 123, 103374 (2020)

20. Fredriksson, P., Hensvik, L., Nordström Skans, O.: Mismatch of talent: evidence on match quality, entry wages, and job mobility. Am. Econ. Rev. 108(11), 3303–3338 (2018)

21. https://www.thehindubusinessline.com/opinion/columns/the-cheat-sheet/digital-divide-in-times-of-covid-19/article31349014.ece

22. WHO. Coronavirus disease (COVID-19) situation reports (2020). https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200314-sitrep-54-covid-19.pdf. Accessed 25 Mar 2020

23. WHO. Coronavirus disease (COVID-19) pandemic (2020). https://www.who.int/emergencies/diseases/novel-coronavirus-2019. Accessed 20 Mar 2020
24. https://corporate.cyrilamarchandblogs.com/2020/05/covid-19-its-impact-on-the-telecommunications-sector-in-india/
25. Gewin, V.: Five tips for moving teaching online as COVID-19 takes hold. Nature. 580(7802), 295–296 (2020). https://doi.org/10.1038/d41586-020-00896-7
26. THE. Will the coronavirus make online education go viral? (2020). https://www.timeshighereducation.com/features/will-coronavirus-make-online-education-go-viral. Accessed 24 May 2020
27. THE. Educating despite the COVID-19 outbreak: lessons from Singapore (2020). https://www.timeshighereducation.com/blog/educating-despite-covid-19-outbreak-lessons-singapore. Accessed 20 May 2020
28. https://www.weareteachers.com/free-online-learning-resources/
29. Shock, fear, and fatalism: as coronavirus prompts colleges to close, students grapple with uncertainty (2020). https://www.chronicle.com/article/Shock-FearFatalism-As/248240. Accessed 12 Mar 2020
30. Timmis, S., Broadfoot, P., Sutherland, R., Oldfield, A.: Rethinking assessment in a digital age: opportunities, challenges and risks. Br. Educ. Res. J. 42, 454–476 (2016). https://doi.org/10.1002/berj.3215
31. Raalheim, A., Mathiassen, K., Moen, V., Lona, I., Gynnilv, V., Bunes, B.R., Hasle, E.T.: Digital assessment—how does it challenge local practices and national law? A Norwegian case study. Eur. J. High. Educ. 9, 219–231 (2019). https://doi.org/10.1080/21568235.2018.1541420
32. Kearns, L.R.: Student assessment in online learning: challenges and effective practices. MERLOT J. Online Learn. Teach. 8(3), 198–208 (2012) https://jolt.merlot.org/vol8no3/kearns_0912.pdf. Accessed 9 Mar 2020
33. Cheating in the digital age: do students cheat more in online courses? (2010). https://www.westga.edu/~distance/ijdl/aug13/watson13.html. Accessed 9 Mar 2020
34. Alruwais, N., Wills, G., Wald, M.: Advantages and challenges of using eAssessment. Int. J. Inf. Educ. Technol. 8, 34–37 (2018). https://doi.org/10.18178/ijiet.2018.8.1.1008
35. https://www.khanacademy.org/
36. https://youtu.be/aaY9IkHHay8
37. https://www.microsoft.com/en-in/microsoft-365/microsoft-teams/group-chat-software
38. https://support.zoom.us/hc/en-us/articles/360029527911
39. https://support.skype.com/en/faq/FA10613/how-do-i-make-a-call-in-skype
40. https://www.youtube.com/watch?v=GbrcML_TLy8
41. https://www.youtube.com/watch?v=M6L-nZGIUTE&feature=emb_rel_end
42. https://elearningindustry.com/mobile-based-education-apps-transforming-industry
43. Harvard University. Coronavirus (COVID-19) (2020). https://www.harvard.edu/coronavirus. Accessed 28 May 2020
44. Kawano, S., Kakehashi, M.: Substantial impact of school closure on the transmission dynamics during the pandemic flu H1N1-2009 in Oita, Japan. PLoS One. 10, e0144839 (2015). https://doi.org/10.1371/journal.pone.0144839
45. Coronavirus COVID-19 global cases by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU) (2020). https://coronavirus.jhu.edu/map.html. Accessed 20 Mar 2020
46. Khachfe, H.H., Chahrour, M.A., Sammouri, J., Salhab, H.A., Eldeen Makki, B., Fares, M.Y.: An epidemiological study on COVID-19: a rapidly spreading disease. Cureus. 12, e7313 (2020). https://doi.org/10.7759/cureus.7313
47. Remuzzi, A., & Remuzzi, G., “COVID-19 and Italy: what next?,” The Lancet (2020)
48. Coronavirus COVID-19—latest update on Kingston University’s response (2020). https://www.kingston.ac.uk/news/article/2306/27-mar-2020-coronavirus-covid19-latest-update-on-kingston-universitys-re. Accessed 27 Mar 2020
49. Bedford, J., Enria, D., Giesecke, J., Heymann, D.L., Ihekweazu, C., Kobinger, G., Lane, H.C., Memish, Z., Oh, M.D., Schuchat, A., Ungchusak, K.: COVID-19: towards controlling of a pandemic. The Lancet. 395(10229), 1015–1018 (2020)
50. https://analyticsindiamag.com/adoption-of-e-learning-during-crises-lockdowns/
51. Al-Rabiaahab, A., Temsahabc, M.H., Al-Eyadhy, A.A., et al.: Middle East Respiratory Syndrome-CoV (MERS-CoV) associated stress among medical students at a university teaching hospital in Saudi Arabia. J. Infect. Public Health. 13(5), 687–691 (2020). https://doi.org/10.1016/j.jiph.2020.01.005