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Pandemic and Indian Education: Evolving Perspectives from Higher Education

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Abstract: The Indian Education sector has shown adaptive capabilities in delivering the teaching-learning processes online. The Adaptive-Structuration-Theory (AST) has been leaned upon to bridge the task-technology inputs, appropriation to tech-based-education output. The fundamental objective behind this paper is to investigate the impact of technology and novel pedagogies on the Education sector with the evolving perspectives in University Education in India. This qualitative primary study is based on a semi-structured questionnaire enabling in producing evidence-based actions to set the stage for a futuristic pedagogy development in the post Covid times. The paradigm shifts in *pedagogical approaches*, evolutionary *Hybrid mode of learning*, aspiring teachers to *orient* themselves, ease of resource sharing/*remote access* of Database would be surfacing even further in the near future of Learning environment.

Keywords: Task-Technology inputs, Hybrid learning, Adaptive Structuration Theory, Teaching Pedagogies Higher Education
JEL Classification: A23, I23, O32

1. Pandemic and Indian Higher Education: Evolving Perspective

The first Covid case surfaced on November 17, 2019. Since then, the rapid transmission of Covid pandemic initially from China to all over the world. This has wrought havoc on human lives and drastically changed the work systems. Governments across the globe were compelled to impose national lockdowns on almost all kinds of activities and movements. Due to the long spells of such lockdowns, the educational sector was affected too and had to scramble together resources in its endeavour of imparting education. UNESCO has stated in 2020, 320 million students in schools and colleges in India are impacted by the Pandemic. The Appendix Table A.1 given below provides classification and number of universities currently operating in India.

The Education sector in India has shown adaptive capabilities in transferring the teaching and learning processes online without any loss of Academic Year. According to the Ministry of Education (formerly Ministry of Human Resource Development) data, the total enrolment in Higher Education sector was approximately 37.4 million. The enrolment of male and female students comprises of 19.2 million and 18.2 (48.6%) million respectively.

As demonstrated in the Table A.1, out of the 993 universities, 394 universities are located in rural areas. For the Academic Year 2018-19, the total enrolment of students in higher education was nearly 37,399,388 (refer Appendix Table A.2), who had to resort to the digital mode owing to the pandemic. Out of the total number of students, 79.76 percent of the students are enrolled in undergraduate level programme which totals up to more than 29.82 million.

As revealed by Table A.2, some 29,920 candidates were enrolled in Ph.D. programmes while 239,356 students are enrolled in Integrated Ph.D. programmes, and 168,297 students were enrolled for M.Phil. This has been merely 0.45 percent of the total weightage. Around 4,042,874 students (i.e., 10.81% of the total enrolment) are associated with post-graduation, and there are some 224,396 students enrolled in PG diploma courses.

This puts into perspective why at the onset of the pandemic, there was a very critical task before the Government and institutions i.e. to prevent the loss of Academic Year for the existing 37,399,388 students of Higher Education. The nation-wide lockdown impelled a structural shift from conventional classrooms to virtual classrooms. This structural shift had many impediments - the preparedness for change over to online mode of instruction and examination mode was not yet tested, and

newer challenges were emerging very often. Furthermore, the student mass was spread all over the nation, with internet capacity being varied from place to place.

The fundamental objective behind this paper is to investigate the impact of technology and novel pedagogies on the Education sector towards the perpetuity in the academic curriculum. The purpose of the study is to explore and document the contextual issues and impediments of the Indian Higher Education sector as a result of the pandemic. The study is conducted on the Indian higher education sector and institutions to recommend the tech-based teaching methods for the post-pandemic times. The paper focuses on the main observations of the Higher Education sector's front-runners (administrative head, experienced faculty members, other staff member and certainly the students) with the urgent need to revisit the pedagogy. It is further aimed at understanding the implications of the policy interventions and actions undertaken in the Higher Education sector to counter the pandemic situation. Besides, the need and phase-wise evolution of hybrid mode of interaction has been analysed which has been propelled by the situations like never before. The study revolves around two research question:

What would be the impact of pandemic on the teaching learning process at higher education levels in the post Covid scenario?

How do the students, faculty members and administration address the issues and impediments of the New learning environment?

The paper is organized into six sections beginning with the Introduction. The second and third sections presents the Literature Review and explains the theoretical foundations respectively to focus on key research dimensions. The fourth section presents research methods followed towards achieving the objectives of the paper. The fifth section articulates the findings including evidence-based actions and outcomes. The sixth section presents the Conclusion, Policy Implications and develops the understanding of the evolving perspectives as futuristic agenda for research.

2. Review of literature

The scholarly Literatures have often referred to the online mode of teaching from three decades. However, there has been an upsurge in the hybrid mode of teaching in the recent years. However, initially digital mode of learning has been there but not in the mainstream. A tremendous prominence has been there in the pandemic times. Majorly a hybrid mode of learning (partially online and partially offline) has been observed. So, let's review the scholarly literature.

McCarthy, 2020 in a scholarly writing claimed that with 150 country-wide closures of educational institutions, there is a devastating impact on global education.¹⁾ As per

UNESCO report, over a billion students worldwide are unable to go to school or university, due to measures to curb the spread of COVID19 (UNESCO, 2020).²⁾ Moody's, 2020 has also shown the concern reporting the financial implications of the pandemic on higher education institutions around the world as they may not be able to recruit prospective students.³⁾ Universities in emerging countries including Africa are continually advancing towards providing a better-quality education that is meant to address the ills of the continent, this pandemic, therefore, presents a wakeup call for Universities to invest in their facilities and enhance student experiences.⁴⁾

There are apprehensions that the home Universities may terminate these cross-border agreements as they try to balance their books amid this pandemic. The University of Reading's Malaysia campus, which opened in 2016, made a £27 million loss in 2017-18 while Aberystwyth University has planned to close its Mauritius campus.⁵⁾ The pedagogy has been a 'contested' term with 'changing connotations and pressures'⁶⁾. It has been advocated that pedagogy is any conscious action by one person designed to enhance learning for another. It has been stated that interactive pedagogies as "fluid, dynamic, situation responsive, pragmatic and virtual" In such interactive pedagogies, it is a pre-requisite that students and teachers are both should act flexibly while interacting with one another⁷⁾. This has been considered as the cutting-edge solution to the impediments of productivity in a fast global pace. A study⁸⁾ has claimed that wherever there is high quality interaction and where a sense of engagement arises in a community of inquiry, the Hybrid learning is most effective. The e-learning driven approach facilitates the link between pedagogy and different learning systems being made by the practitioners⁹⁾. It is firmly believed that an improvement in students' achievements is possible by the use of technology in education. He further extended his research to conclude that it often enhances teaching-learning processes¹⁰⁾. A research¹¹⁾ considered that in the new network-based age, a successful style of learning is characterized as open source and mobile networks, peer-to-peer distributed systems of collaborative work, self-driven learning and de-centred pedagogies. A study¹²⁾ outrightly claimed that 21st century learning has to be characterized by network flows, cyber-pedagogy, lifelong self-education and certainly hyperlinked with everyday participatory mode.

Many of those who had never ventured far past our institutional virtual-learning platform before on-campus teaching was suspended, while still others have been employing innovative online pedagogies for some time.¹³⁾ The model – peer-to-peer mentoring and coaching, in groups is different from subject specialisation. It allowed the sharing of some best practice. It achieved its aim in terms of raising the general standard of teachers' digital literacy, and proved to be successful in other ways too.¹⁴⁾ The spatial skills and spatial anxiety may not vary

between teachers working at primary versus secondary levels, but that higher spatial skills in teachers are associated with lower spatial anxiety for mental manipulation tasks.¹⁵⁾The times have undergone digital transformation with a shift from institutions to networks. It's not the role of institutions such as schools/colleges that acts as a nodal point in the learning system. The primary modus operandi and delivery systems are networks. People interact across institutions, so the complex learning network must be leaned upon and strengthened¹⁶⁾. The students-teachers endeavour to be acquainted with technological tools and advanced thinking skills and development of suitable teaching activities. In up-to-date learning spaces which peculiarly promotes the autonomous, class learning, diversified learning styles, encouraging dynamic, purposeful and collaborative work is easier to be practiced¹⁷⁾. New pedagogy aims to equip learners with twenty-first century skills so as to assimilate and be flexible, creative and innovative in the learning system¹⁸⁾. As²¹⁾ recommend that students do fix the goals, design and monitor the learning plans. Students need to be proactive in information finding, guidance-seeking initiatives and establishing communications.

Let us not overlook the ground reality and associated apprehensions. It has been grounded in the theory²⁰⁾ stating that in certain cases, even when the classroom is equipped with state-of-the-art technology, teachers still teach in traditional knowledge-centred ways. Here, they prefer to focus on the teacher as the source of knowledge and passive learning being made by the students. With this, the efficiency of virtual resources has already been in the history of Education sector.

3. Underpinning theoretical Framework

In order to proceed with objectives of the paper, a list of theoretical models have been considered. Thereafter, it has been observed that Adaptive Structuration Theory (AST) could effectively take the study to the logical conclusions. The AST model²¹⁾ states that the Task is key source of structure that combines other sources such as technology to affect social interaction. AST does address how the resources and rules are combined, adapted and used for task performance. Henceforth, the paper attempts to analyse the task-technology association on the New Learning Environment during the pandemic times. Application of *small-N* designs is required here due to the lack of depth in knowing which factors matter the most and how they are causally contributing to the AST. The conceptual model of the study can be detailed further in Figure 1 encapsulating the Input - process- output system as granted^{21) 22)}. The methodology has also been backed by scholars^{23) 24)}.

The AST has been leaned upon to bridge the task-technology inputs, appropriation to tech-based education output. The structural description identifies the following three segments of the process:

- a) Input (Process, Technology, People, Organization)
- b) Process (Appropriation in the format of task-tech adaptation)
- c) Output (Decision outcome, New social structure, Administrative outcomes and Student based outcomes)

The absolute idea of structure comprises of rules, resources and capabilities. It may further be extended to formal, informal procedures, techniques, rules and technologies. The input parameters' *learning goals* pinpoint the goals desired and designed by the program. The *communication technology* covers the emails, audio-video conferences and *info-sharing* encapsulates the e-resource contents, data conferencing and document management system. The *spirit* is the general intent of technology as it is presented to the user. Another vital input is *epistemology* which is belief and values about the nature of knowledge.

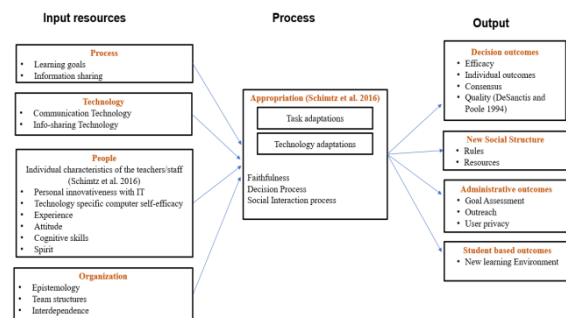


Figure 1: Structural Descriptor in AST and Conceptual Model^{21), 22)}

The *Appropriation*²²⁾ process has been categorically analysed on a scale of faithfulness, consensus, decision making process to make a mega-cognitive procedural strategic analogy. The technical component explicitly includes task and technology adaptation. The task is encrypted as *Exploratory task* and *Exploitive task* adaptation. The former occurs when a user attempts to transform task processes while generating *new structure* and *target*. The latter occurs when a user endeavours to modify prevailing task processes adhering to the existing structure and target objectives of work processes.

The *individual outcomes* define the way individuals adapt or reproduce structures. The *new social structure* acknowledges the people (end users and programmers) and organisation (society, groups, teams, firms) in the system. The concept of *New-learning environment* as a Tech mediated learning is evolving as a hybrid mechanism embalming the physical and digital mode of interaction simultaneously.

4. Methods

The study is a primary analysis based on a semi-structured questionnaire. The non-probability (*purposive*

and convenience) sampling methods have been used. The N-sample includes 5 Principals and Administrators of Institutions and 26 teacher respondents. This qualitative methodological approach has enabled in producing evidence-based actions, and the analysis of outcomes have set the stage for developing a narrative of futuristic pedagogy developments in the post Covid times. The categories have been defined by two coders and a sample table of codes has been attached in Table A.3. The inter-judge reliability averaged above 0.82 and no individual coefficients were found to be below 0.80. While collecting the responses during the course of interaction with the respondents, it has been found that the internal validity has ensured the accurate representation of collected data. Since the data collection has been done by interviewing students, faculty members and administrators that too across the disciplines, there are possibilities of biasness. So, mind mapping has been followed as coding, conceptualisation and categorisation within the data has been done. As the pandemic invoked a sudden change unprecedented in recent history, it is difficult to make theoretical assumptions beforehand. Since the pandemic has been an emergent phenomenon, accordingly, the emergent responses and findings would be highly representative of natural phenomena of the discovery mechanism.

5. Sample and Data

As a strategy of collecting data, the current research uses a framework of qualitative analysis through semi-structured questionnaire. With the help of literature search and expert interviews, the research questions and research dilemmas have been deciphered. The pandemic phase has been a research opportunity. The method of Convergent Interviewing has been followed to design the questionnaire. The non-probability (purposive and convenience) sampling methods have been used. The individual (online) interviews have been preferred for the sensitive issues by adopting small-N research designs. The semi-structured questionnaire predominantly focuses on prompting responses and opinions around the objectives of the study. The meritorious side of semi-structured data points is that this begins with a few specific questions and then follows the individuals' tangents of thought. As the research domain is less explored, the AST is complemented by this type of questionnaire and data points. The paper has endeavoured to explore the impact of technology/task on education sector to pose the best opportunities.

As time was the critical factor in exploring the natural phenomenon and the discovery process, here we could engage small-N research design at two levels on the basis on convenient sampling. In particular- 5 educational administrators and 26 experienced faculty members from two Central Universities of India located in two metropolitan cities responded for documentation. The

respondents have been chosen on the grounds of their experience on the academic arena.

6. Results and Findings

There have been several instances while interacting with the administrative officers and faculty members where they have disclosed their experiences about this evolutionary phase of Learning Environment on the following key aspects:



Figure 2: Mind Mapping of data
 Crafted at <https://whimsical.com/pandemic-and-lockdown-copy-4XTjuYivCSCs2npKfpJm7v>

What has been the shift in the digital technology used pre and amidst the Pandemic? What kinds of digital access modes have been used for the ease of access between the students and other stakeholders?

- Has the education sector been more effective or less effective to deliver with the higher usage of technology? Why so?
- Did your institution induce any new courses or pedagogy during the Pandemic times?
- How did the employees/staff members respond to online interaction during these times?

With an objective to answer these research questions, individual interviews have been conducted. These responses have then been coded. Drawing some logical conclusions, the following observations have been made in regard to the administrative and academic struggle in the year of academic years 2019-20, 2020-21, 2021-22 and 2022 onwards.

6.1 Contextual issues and challenges:

1. *Switch over to pedagogy:* With the lockouts of all the academic institutions across the nation, the Chalk and talk sessions suddenly turned up to be irrelevant. Hence, came the first challenge for the teachers and administration. There was an urgent need to decipher some newer methods of class engagements when students and teachers were not just at home but also migrating to the native

places. This has been uniformly addressed by the Teachers.

2. Implementation of virtual teaching and learning: Sudden exposure to online teaching and learning-process in these crisis situations were very confronting as no one could ever prepare themselves during the Academic Year 2019-20. Most of the teachers substantiated that they could not train oneself properly. Therefore, there was an urgent need to have an orientation session for the emerging pedagogy.

3. Unequal access to connectivity and technology: The administrators validated that the apprehensions relating to internet connectivity and accessibility to technology was talk of the town for initial some weeks. Even students from remote and hilly areas had difficulty in accessing the internet bandwidth. Further, accessing internet also require gadgets, at least a smart phone. Students from the economically weaker sections and those residing in rural areas had a very tough time to deal with this aspect.

4. Selecting right platforms for effective engagement: In the initial phase, the teachers merely shared the course content on mail and on the official portals. But this could not substitute for the suddenly vanished student-teacher class engagement. So, some teachers began experimenting the interactions on WhatsApp groups, Google Meet, Zoom platforms, Microsoft Teams etc. Many online whiteboard softwares have also been attempted and promoted by institutions' administration to extend the learning experience towards a better one. Lab/Practical sessions also suddenly switched to virtual mode where faculties started taking practical discourse.

5. Switching over to hybrid administration and governance: Managing administration during and after the lockdown period was also a very challenging. The switch over began with the conduct of online meetings with the staff, faculties and students. However, the problem was that, most of the records and files were yet to be digitalized. Thus, digitalization of office records and files has been the need of the hour.

6. Psychological and mental health issues of students and staff members due to disruptions: Large-scale lockdowns may certainly have assisted postponing the impact of the virus. But this has hit the mental health of many. There has been an upsurge in *lockdown fatigue* among a major segment of the society. Almost all the faculty members supported the upsurge in this issue among the students. This restriction to stay indoors has disturbed the psyche of many students. Academic dedication to study under these testing times has been a challenging exercise for the students.

7. Conducting examinations and evaluations: With all the effort concentrated to cope-up with the syllabus, the subsequent goal was to conduct examinations. Left with no other mode of examinations, most of the universities had to resort to online examinations. However, the Universities have opted for another form of online examination known as Open Book Examination (OBE) as the volume of students and number of courses was well diversified. Another factor was also important to this decision. There have been two completely different varieties of the students (with and without enough resources). University wanted the examination to be *inclusive* in nature and accommodating even the farthest pupil's answer sheet within the time constraints. So, this was the only method through which any student anywhere in the country could appear for the examination and submit the answer sheet even by e mail within the permissible time limit.

Every crisis comes with an opportunity. This situation opened up with a bundle of initial impediments and challenges. There have been numerous endeavours at students' end, teachers' experimental levels, administration set-up and even at the Government's side that could succeed in these tough times.

6.2 Evidence based outcomes:

In order to analyse the role of IT enhancement in organizational change, the AST is considered to be a feasible approach. The AST captures the advent of task-technology as input and concludes the output on the pedagogy shift. The theory seems to be fit in the contemporary times as the pandemic has induced more of digital medium to educate the youth.

There has been a paradigm shift in the mode of learning in the year 2020. The Chalk and talk method have been majorly displaced by online student teacher interaction in both schools and colleges. In this scenario, technology could only offer some solutions. Accordingly, internet allowed personalisation of education swiftly. Now every student is a front bench student. Everyone can raise queries in the class and interact with each other. The strength of the students at Central Universities is so diverse that in some Colleges more than 50% of them belong to outstation. Nor all of them have equal access to even a smartphone. This factor has been addressed by the examination branch and Common Service Centre (by Ministry of Electronics and Information Technology, GoI). They have assisted the remote areas students to upload the answer sheets during the examination through their networks.

To illustrate this further, the Universities have made a tie-up with the G-Suite allotting a Gmail Login Id to all the faculty members and many students to authenticate the video-conferencing on the Google platform. Besides, the extended features of the G-Suite are now open and accessible to both the end-users. These tough times and

this tech-opportunity have together impelled the institutions to host and organize a quantum of virtual meetings, webinars, conferences, seminars, workshops and orientation programmes like never before. The New Education Policy (NEP) 2020 has also given the due credit to the online courses as well. Now up to 40% of the courses may now be pursued by the students and they may further learn from SWAYAM in the upcoming times. Also, this virtual connect has drastically descended the levels of brain drain of students. They have now enrolled with the University of their choice and attending desired courses on-screen. As a by-product of this scenario and the Government initiatives, there has also been the Brain Drain Management which has been brought to the lower levels than in the past.

Ensuring the equal access to education, the Government has also been pushing various initiatives with an intention to keep the spirit of learning high and perpetual. Initially, the online content of the curriculum was promoted which could ensure a swift mode of dispersing knowledge. The *SWAYAM online courses, UG/PG MOOCs, e-PG pathshala, Swayamprabha, national digital library, Shodhganga, e-shodhsindhu, Vidwan, INFLIBNET* have proved to be some effective management techniques. Even the courses are open for research scholars along with the open access libraries, databases and repositories. Even several orientation and refresher courses are now widely enrolled by the Teachers and Professors. The flexi-timings are making them more captivating. Faculties across institutions are getting benefitted and feeling more enriched and empowered with the knowledge enhancement.

6.3 Evolving Perspectives from Indian University Education:

For instance, Universities have introduced a handful of new experiments to meet the best interests of the students. The University's decision to conduct Open Book Examination (OBE) was predominantly a very courageous decision when no other mode of evaluation could ever be thought of. Despite several odds and a go-ahead from High Court, over 260,000 UG and PG final year students appeared for OBE and 92% of the appreciated the process under Phase 1 by uploading their answer sheets on the portal or sending a mail within the designated time. The leftover students who had a technical glitch were given an added opportunity under OBE Phase 2. The High Court monitored OBE was conducted so that students must get an equal access to examination. Even the Colleges and Institutes in remote locations offered their requisite infrastructural support to the students in the premises after the request of University. The conduct of OBE has not just been a unique one but also has made a milestone success in the history of education system.

The psyche of the students is also a prime concern besides academics. The '*Atmanirbhar Bharat Abhiyan*' has also launched the '*Manodarpan*' initiative. The objective

of this endeavour is to offer a psychosocial support to students, teachers and family members as well. Majorly, issues hovering around mental health and emotional quotient is being addressed. Most of the universities and institutions played a proactive role and coming out with many innovative initiatives in mitigating student's difficulties. This has been made possible through continuous engagements through active support of the regulators, the University Grants Commission and All India Council for Technical Education.

Ultimately the pandemic is going to be over in the near future. However, the bigger question is- would the academic institutions be back to the physical classroom mode of imparting education. Or is this the new normal? Perhaps a hybrid mode of physical plus virtual mode would become the reality. Before the onset of the pandemic, UGC has given a mandate to the organizations for twenty percent teaching and learning through remote/digital mode. This has been now revised to allow forty percent. Accordingly, a proper mechanism of academic credit transfer and management has also been prescribed. The recent year saw a very encouraging collaborative effort of administration, teachers, students, parents and corporate sector involved in developing different types of educational platforms/software and offering several assistances to institutions. It is indeed possible that in the post Covid scenarios, can these collaborations vanish. The answer may not be a categorical yes. These virtual meetings, online classes and all other technological advancements have emerged all of a sudden. But its by-products like efficient management of time and the personal convenience cannot be easily overlooked. Most of the academicians have found their own comfort zones in the new normal scenario. Owing to which, a complete reversal may not be easy.

Besides, the global education suddenly seemed to be more accessible like never before with plethora of onscreen options. People have also discovered an economical model of studying as one can easily explore quality institutions providing education at lesser cost. The ecosystem has also generated lot of free softwares and Apps which have also come to the rescue of learners, students and teachers. The pandemic has also impacted teachers in rediscovering their potential to effectively shouldering the responsibility of mentoring the young minds. Now, they play the role of guide, counsellor, psychologist and at times companion too. Even there has been manifold increase in teachers' training programmes. Thus, the above discussions led to of following enumerated futuristic takeaways for the education sector.

1. With this new mode of interaction, there seems to be no geographical constraints and barriers for any student, even accessing the academicians, scholars and spokespersons from the world has been just a click away. Though there may not be sufficient research data available as of now, but our own experience establishes manifold increase in academic

activities/engagements through online mode. The most advantageous scene is the drastic reduction in organization costs and availability of quality resource persons anywhere across the world.

2. Reaching on time has been easiest task ever as we just need a Meeting Id and password to step in the classroom. The problem of students reporting for classes on time from distant places which was actually a bottleneck to their learning process has been resolved. Moreover, knowledge can be imparted at every corner of the world now. This would result in lower attendance rate of students in the physical classes. Even as students may demand a hybrid system of online and offline choice for higher attendance rate.
3. It has been proven environment-friendly pedagogy as there is minimal load on transportation in cities. This might propel policy makers and agencies to use it on a regular basis to curb the menace of pollution in cities.
4. This may lead to reduction of national and international student mobility for the Higher Education. Student safety and well-being issues are key parameters for students and their parents for movement to international institutions for higher studies. New modes of social distancing will continue for quite some time and may impact on-campus face to face teaching learning. Most of the parents will prefer to find workable alternatives closer to their home and may restrict for less movement within the country due to the pandemic.
5. Universities and institutions may run with different shifts per day with the hybrid mechanism. The need for social distancing may imply lesser students in each class. So, most of the educational institutions may work in different shifts per day. Thus, the physical spaces and infrastructural resources can now be extended to multiple usage due to this hybrid mechanism of operating (in online and offline modes both) and make higher education accessible to a larger section of the population.
6. The Covid propelled a shift to adoption of digital and virtual technology in class deliverance would ultimately lead to introduction of artificial Intelligence (AI). Many innovations and experiments by Higher Education Institutions (HEIs) using AI during Covid times (ranging from organizing convocations to degree deliveries etc.) have been reported. AI may help teachers to deal with assessment, evaluation, preparing mark-sheets and monitoring the performance of each student easily. These are the activities which consume a lot of time of the faculties which otherwise may be utilised for course development, qualitative teaching-learning, skill development and mentoring.

The tough times are often accompanied by deciphering and re-inventing new resources. The co-creation and co-sharing of knowledge has been an added virtue in the recent times where the digital resources (e-journals, e-

books, e-magazines, e-newspapers, e-knowledge centres) have proven to be of tremendous help. The students belonging to the economically weaker sections/who are differently abled have found these resources instrumental for gathering knowledge in these evolving circumstances.

7. Conclusion and Limitation

The escalation of Covid-19 has led to the shutdown of all the Institutes, Universities and Schools across the world. This has created an opportunity for change in pedagogical approaches and induction of virtual education at all levels in the field of education. This has resulted in adoption of online method of teaching and learning and monitoring of students in all the areas and disciplines. Further, it may not be precise to predict the end of this pandemic. It has been realised that this experiment of virtual learning has proven to be, in any way, quite resourceful for many. This may also lead to blended hybrid form of teaching and learning in future. Hence, all the agencies, regulators and administrators need to prepare for providing proper digital infrastructure to all the educational institutions spread over length and breadth of the country. In the meantime, NEP 2020 has also been notified which is also in sync with many of the points listed above. The preference of hybrid mode of education may not vanish anytime soon even in the post Covid era. They have been resolved at micro and macro levels.

This pandemic has given HEIs lots of opportunities for innovation and creativity which will ultimately result in equity, accessibility, affordability, quality and accountability of higher education in India. This paper has taken sufficient care to follow AST model within the constraints to contribute to developing state of the art strand of literature on the subject in India. The impact of technology has been scrutinised on the Higher Education sector under pandemic times. This would prefer the New Learning Environment (NLE) and hybrid mode in daily business even in the post-Covid times. However, paper could not analyse the discipline wise data which could conclude the impact of technology on Education sector discipline-wise. Due to the restricted access to gather data, the paper could not encapsulate the differences in influence between urban- rural gap. A digital divide has been a by-product of these times. So, further study may highlight this parameter to boost the results with an empirical methodological framework. Future research may take care of this factor.

8. Contributions of the Study

The paper has considered the following perspectives pivotal and worth-mentioning from the analysis:

Firstly, the initial impediments in the *adoption of online mode of learning* have subsequently been shifted to a comfort zone of the students. Majority of students have now observed online mode to be a preferred mode of learning. In the recent years, 2019-22, the Online courses have gained the attention of the academia around the globe.

Secondly, out of all the disappointments brought by the Pandemic, there has been a paradigm shift in the way we learn. The *pedagogical approaches* have undergone a drastic change across the nations. With the induction of virtual learning at all levels of education, the future of learning has been heading towards a *Hybrid mode of learning*.

Thirdly, not just students are confronting the changes in this era of evolution, rather the faculty members are also racing against times to perpetuate the process of Teaching-Learning. Hence, there is an urgent need to orient the faculty members with the *interactive mode of online learning* to make the process an ongoing one.

Fourthly, in the upcoming times, the resource sharing/remote access of Database/preference of Webinars over Seminars would be surfacing even further. With the advent of a new layer of *virtual preference of learning*, it's been a new normal that flexi-learning and geographically distant learning is equally preferred mode of learning.

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Notes

ⁱ The small-N for administrators includes 5 Principals and Administrators of Institutions

ⁱⁱ The small-N for teachers included 26 respondents who have closely witnessed and experienced the unfolding of the pandemic and actively engaged in teaching, learning and other work as assigned by the respective institutions from time to time. Further, they are the active actors who are in direct contact with the students. Their experiences justify the representation of the students in the study.

ⁱⁱⁱ The semi-structured questionnaire solicits responses relating to identifying the issues hovering around the initial lockdown of Educational Institutions, a disconnected conventional classroom interaction, sinking prospects of conventional written examination, managing students' admissions in 2020-21, psychological issues of students, managing affairs of the institute in new normal situation, teachers' knowledge enhancement and empowerment, requisite inclusiveness and outreach initiatives, perspectives for future etc.

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Appendices

Table A.1: Classification and Number of Universities in India
Source: Ministry of Human Resource Development, 2019

Type of University	Number of University
Central University	46
Central Open University	1
Institution of National	127
State Public University	371
University under State	5
State Open University	14
State Private University	304
State Private Open University	1
Deemed University-	34
Deemed University-	10
Deemed University-Private	80
Grand Total	993

Table A.2: Student enrolment by level
Source: Ministry of Human Resource Development, 2019

	In percentage	In Numbers
PhD	0.08%	29,920
PG Diploma	0.60%	224,396
M. Phil	0.45%	168,297
Diploma	7.22%	2,700,236
PG	10.81%	4,042,874
Certificate Courses	0.44%	164,557
UG	79.76%	29,829,752
Integrated PhD	0.64%	239,356
Total	100.00%	37,399,388

Table A.3: Sample Table (Code and Sample Statements)

Code	Sample Statement
1. Dynamic faculty members	1. Faculty members are experimental, technologically and pedagogically comfortable to handle the digital devices
2. Continuous mode of learning	2. Tech-triggered and perpetual mode of learning is offered on global platform
3. Accessibility	3. A prerequisite access to a Tab or mobile or laptop or computer for Learning purposes
4. Availability of IT support staff	4. Optimum numbers of qualified technical IT assistive staff
5. Internet services	5. Requisite internet speed or bandwidth at both the ends
6. Emotional Quotient	6. Emotional quotient of the students is an area of concern in the recent times more than their academic excellence
7. Students' participation	7. Increased Number of students to attend the learning sessions overcoming the geographical barriers
8. Mentoring	8. Students need to be mentored more in these times than ever before
9. Class backup	9. Preferred backup/recorded class to revise or have missed the original one
10. Hybrid Learning	10. Achieving the hybrid combination of virtual and College activities
11. Tech-responsiveness	11. Inclination towards innovative and tech-savvy alternatives
12. Parents' support	12. Parents cooperation for the New-learning environment
13. Emerging pedagogy	13. Boost in pedagogical opportunities for faculty members
14. Students' Access to classroom	14. Societal interest is served in a better way with a wider students' outreach
15. Work-station	15. Conducive environment and quiet place to study and attend online sessions
16. Digital divide	16. Access to a geographical location where internet services are in place
17. Teachers' training	17. Faculty orientation programs to perpetrate the process of teaching
18. Class Attentiveness	18. Students' response rate in the class
19. Need of study material	19. Students are complemented with e-resources, study material etc.
20. Parents' awareness	20. Adequate information with parents to coordinate curriculum aligned learning