# COVID-19 Triggered Transformation in Teaching-Learning Pedagogies: An Opportunity to Innovate Education

**Manjit Kaur[1], Rupinder Preet Kaur*[2]**

[1]Department of Political Science, Guru Nanak Dev University College Verka, Amritsar, Punjab, India. Email: manjit.k19@gmail.com
[2]Department of Chemistry, Guru Nanak Dev University College Verka, Amritsar, Punjab, India. Email: rupinder_chemverka@gndu.ac.in

Corresponding Author: Rupinder Preet Kaur, Email: rupinder_chemverka@gndu.ac.in

**Abstract:** Digital mode of education in the post-humanist society holds huge prospects but at the same timeit poses myriad challenges.The Covid-crisis has initiated fundamental transformation in the pedagogy of Sciences and Social Sciences. These changes have become essential and inevitable in the post-pandemic era also. It is widely accepted that the future will befor the blended mode of education. The major challenges forthe developing world would be to gear up their academic institutions and train the educators to use as well as devise their teaching programme using innovative software.

**Keywords:**Higher education, pedagogy, teaching-learning, Covid-19, e-learning, Online teaching.

## Introduction:

Education is a vital index in the developmental parameters of a nation. Developing countries like India still facehuge challenge in improving its ranking in this sphere. Digital platform emerged as an attractive option due to its capability to reach out to a wider section. It is cost effective as expenditure on building physical infrastructure to cater to the demands of education for a large population is larger than investing on digital infrastructure (Rashid et al. 2021).But the developing world encounters with the problems of technology gap and socio-economic disparities that leads to digital exclusion. Notwithstanding this, in order to fill the digital divide and provide "access, equity and quality" in education, the government of India has been taking various initiatives in terms of launching various platforms for MOOCs.Amidst such efforts the Covid pandemic provided a fillip to the digital mode of education. It forced people in a physical and psycho-social environment where the latter emerged as a sole viable option (Das et al. 2021). Even the teachers and students who had never explored the online option had to learn to operate on this turf and take resort to it for their routine teaching and learning process (Rafi et al. 2020).

The Covid-19 pandemic has produced unparalleled upheaval and the following economic and social measures have resulted in tremendous transformation(Krishnamurthy, 2020). During the pandemic, the government imposed social isolation, lockdown, and a halt to activities

outside the home, causing the pandemic to have a huge impact on education system from elementary to higher education levels. Numerous institutions, universities, and colleges discontinued face-to-face education.Within a few weeks, the system had to switch to an online learning mode (Mishra et al. 2020). The sudden forced closureof face-to-face teaching has led academics and students into "unfamiliar terrain" due to theneed to adapt swiftly to total e-learning settings (Carolan et al., 2020).This closure boosted the rise of online educational activities, ensuring that education would not be disrupted.Many faculties have been involved in how to effectively provide online course materials, engage students, and conduct assessments.

This crisis made institutions to adopt new technology i.e. online e-learning. Online e-learning is described as learning experiences using various electronic devices (e.g.computers, laptops, smartphones, etc.) with internet availability in synchronous or asynchronousenvironmental conditions (Singh et al 2019). This triggered transformation in teaching and learning pedagogies in the fields of science as well as social science (Dwivedi et al. 2020). In literary sense a post humanist era was inaugurated in which there was a paradigm shift from human-centric to technology-based pedagogy (Garcia-Morales et al. 2021). Assuming that the increased role of technology is irreversible even in post-pandemic era, this paper attempts to explore the pedagogical changes in Science and Social Science in higher education in India in general and Punjab in particular, during and after Covid crisis.

**Pedagogy Changes in Science and Social Science:**

Pedagogy can be simply defined as the method and practice of teaching. The teacher uses different and innovative ways to plan and deliver their content depending upon their experience, context of teaching, level of students, and availability of infrastructure. Teaching pedagogy has been constantly evolving with time. Its three major components, namely,Teaching styles, Teaching Theory, and Feedback & Assessment, have undergone a major makeover with the increasing use of ICT tools in teaching.The commonly used teaching pedagogies include lectures, worked examples, interactive learning, spaced learning, flipped classrooms, Socratic questioning, discussion-based learning, case-based learning, collaborative learning, Enquiry-based learning, Problem-based learning, project-based learning, self-based learning, game-based learning or gamification (Kaur et al., 2021).

In the recent past, there has been a gradual transition in the teaching and learning process from physical classrooms to virtual environments. Initiated by computer-aided teaching, digitization of education has led to a revolution where students across the globe can access quality education through online MOOCs (Massive Open Online Courses) developed by masters in their respective fields, thereby opening a world of new opportunities for the learners. The government of India in collaboration with the Department of Education and Ministry of Human Resources has launched a nationwide online learning programme referred to as NMEICT, that is, National Mission on Education through Information and Communication Technology. In this e-learning programme, the government has taken various initiatives. The initiatives are listed in the Table1.

Online e-learning became a platform that makes the process of education more student-centered, creative, and flexible (Singh et al. 2019). Online delivery of courses is cost-effective and easily accessible especially when delivering curriculum to students in rural and remote areas. This revolution in online teaching further proved as a gift to combat the impact of COVID-19 in the education sector and enable students to achieve their educational goals. The COVID-19 pandemic has further triggered the adoption of novel and diverse teaching pedagogies, particularly those based on the internet and information technology to make teaching interesting as well as fruitful even during stressful conditions. Colleges and schools had implemented numerous creative strategies to combat the crisis, using various software/apps such as Google Classroom, Zoom, and Microsoft Teams to take online courses not only to teach courses but also remain in touch with the students and their evaluation. It changed the traditional teacher centric approach to student centric model (Zalat et al. 2021). Table 2 lists some of the commonly used innovative resources in teaching and learning by educators and students.

**Table1:** Different e-learning programme initiatives taken by government in India.

| **S. No.** | **E-Learning Programme** | **URL** | **Description** |
|---|---|---|---|
| **1** | Swayam | https://swayam.gov.in/ | Offers courses to students of 9$^{th}$ standard and above in all subjects. |
| **2** | SwayamPrabha | https://www.swayamprabha.gov.in/ | 30 scholastic channels on television through digital satellite services (DTH) to provide e-learning to secluded regions |
| **3** | National Digital Library (NDL) | https://ndl.iitkgp.ac.in/ | Online library with more than three crore electronic data sources |
| **4** | Spoken Tutorial | https://spoken-tutorial.org/?trk=profile_certification_title/ | offers ten minutes audio-video tutorial to enhance the skills of learners |
| **5** | Free and open-source software for education (FOSSEE) | https://fossee.in/about/ | It provides free and open access to various programmes and software |

| | | | |
|---|---|---|---|
| **6** | Virtual Lab | https://www.vlab.co.in/ | An advanced online technology to conduct experiments, simulations in a virtual environment i.e. online in the artificial environment but get bonafide outcomes in the field of engineering, computer science, biotechnology, physical and chemical sciences, etc. |
| **7** | E-Yantra | https://www.e-yantra.org/ | By MHRD in collaboration with IIT Bombay for the development of robotics in various fields like agriculture, industries, home, service sector, etc. for the support of human beings. |
| **8** | e-Pathshala | https://epathshala.nic.in/ | An online educational hub of resources in the form of e-textbooks, audios, videos, etc. |
| **9** | National Repository of Open Educational Resources (NROER) | https://nroer.gov.in/home/e-library/ | A nationwide open repository of educational resources in multiple languages in form of audios, videos etc. |
| **10** | Saransh | https://saransh.cbic.gov.in/ | To access the performance of students and improve that as well |

**Table2:** Innovative Resources for online teaching and learning:

| **S.No.** | **Resources** | **Application** |
|---|---|---|
| **1** | Dropbox | Stores file in secured and accessible manner. A way to share and edit files between mentor and mentee. |
| **2** | Class Dojo | Act as a communicative source between mentor, mentee and parents of mentee. |
| **3** | Edmodo | Teacher can post assignment, take quiz, create polls and is a link between teacher, mentee and parent |

| | | |
|---|---|---|
| **4** | Educreations | Platform for teachers to prepare audio and visual lectures. |
| **5** | TED Ed | To create and post videos by teacher and can be accessed by students. |
| **6** | Unplag | Can check the plagiarism between work submitted by mentees. |
| **7** | Teachmint | An app to take online classes, take online tests, share study material etc. |
| **8** | Kahoot | A game based learning platform to create, play and share quizs. |
| **9** | Zoom | App to take online classes. |
| **10** | Slack | Social media tool to assign group assignment to students. |
| **11** | Google Apps | To teach, give assignment, online tests, sharing data, regular assessment of student etc. |
| **12** | Remind | To remind students about important tasks |
| **13** | Edublogs | A webpage written by teacher, researcher, learner and can be assessed by student |
| **14** | Socrative | For online quiz and to access performance of mentees |
| **15** | MOODLE | Educators can prepare lessons. Students can access lessons, take MCQ and submit their work |
| **16** | Discord | A group chat app by which text, videos, audio, music etc. can be shared. |
| **17** | Schoology | App to post assignments, videos, projects, study material etc. |
| **18** | Animoto | An app to create video lectures and presentations. |

The future of higher education in post-COVID-19 circumstances, however, is not entirely bleak. Our post-pandemic pedagogy is altered across the higher education ecosystem. The most commonly predicted teaching pedagogy include:

1. Dramatic increase in blended learning mode
2. Online education will become strategic priority

One of the benefits of teaching an online course is flexibility.Practical courses in an online course are among the most difficult. Online laboratories (OLabs), whether remote or virtual is one of the promising innovation to enhance teaching and learning. These online laboratories help students to simulate scientific experiments while remote ones allow students to use real laboratory equipment from a distance through the Internet. The use of online laboratories requires only the internet but allows access to more experiments than a single college can provide to the teachers and students. The online laboratories should provide the benefits like lower-cost access, flexible access, and better learning. In this regard, an initiative was taken by Indian government, where CSIR (Council of Scientific and Industrial Research) launched Jigayasaprogramme. In this program, students are exposed to virtual labs developed by CSIR in collaboration with IIT Bombay, for science subjects. Another example of online

laboratories for upper secondary physics and mathematics subjects was developed by Amrita University in India (Damme et al. 2016).

Online courses attract learners because there is no need to be physically present as in conventionalset up of a classroom. Though, the lack of student-to-student contact in an online class will minimize their experience oflearning.While there is still a lot of uncertainty, it seems likely that even after the COVID-19 measurescurrently in place are lifted, the balance of face-to-face, blended and online learning at many universities and colleges willshift in the medium- if not long-term. Within online there are two distinct modes of learning i.e. synchronous and asynchronous. A judicious balance between the two can provide a platform which can motivate students to participate in the online activities at the same time or as per their convenience lateron. However, the educators should be "able to use technology; have skills to design and implement courses…; moderate, organize and archive asynchronous discussions; [and] establish ground rules".

**The challenges of online learning**

There are, however, challenges to overcome. Some students without reliable internet access and/or technology struggle to participate in digital learning; this gap is seen across countries and between income brackets within countries. For example, whilst 95% of students in Switzerland, Norway, and Austria have a computer to use for their schoolwork, only 34% in Indonesia do. The major challenge however, would be to cope up with the de-territorialising of the pedagogy by learning to operate and creating different software tools to support analysis, design, documentation, implementation and deployment of instruction via Web (2012: 48). For countries, like India problem begins from lack of space at the residence of both teachers and students to undergo the complex activity of teaching and learning from their homes (Manazir et al. 2020). They lack on-hand training in using different software as well as knowledge about which particular software to use for which particular aspect of a wide rangingpedagogy for different disciplines (García-Morales et al. 2021). Digital technology is an expansive arena that has to be constantly explored and requires regular updation. There is also an additional problem of developing digital infrastructure by various institutions. However, the academic world has to accept and live with these transformations that hold promise for many young students.

**Conflicts of interest/Competing interests:**

The authors have no relevant financial or non-financial interests to disclose.All authors contributed to the study conception and design equally.

**References:**

1. Carolan C., Davies C. L., Crookes P., McGhee S., Rox-Burgh, M.(2020). COVID 19: disruptive impacts and transformative opportunitiesin undergraduate nurse education. Nurse Educ. Pract. 46:102807.http://doi.org/10.1016/j.nepr.2020.102807

2. Das K., Paital B., (2021) Future call for policy making to speed up interdisciplinarity between natural and social sciences and humanities in countries such as India. Heliyon 7e06484.https://doi.org/10.1016/j.heliyon.2021.e06484
3. Dwivedi Y., Hughes L., Coombs C., Constantiou I., Duan Y., Edwards J., et al. (2020). Impact of COVID-19 pandemic on information management research and practice: Transforming education, work and life. Int. J. Inf.Manag. 55, 102211. http://doi.org/10.1016/j.ijinfomgt.2020.102211
4. García-Morales V. J., Garrido-Moreno A., Martín-Rojas R. (2021) The Transformation of Higher Education After the COVID Disruption: Emerging Challenges in an Online Learning Scenario. Front. Psychol. 12, 616059. http://doi.org10.3389/fpsyg.2021.616059
5. Kaur J., Singh H. (2021). Smart Learning Solutions for Combating COVID-19. Chp-8 pp 135-166 Kose, U., & Bhoi, A.K. Explainable Artificial Intelligence for Smart Cities (M. Lahby, Ed.) (1st ed.). CRC Press. https://doi.org/10.1201/9781003172772
6. Krishnamurthy, S. (2020). The future of business education: a commentary in the shadow of the Covid-19 pandemic. J. Bus. Res. 117, 1–5. http://doi.org10.1016/j.jbusres.2020.05.034
7. Manazir S.H., Rubina, Govind, M. (2020). E-Learning pedagogy in institute of higher education in India post lockdown due to COVID-19 pandemic. New Delhi: Digital Inclusion Research Forum.
8. Mishra, L., Gupta, T., and Shree, A. (2020). Online teaching-learning in higher education during lockdown period of COVID-19 pandemic. Int. J. Educ. Res.1, 100012. http://doi.org/10.1016/j.ijedro.2020.100012
9. Damme D.V., Linden R. OECD (2016), Innovating Education and Educating for Innovation: The Power of Digital Technologiesand Skills, OECD Publishing, Paris.http://dx.doi.org/10.1787/9789264265097-en
10. Rafi A.M., Varghese P.R., Kuttichira P. (2020) The Pedagogical Shift During COVID 19 Pandemic:Online Medical Education, Barriers and Perceptions inCentral Kerala. J. Medical Education andCurricular Development7, 1–4https://doi.org/10.1177/2382120520951795
11. Rashid A., Khan M. R., Yaseen R. (2021). The Traumatic Impact of Online Teaching of ELT in Universitiesof South Punjab due to MCO during COVID-19: The Post Humanist Paradigm for New Pedagogical Practices. GlobalEducational Studies Review, VI(I), 275-285. https://doi.org/10.31703/gesr.2021(VI-I).29
12. Singh V, Thurman A. (2019) How many ways can we define online learning? A systematic literature review ofdefinitions of online learning (1988–2018). Am J Distance Educ. 33(4), 289–306.https://doi.org/10.1080/08923647.2019.1663082
13. Zalat M. M., Hamed M. S., Bolbol S.A. (2021) The experiences, challenges, and Zalat M. M., Hamed M. S., Bolbol S.A. (2021) The experiences, challenges, and acceptance of elearning as a tool for teaching during the COVID-19 pandemic among university medical staff. PLoS ONE 16(3): e0248758. https://doi.org/10.1371/journal.pone.0248758