

# A Scrutiny On Aftermaths Of Covid – 19 On Scientific Teaching And Learning With Potential Reforming Strategies

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## **Abstract**

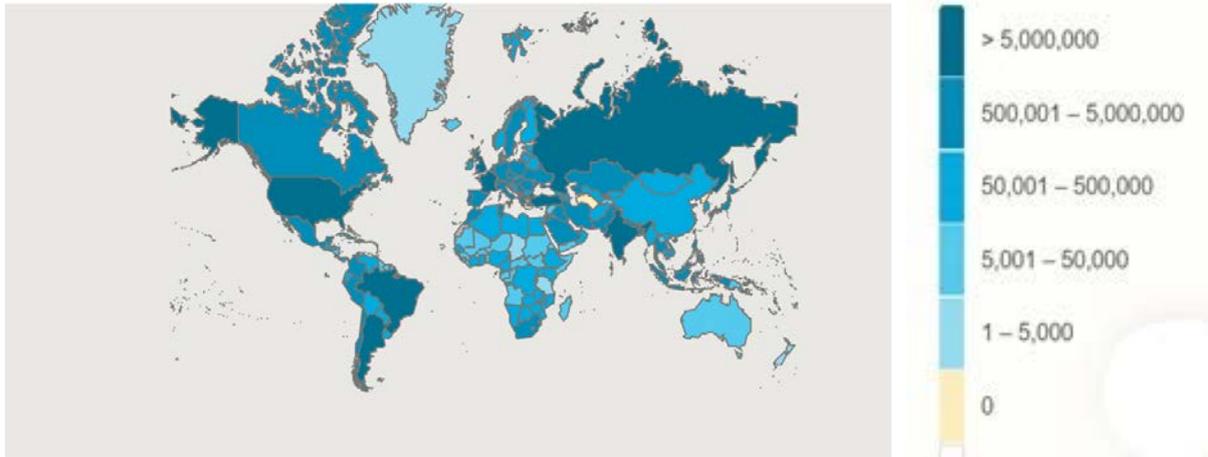
The worldwide outbreak of Corona Virus Disease in late 2019 (COVID - 19) has affected every single aspect globally as well as of human life. We have imbibed far-reaching changes due to this. The largest disordering has been experienced by the education sector due to the pandemic where approximately 1.64 billion students of more than 200 countries were affected. Universities, Schools, Educational hubs, Libraries, Institutions, etc. were brought to a stand-still due to Lockdown hitting more than 95% of global student population. The government has imposed various restrictions on movement and imposed Social Distancing thereby disturbing the traditional educational culture. Although after rigorous vaccination drives, reopening of educational sector has been allowed but with SOP (Standard Operating Procedures) which is another challenge.

Due to COVID-19 pandemic, various educational institutes have discontinued physical and interactive teaching. There was a bigger issue with the practical subjects. The present-day requirement is to evolve and devise alternate educational system and evaluation strategies. Introduction of digital teaching-learning mechanism came as an opportunity during the pandemic. The study focuses at providing an exhaustive record on the impact of COVID-19 pandemic on education and proposes a way forward.

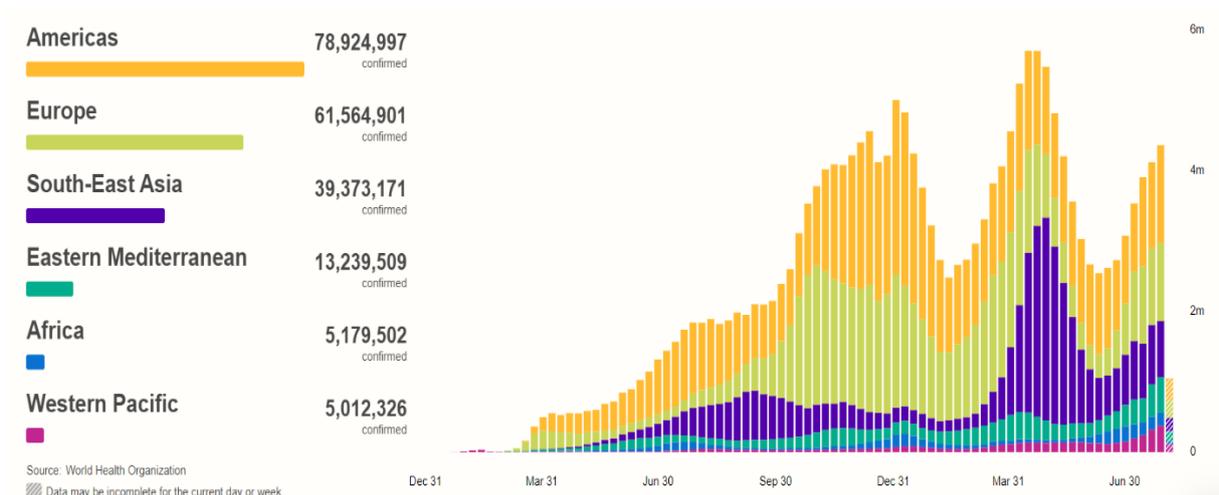
**KEYWORDS:** Outbreak, COVID – 19, pandemic, Lockdown, Teaching, hub, Social Distancing, SOP.

## **1. Introduction**

Since December, 2019, coronavirus has been the most talked about topic due to the amount of loss it has brought about. It was first reported in Wuhan, China where it was said to spread from a seafood market. World Health Organization declared it a global pandemic in a few weeks<sup>1</sup>. The governments of all the countries advised people to take various precautions as handwashing, social distancing, using face mask and avoiding gathering and assemblies. Implementation of lockdown and encouraging confinement at home became the need of the hour to reduce the transmission of disease<sup>2</sup>.



**Figure 1** - Geographic distribution progressive number of reported COVID-19 cases, as of August 11, 2021 (Data source: WHO, 2021).



**Figure 2** - Graphical Representation of Number of COVID-19 cases reported country-wise, and total deaths, from December 30, 2019 up to August 09, 2021 (Data source: WHO, 2021).

Nationwide lockdown was implemented in many countries in 2020. Accordingly, divisions like travel and communication, tourism and hospitality, trade and commerce, construction and many more, experienced a complete handicap<sup>3, 21</sup>. In the same way, education sector also came to a stand-still. The pedagogues across the world are trying to figure out alternate methods of teaching and learning<sup>4, 15</sup>. During these pressing times, the educational bodies and governments have realised the importance of digital modes of teaching and learning<sup>5, 22</sup>. This scrutiny assesses the output of the pandemic on scientific teaching and learning process throughout the world. The provocations and chances of online and continuing education during the COVID-19 pandemic has been encapsulated and potential strategies for improvement have been suggested.

## 2. METHODOLOGY

The methodology adopted for the conduct of this study is by the review of available literature through online medium. Various case studies and information catered by various government and non-government organizations in the form of reports available on their official websites were also considered. The collection of literature on science was done through electronic means from the database of Science Direct, Springer, PubMed, Sage, Taylor and Francis, ISI Web of Knowledge, Research Gate, and Google Scholar. Hence, this study compiles the data of various studies and puts forth data along with the information pertaining to the aftermath of COVID – 19 on scientific teaching and learning.

## 3. COMMANDMENTS FOR SCIENTIFIC EDUCATION IN ONLINE MODE

The schools as well as higher educational institutions have been closed due to lockdown during COVID-19 in many countries. Since regular classes came to a halt, hence educational delivery was sought using various online mediums. The educators were not prepared for this emergency education technique which came as the only alternative available. The transition from the traditional physically interactive teaching-learning method to online teaching-learning was without preparation.

As the higher education centre and schools were closed during the pandemic, E-learning gave a good platform to enable learning of students<sup>6, 23</sup>. There are many educators and learners who have a set pattern of following only face-to-face methodology, however there are others who are eager to adapt the new proposed environment of online teaching and learning. Along with the variety in educators and learners, there are also varying needs of different subjects<sup>7, 16</sup>. The students with physical disability can participate freely in online classes and also their limited movement can be taken care in virtual environment<sup>8, 14</sup>.

The pandemic has imposed a lot of stress on everybody and this has taken a huge toll on students who are experiencing psychological and emotional distress thus resulting in loss of productivity<sup>9</sup>. The familiarity of teachers and students to the ICT (Information & Communication Technology) tools is an important aspect for online scientific education. Various applications like Microsoft Teams, Google Classroom, Canvas and Blackboard, have been quite helpful for online teaching and learning. The fictional classroom podiums like video-conferencing (Google Hangouts Meet, Zoom, Slack, Cisco, WebEx) and tailored cloud-based learning administration podiums such as Elias, Moodle and Skype are growingly being used. These are effective ways of invigorating skills such as solution approach, creative thinking and self-paced learning. They also keep a track on learning of student and computation by using rubric-based evaluation of presented assignments<sup>9</sup>.

## 4. DIFFICULTIES IN SCIENTIFIC TEACHING & LEARNING IN ONLINE MODE

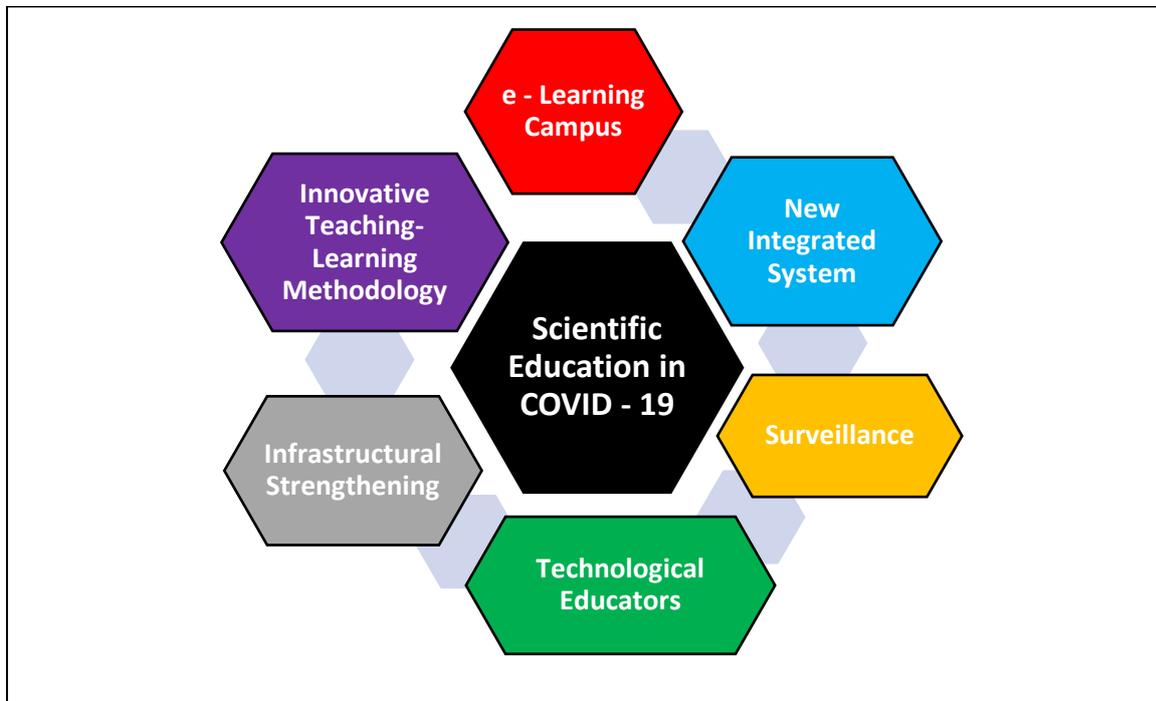
Electronic learning has various identified challenges as: Education Policy of Government, Long-term Learning, Teaching-Learning Didactics, Resilience, Affability and Accessibility<sup>10, 11</sup>. The financially weak children face crisis in digital devices and high-speed internet connection. There is also risk of high exposure to screen time for both teacher as well as

learner. Now the new concept of home-schooling has made parental guidance a very important aspect for learner.

The prompt and driven learners are in slight need of supervision and guidance but the weak and liable students experience difficulty in online mode. Since the COVID times, there has been lesser to negligible face-to-face consultation of students with teachers, hence the academic performance of the students has dropped during examinations<sup>12, 19</sup>. However, in the uncertain situation, the examinations ought to be conducted online but the schools need to adopt a policy for checking plagiarism. School exams could be conducted somehow, but many competitive exams got postponed or rescheduled. The complete system of education in schools, colleges and universities across the country has been severely influenced due to the proceeding situation.

Along with being a centre for imparting knowledge, School is a hub of developing social and soft skills among students while having fun. Thus, keeping away of the normal schedule of school, mars students psychologically. Additionally, virtual platforms are exposed to online exploitation, violent content, cyberbullying, etc. Closing of Schools and steps of containment measures have forced parents to take refuge of technology and digital solutions for the engagement of students for connection to surroundings, learning and entertainment but many children are devoid of the imperative knowledge, expertise and resources to keep themselves safe online.

## 5. OPPORTUNITIES FOR SCIENTIFIC TEACHING & LEARNING IN COVID TIMES



There have been numerous challenges in scientific teaching-learning during COVID times, yet the opportunities created by the pandemic, which came as a need of the hour, cannot be ignored. The implementation of e-learning system and the strong bonding between parents and educators for the best interest of learner could be seen best during this period only. For uninterrupted education, virtual mediums and networking media groups were explored for the

first time. They can be kept active even when physical-interactive-centre learning resumes. There is active alliance among teachers at every level to ameliorate virtual teaching. There are unparalleled opportunities for coordination, out-of-the-box solutions and eagerness in learning from others and try new tools as educators, parents and students share alike experiences<sup>13, 17, 18</sup>. There have been various tools offered by educational organizations as solutions in support to synergic and engrossing environment. There is immense opportunity of teaching and learning through inventive ways as compared to the traditional classroom setting<sup>20, 24</sup>.

## 6. REFORMING STRATEGIES

Amidst the challenges and opportunities, there are core recommendations for the future.

**A.** The students, who lag behind in achieving learning targets due to COVID situation, should be provided a structured learning recovery programme. Firstly, an in-time assessment should be conducted to identify the amount of support needed; then individual as well as group remedial target-oriented support should be imparted. Finally, regular monitoring should be planned to understand the amount of improvement being brought about in removing the learning gap.

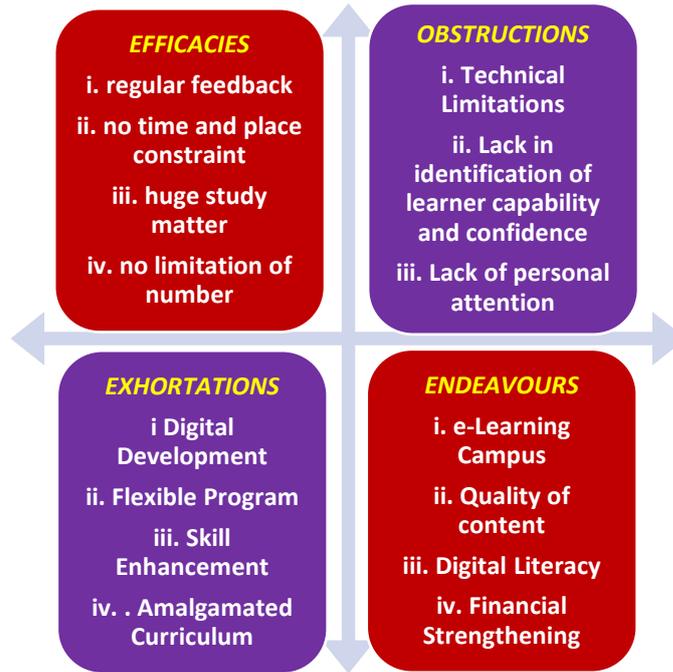
**B.** For a consistent and sustained recovery of education sector, financial support is a need of the hour. The protection of educational budget is very essential. The funds need to be diverted to remote areas where high-poverty and high-minority population resides. Educational boost-up incentives have to be implemented to bring back the lot to educational centres.

**C.** Strengthening the educational system at all levels for any and every future situation is extremely imperative. An amalgamated education model should be built for the future to address lucid flow of education in tough times. The education sector should be prepared to easily switch between online and offline teaching-learning situations such as pandemic, natural disasters or adverse weather conditions. Teaching-learning should have an individualistic approach in designing of curriculum. Educators have to be better equipped in digital terms.

An education system for the future is the need of the hour, which can optimally use the amalgamated model for learning to reach all the students at their level and to instil better personalised teaching techniques.

## 7. CONCLUSION

The proceeding study on output of covid – 19 pandemic on scientific teaching and learning culminates that relevant methodology and medium for education of science at various levels need to be explored. The strengthening of digital infrastructure focussing on accessibility and affordability is the utmost requirement. Designing of a suitable policy will bring uniformity in overall scientific education. Development of veritable assessment and valid feedback should also be an area of study.



Information and Communication Technology (ICT) should be a considered while framing an effective methodology of the education system. There should be focus on making online teaching imaginative, inventive and bilateral through user-friendly tools. The educators as well as seekers of knowledge should be ready to use various online teaching-learning tools and on resuming offline mode, they should be invigorated to pursue online tools for the same.

It is necessary to understand that planning is the key to come out victorious of any and every crisis. Hence, we should have a concrete core plan for everything and a backup plan ready, in case the main plan fails. This can be achieved by schematic planning whereby all analytical and demanding situations are prioritized and planned appropriately. The students should be encouraged to develop expertise of problem-solving, analytical thinking, and mainly adjustability to survive the crisis. The presence of these attributes in their students must be ensured and prioritized by educational institutions by building pliability in their system.

### DECLARATION OF CONFLICTING INTERESTS

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