

Challenges and Solutions to Teaching during Pandemic in India

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ABSTRACT

With the outbreak of pandemic in India during the *Shishir Ritu* (March) of 2020, the educators and students' community faced a challenging task to communicate. The science teachers were affected as experimental learning and hands-on training, which being the backbone of scientific teaching, was completely halted. Educators were deficient in propaedeutic curriculum understanding (PCU) of online teaching-learning module. Educational institutions were quick to adopt the online ways of teaching using the online interactive tools, but science teachers had to take an extra step as they were to demonstrate practical's in ways that the student can learn as if they themselves are conducting it. These challenges gave teachers new ways to explore and communicate. In this paper, we discuss about the challenges faced by education community and the solutions they devised to solve the challenges. Also, we propose some solutions that governments should consider as part of their policymaking.

Keywords: COVID-19, Education, Teaching, Methodology, Digital Learning

1. Introduction

On *Shukla Paksha Purnima* i.e. 10th January 2020, a worldwide alarm was raised by WHO due to the crisis situation created by the outbreak of Coronavirus from the city of Wuhan, China. Within a span of one month, the disaster unfolded in each country across the globe. The month of March, saw an

emergency lockdown orders issued in each city of India. The nation stopped abruptly and completely. Universities and schools were closed with immediate effect, with a directive to start adopting and exploring online teaching methods. Science educators at all levels were in a dilemma on the methods to be used being online as science is best learnt with hands-on experimental methods (Akerson VL & Carter IS 2021). In a huge nation like India, this online teaching was yet to make a foothold and the pandemic crisis created a staggering requirement for online resources, technical platforms, and distance learning modules. The educators and learners suddenly found themselves in front of laptops, computers, and smart devices to teach and attend classes innovatively.

As per the UNESCO'S report of Global Monitoring of School closures caused by COVID 19 for India, the total affected learners stand at a whopping 29,81,45,295. The most affected learners, approximately 44.95 percent, were those who are in Secondary classes, followed by primary school goes (40.81 percent) and Pre-primary students with an affected of 14.22 percent (*UNESCO report, 2022*).

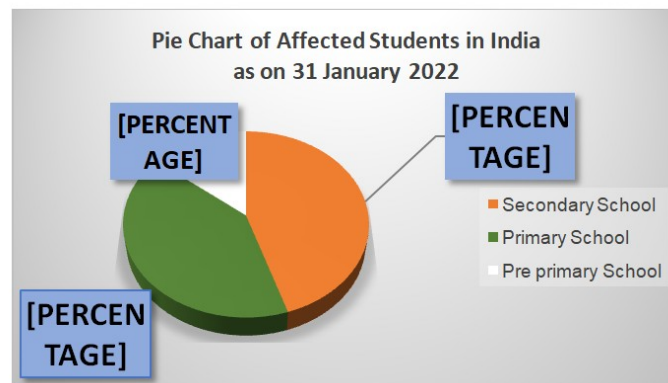


Figure 1: Pie chart of affected students in India as on 31 January 2022
(*UNESCO report, 2022*)

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Science teaching during the pandemic can best be described using the pattern of emergency remote teaching (ERT) that is an online method of teaching of subjects that should have been

taught in physical mode and will return to its old pattern once the emergency crisis gets over (*Hodges et. al. 2020*). The scenario in India started by adopting basic online teaching methodologies available at that time like Microsoft Teams, Google Meet or Classroom, Zoom platforms to organize theory classes and webinars (*Sheikh, T et. al. 2026*). Universities, colleges and schools immediately created their presence on social platforms like Facebook, Twitter, Instagram and Koo to communicate their messages to their students and teachers. Science teachers started creating online resources as write-ups, videos, audio talks, animations, and other ways to effectively support their online lectures. Government of India also came into action by making Open Educational Resources (OER) freely available for teaching and research activities. The National Knowledge Commission of India has proposed an increase in OER's to keep up with the increasing requirement of online teaching resources (*Mishra, S, 2025*). Prominent Indian institutions supported the government endeavours by creating sources like National Digital Library (NDLI), Shodhganga, NPTEL, Project OSCAR to name a few.

2 Challenges posed due to abrupt pandemic

2.1 Educator specific difficulties

The pandemic completely transformed methodology for teachers who were in the habit of face-to- physical teaching in India. The adoption of online teaching with use of technology platforms was like a bouncer to them. Many of them had never used these platforms and did not know their usage, especially with the faculties who were not so well versed with use of digital systems. Senior educators found it extremely difficult to manage these new app-based techniques of teaching. Teachers were used to physically writing and explaining concepts on whiteboards during the classes. They faced an unpleasant situation during verbally teaching many concepts like deriving equations, reaction mechanisms. There were no devices available in the initial days which could provide them the solution of a whiteboard.

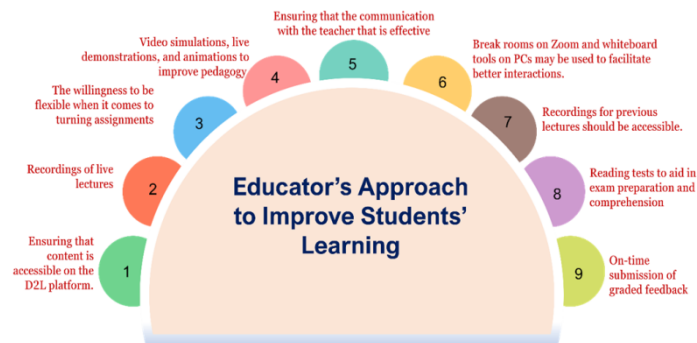


Figure 1: Educator's approach to improve students learning

The situation was pounded extremely with regards to experimental practical classes, with teachers also locked at home, they found it difficult to explain the practical lessons. Experimentation involves giving a challenge in the form of an experiment to solve and find answers by hands on training. These hands-on practical activities tend to motivate student and attract them towards better understanding of the subject (*Millar R, 2004*).

Another challenge faced by teachers was to successfully engage the children during the class. With cameras off and network stability a major issue, the virtual teaching-learning environment during the classes was full of interruptions. Many a times, teachers had to repeat the same points many times as the students facing unstable network were unable to grasp the topic.

2.2 Student specific difficulties

Students had a roller coaster ride during the pandemic days. Stuck between schoolteachers and parents at home, they had to pay double attention to work. It was indeed difficult for many of them to grasp the basics by listening to the subjects only verbally in the new virtual learning environment. Attendance being mandatory, they found it very disturbing psychologically when the internet used to get unstable during the attendance routine by class teacher. It was challenging to focus constantly during the class by just staring at the screens of electronic devices. Long hours took its toll on their eyes and backbone ache becoming a common feature.

With online classes came online examination also in various formats. Each organization tried new methods for the ease of conduct for the authorities as well as for student and constantly maintaining the quality standard of examination. Taking an example, the University of Delhi, India conducted Open Book Examination (OBE) for its students. On the first thought, it looks easy, but the way lockdown was abruptly introduced, students were stuck at homes with no books or note or any study material. Internet stability was once again a major issue, as the files for uploading on university serves used to take a long time and many a times, students missing the allotted time to upload their answer sheets. These types of situations were psychologically very taxing for students especially when giving examinations.

2.3 Technological challenges

As mentioned previously, the experimental laboratory classes in this online learning mode was one of the biggest challenge for both students and teachers. The implementation required proper broadcast arrangements, availability of apparatus, chemicals, and safety precautions, none of them being available to science educators at their homes. Digital inequality was highly prevalent in Indian homes, some of them having high end multiple devices whereas others not having even a single smart device. Cities could still manage teaching to some extent, but the situation was pathetic in villages and remote areas. These remote areas didn't have proper telephone signals leave aside internet signals and these situations created emotional and physical problems to students.

Various online teaching platforms were also not ready and did not have updated features which were required for online teaching. Although later the technological problem was solved due to government's initiative, but the initial months created difficult situations for students and teachers (*König J et. al. 2020*).

3 Solutions devised and suggestions to policymakers

3.1 Open Educational Resources (OER's)

UNESCO in its meeting "Forum on the Impact of Open Courseware for Higher Education in Developing Countries",

Paris, 2002, coined the term OER's and defined it as "technology enabled, open provision of educational resources for consultation use and adaptation by the community of the users for non – commercial purposes". [6] These resources are digital in format, available freely and open for students, teachers, and researchers. OER's can be freely used and reused for non-commercial educational purposes and do not require any permission. During the pandemic, Government of India realised the importance of OER's in improving the quality of online teaching and as the best source of providing study material to the academic community. In collaboration with many eminent institutions and organizations, many websites and portals have been established.

One of the prominent sites established by the government is National Digital Library of India, an initiative of IIT Kharagpur which provides access to digital articles, texts, audio, videos, simulations, and lectures. The site is available in 10 Indian languages and contains many rare books, newspapers, eminent articles, and publications. Similarly, IIT Mumbai has launched Project OSCAR (Open-Source Courseware Animations Repository), a repository of interactive simulations, animations, 3D models and pictures. Use of animation has proved very helpful to teach science concepts and practical lessons. IIT Kanpur has launched, Agropedia-online repository for catering to data related to Indian agriculture. They contain several local contents and models in multiple Indian languages for different type of users. It can be termed as Indian Agriculture Wikipedia and is immensely helpful for Agri students and farmers too.

On Teacher's Day, 5th September 2017, Ministry of Education, Government of India launched the digital DIKSHA portal for school level education. DIKSHA stands for Digital Infrastructure for Knowledge Sharing and is also supported by NCERT. It is a unified infrastructure containing textbooks, multiple Indian language academic content and teacher-training professional modules. As of June 2026, the total number of registered users is a whopping 2.25 crore with nearly 4 lakh average active users. If we get into the details, the numbers are impressive and show the success level of the program. According to DIKSHA website (*DIKSHA website, 2026*), the learning lessons figure stand at nearly 573 crores and the total

DIKSHA usage minutes is 6683.3 crores (as of June 2026). It supports study of courses in 128 Indian languages and 7 major foreign languages. Portals like these have supported skill digital learning in even remote areas of the country.

Another important digital initiative undertaken by Government of India is the SWAYAM PRABHA portal, through the use of Direct-to-Home (DTH) television Channels. Using the GSAT-15 Indian satellite, it broadcasts 40 channels delivering more than one lakh academic titles. These channels run 24 hours, all 7 days a week, delivering quality higher education for postgraduate and undergraduate students, school students from class one to Senior Secondary board. (Brochure, SWAYAM PRABHA 2026)

Some other similar sites are

- SWAYAM Online Courses
- UGC MOOC's: A vertical of SWAYAM
- e-PG Pathshala: initiative of the MHRD under National Mission on Education using ICT (NME-ICT).
- Consortium for Educational Communication (CEC)
- Shodhganga
- e-Shodh Sindhu
- Vidwan etc

3.2 Schedule and structuring

Another step was considered by many research institutions is allowing the faculties and students to schedule their talks and sessions according to the ease of participants. Since faculties and students were present at their homes and facing unprecedented situations, this ease of attending classes was a major advantage to all. This solved a big challenge of time management in distance online learning.

Educational institutions should now regularly organize digital learning periods, hands-on training activities for staff as well as students to update their skills and make them aware about the new technologies gaining ground in the field of ways of teaching.

The institution website should be active and updated every few hours with easy access to assignments, tools, worksheets, FAQs, mass messaging options to share updates. Student, teacher and parents' feedback should be mandatory and taken at regular intervals to improve logistics and basic functioning of online teaching.

3.3 Improving digital inequality

In this pandemic situation, when both the parents were at home and attending to their jobs through online medium so on an average of a family of four needed at least one device per member. This was a peculiar situation since many well-off families were also not prepared and did not have all the facilities. As mentioned earlier, the problem of lack of devices in various Indian homes and in particular villages and small remote towns needs governments direct intervention. Maintaining a digital equality for every child is very important i.e., at least one device be present at one home for a student to attend their classes and participate in activities.

Government should draft a policy that ensures that every school going child gets a smart device to study as part of their learning kit. The devices should contain pre-loaded all schemes, websites and apps created for students and educators to help them in learning.

There is now an ever-urgent need of a large area Wi-Fi facility equivalent to the size of a colony or a residential area. Students and parents must shell out good amount of money to recharge the phones as Indian telecom companies are presently giving an average of 1GB per day. This limitation of data pack was a big hurdle as 1GB used to get consumed within few hours of online teaching using video, leaving no space for further study, and preparing study material using online resources. Infrastructure should be placed with government initiative that Wi-Fi reaches every household, be it poor or rich. Digital connect is the need of hour for online teaching. Large Wi-Fi transmitters with maximum reach be made available free to students and teachers.

3.4 Encouragement

Another important aspect to be considered as a solution to better online learning is the encouraging environment at home and teachers sitting online. A positive attitude reflected in the improved performance of students and keeps them motivated nowadays when educational institutions are closed (*Pellegrino et. al. 2012*).

Teachers and educators have started giving extra attention to personality development skills of students and help them in improving their confidence. It has been observed that many students, who were shy in coming to stage to give a speech, were confident when speaking in front of cameras since they were at home environment. Gradually these students exhibited exceptional improvement in presenting skills that they started participating and representing their institutions. These all-positive outcomes culminated into a positive outcome in their examination results. These attitude and behavioural skills of humans are changeable according to the situations in environment and the present pandemic made the human generation adopt to a new world order (*Arandas, M.F. et. al. 2024; Kautz et. al. 2014*)

Emotional and moral support in various forms work as an incentive and can be incorporated effectively in education system, generally and gains particular importance in special circumstances like the current pandemic. Therefore, it becomes imperative for educators and parents to adopt the most appropriate support feature for their child to work in this futuristic digital learning environment.

4 Conclusion

Educators and governments should on priority draft regulations and responses with specificity to help continue online learning technology. Online learning will be part of new world order and is here to stay. Using the ICT tools in learning tend to benefit the students strongly as they can understand concepts and designs graphically in a much clearer manner than a blackboard version.

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