

A Perspective on Online Education and the Role of Technology in the Higher Education Segment

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Abstract

In this article, the authors have discussed how the COVID-19 pandemic created challenges for the higher education segment in India. In actuality, the challenges are for both school education and higher education, but this study focuses on higher education. The study discusses the role of technology in COVID-19 and how technology helped maintain the tempo and pace of educational institutes. The authors have also compared both online and offline education, and the student's perception about the effectiveness of online education. Although the offline mode of education is still more effective, the online education mode helped the education sector achieve sustainability. However, further actions need to be taken to improve the online way of teaching.

Keywords—Online Education, Higher Education, Sustainability, Technology

1. Introduction

The Covid -19 pandemic has thrown the higher education process into disarray in all the countries across the globe, including India. This paper focuses on the intervention of technology and the absence of classroom socialization during the pandemic and the resulting experience of various stakeholders and conceive pathways. Knowledge and skills of individuals of a nation lead to its development. The more efficient the common man in his working areas, the more progressive the nation. To gain that efficiency and effectiveness, education plays a very critical role. Education links the individual with the working areas and other dimensions of life (Yabiku & Schlabach, Aug 2009). In order to be employable and become successful in the world of work and efforts, higher education is necessary. The primary aim of higher education is to transform students through the knowledge, skills, actions, and behavior, into a rational and sound person who can

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look upon matters logically and critically (Harvey, 2000). However, some researchers have thrown light also on the opposite aspect that higher education does not appear as the sole aim of students to be employable. Besides, the environment that prevails at the institutions, and the working areas are quite different. Due to regular modification in the curriculum and syllabus, institutions enable the students to become employable and nurture them with employability skills and education.

In order to boost economic growth, higher education has been given utmost importance. Various policy measures have been taken to boost the association between higher education and employability. Globally, if we look at scenarios, countries are facing a crisis, one or another (Khare, 2014). To reduce the crisis effects, to boost sustainability, higher education is required. On the other hand, employment seems to be an agenda, where sometimes highly qualified individuals do not get a job and remain jobless. To overcome this, higher education is being revamped by looking at the parameters which require attention. It is reforming its objectives to encourage students with better careers, skills, knowledge, training, and opportunities. It is also working on the changes which need to be done by making them skillful and proficient for more career opportunities and advancement.

Higher Education in India

Amid COVID, India is facing an imbalance between demand and supply of capable individuals, which the economy needs right now as India is a blend of demographics that shows an advantage to its working world. Higher Education in India comprises various management and technical colleges, degree courses, diplomas, etc., (Gupta & Gupta, 2012). Higher education helps students in boosting their careers and establishments of new business, which further provide employment to many. Prior to the pandemic lockdown worldwide, the physical offline classes mandated the students be a part of physical activities at the campus. Group Discussions, debates, on and off-the-job training, cultural activities, projects, etc., were the some of the activities that were mandatory for the students to participate in. COVID has made education virtual, and it has a severe impact on students as well as on education. Attending classes through various applications has made students realize that offline classes were much better than virtual ones.

By getting higher education, every learner dreams of their best career ahead, but due to COVID-19, many employees were laid off. Many industries faced losses, which further impacted their re-employment. Overall, the downsizing of job opportunities has demoralized the postgraduates. Higher education has a strong relationship with employability so that learners prepare their long and short-term objectives for their employment. But due to less availability of jobs and the demand of graduates has put more burden on higher education levels. Higher Education needs to enable students to perform better in this cut-throat competitive world. To motivate students to work on their skills rather than just theoretical work, and to enable them to survive according to new trends and demands of the market (Husain, 2005), higher education acts as a platform which makes sure about the quality and quantity of progressive instructor. There is vast literature available on the relationship between education and employment. Many researchers have worked on it, and further policies have been framed regarding higher education.

Covid-19 pandemic and rumblings in the higher education sector

The worldwide spread of the COVID-19 pandemic has been unprecedented and has been no less disastrous for human lives than the Spanish flu of 1918 (Kumar & Ayedee, 2021). The (World Health Organization) WHO report of July 2020 (situational report -175), for instance, presents a

view of the scale of impact in countries around the globe. The report indicates 12.7 million cases and 566654 deaths across countries, the United States of America, for instance, had 3.2 million cases and 134392 deaths; China reported 85,568 cases and 4648 deaths, while India 878254 cases and 23174 deaths (World Health Organization, 2020). This represents a global scenario as it also brings forth the comparative situation of countries. An extract of China, India, and the United States of America is presented above. As on the 8th of May 2021, the statistics for India was 22.3 million cases and 242398 deaths (The Hindu Newspaper, n.d.). The situational dashboard of WHO indicates on the same day viz., the 8th of May 2021, indicated 152 million confirmed cases. Across the countries of the world, over 3.2 million people are reported to have died, as per the WHO report for the year 2021 (World Health Organization, 2021); and till the 5th of May 2021, as many as 1.17 million vaccine doses had been administered to the world's population.

The higher education sector has been quite disrupted by the pandemic. Many countries like India have been affected in multiple ways in respect of Higher education. The Indian students who go abroad for higher education are large in numbers and next only to the number of Chinese students. The Indian students mainly go to the countries including but not restricted to the USA, The UK, Australia as also China, which have incidentally been worst affected by the pandemic, and hence there are restrictions in respect of entry in place. The school education sector in India is a bit of a different kind of challenge as against, say, Higher or 'College' education (Chaudhary, 2020). For one, a good part of school pedagogy has been alternated by the available online education tools that the more technologically endowed schools, school students have been able to utilize in line with their economic strata, however with the repeated inability to hold classes, examinations, and meet feeder goals for higher education the overall situation is dismal. The same has meant disruption of higher education plans and prospects for many students who must move to higher education.

It is a big thanks to technology that the education sector did not suffer much. Either in India or other countries, both the higher education segment and school education segment rapidly adopted technology, in response to the pandemic. Instructors and teachers took classes and examinations through the Zoom conference app, Microsoft Team, Google Meet, and several other technological platforms (Kumar & Ayedee, 2020). One after another the classes had to be taken through these online channels. Placement of students has been a bigger concern during the pandemic time; both management and engineering colleges in India had to take the help of online platforms to prepare students for placement drives.

Education disruption and unemployment linkages

Of the 44 million unemployed population (as of March 2021), as many as 38 million are between 15 and 29 years of age. April 2021 saw a sharp rise in Covid cases, inadequate health services leading to increasing deaths, and rising unemployment as well (Vyas, 2021). The digital technology service providers moved in to occupy this opportunity and to fulfill a possible need for the students. The colleges and institutions had very little reaction time at the beginning of 2020 when pandemic struck as to how to continue pedagogy and examinations as it became increasingly clear that the physical classes, the face-to-face tutorials, and the examination hall and process had to be forgotten for quite a while. Absence of viable alternatives – except as supplements: “technologization,” for instance, proceeds on the assumption that education is disrupted and hence can be fixed with technology (Teräs, et al., 2020) – how appropriate would it be to push?

However, to do their best to prevent loss of the academic year and later placement opportunities, the institutions realized that they had to move in with alternatives. It did not take time to notice the online learning solutions did not meet specific institutional background and curriculum needs, nor the pedagogy was in any way fitting with varying student community scholastic levels (Teräs, et al., 2020). The solutions that are provided and sought to be provided by the learning providers often results in misleading on the intended concepts of both teachings as also the purpose of learning. This, in turn, is seen to lead to “educationalization (imposing growing societal problems for education to resolve) and technologization”. These roles thrust the societal problems onto education.

Relevance of this study

In this paper, the authors have discussed the COVID-19 challenges and how they transformed higher education in management, engineering, and all other domains. The authors have also discussed the student’s perception about the effectiveness of online classes/education. There is an increasing dependency on technology, be it in classes or preparing students for interviews and placements. The Indian government also came up with the National Education Policy, which is encouraging and emphasizing the increased usage of technology in the education sector (Aithal & Aithal, 2019). With the use of technology and online teaching, no doubt the technology will help the students and save the time of the students as it will save a lot of commute time. Usage of technology will also help the education sector to achieve goals of sustainability because there is a saving of all types of resources but is it the permanent solution, or in the future, we have hybrid classes for higher education?

Pedagogical progress and adaptations across different countries

It is fortunate to see that soon after the onset of the pandemic, there has been a retinue of pedagogical and academician responses to innovating around researched and available options. The researchers have noticed across a range of universities various shades of responses from no responses at one end to social isolation rules on campuses to the curriculum redevelopment for fully online offerings by various institutions. The agility of the managing organizations came into focus to determine who did what. As is to be expected, pedagogy development being a more involved process, the initial response instead went about transferring regular classroom content viz., texts and material to online access. The intervening factor was also certainly the access to technology and the internet (affordability and accessibility). Previous research suggest the use of varied sources viz., News articles, university websites, Government Information, Higher Education News, (Consultancy) reports, and Papers, besides University communications in getting the assessment ongoing digital era pedagogy responses (Crawford, et al., 2020). The study has tried to encompass World Health Organizations’ classification of countries (all six regions) to get a population canvas for the findings. It is instructive to note that in line with their economic strength, the developed economies, while affecting campus closures, did not go in for any semester break extensions, have moved over to online teaching, except that within the USA, it has varied across universities and States. The large developing economies (India, Brazil, China, and others) as also the smaller ones affected campus closures; the movement to online education has been selective depending on the university. The ability to implement digital strategies has been based on resources available to the organization, as also on the economic conditions of the students attending the University (Organization). This research has been based on the early period, around the first four months or so of the responses after the pandemic commenced.

Literature Review

Role of technology in achieving sustainability in education

Sustainability in higher education is a challenge in this twenty-first century, and with global development, there is an increasing environmental predicament and discrimination (Stough, 2018). To overcome these, there is a need for sustainable development, the completion of the 20th century has made political leaders adopt a sustainable development model in response to the reported growing number of inequalities and environmental crises (Filho, et al., 2018). Various researchers have defined sustainability and sustainable development, according to the World Commission on Environment and Development (WECD), Sustainable Development is defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Oxford University Press, 1987). Whereas sustainability is defined as “Sustainability is the process of living within the limits of available physical, natural and social resources in ways that allow the living systems in which humans are embedded to thrive in perpetuity.” Some researchers preferred sustainability over sustainable development, whereas others the opposite. Sustainable development can be seen as an approach to every field, whether it is education or crisis, or development. Sustainable development and its approaches play a keen role.

During the COVID-19 pandemic, the usage of technology has increased to a greater extent in the education vertical. Like all other sectors, the education sector is also looking for sustainable development. The three pillars of the triple bottom line approach of sustainability are people, planet, and profit (Kumar & Pandey, 2018). If an organization is improving its social performance, then it is thinking about people; if it is improving its environmental performance, then it is taking care of the planet, and it is thinking about economic performance, then it is increasing its profit (Braccini & Margherita, 2019). The usage of technology during COVID-19 times helped all the stakeholders in the higher education segment. It helped the students, instructors, college authorities, and administration. People involved in the education domain are getting benefits from the usage of technology in education in the absence of offline mode. Secondly, the usage of technology also improved the environmental performance of the educational institutes. Very few vehicles are coming into the institutes. There is a saving of electricity and other physical resources, so from everywhere environment is getting protected. Thirdly, it is generating profit for the educational institutes. Even during a pandemic, educational institutes are doing fine in terms of revenue because they are charging fees by providing education through online mode. If there would have been no online mode, it was difficult for institutes to call for fees and other charges. Online education through various applications is helping the institutes in strengthening all the three pillars of sustainability.

Rising loads on the environment, economic crisis can only be handled carefully if there is sustainability in education. To create a sustainable future, higher education acts as a powerful tool. These words “sustainable development for higher education” being buzz words, and various initiatives and policies have been framed in recent years. Higher education plays a critical role in creating and maintaining a sustainable future. Sustainable development goals made by the UN also show the importance of higher education. Technology has changed the way of teaching. Nowadays, technology has made everything easier at the same time, complex for those who do not possess that specific skill. Knowledge provides a sustainable edge in this time. But to get a competitive edge, people should be aware of technology enough. There are various parameters and policies inculcated to know how education can be made sustainable. Advancements in curriculum,

modifications in projects, increasing innovation, and making environmentally more active, etc., are one of those. Students getting skills and knowledge according to their interest area will further help them in getting the job they want. This will be helpful to the organization as well as they require the right people for the right job. This time of COVID-19 has made people to “work from home.” Whether they are of any profession, i.e., teacher, engineer, students, etc., technology has made so many advancements that this has made possible. Technology itself has made people aware of its significance. Students, teachers, engineers, and others are relying on it to do their work. Work can only be efficient and effective if they are having knowledge and possessing skills.

Need for responsible vision from educational leaders

The educational leaders need to think responsibly at this juncture as to what should be the path and enablement to enable vibrant education in the light of the constraints imposed due to Covid 19 and Covid restrictions. As Arundhati Roy (Roy, 2020) has mentioned in the “pandemic is a portal” write up in the ‘Financial Times - online publication’ on the 3rd of April 2020 (over a year ago), pandemics have been turning points in human progress. Inevitably pandemics have compelled human society to think fresh and evolve a contemporary concept of the world. It has necessitated configuring a new transition to the working society. Technology or no technology, the pandemic this time around has given a mock and a slip to all the ‘biometrics,’ digital surveillance, immigration controls as also to the ubiquitous ‘data analytics’ and firmly thrust itself on human lives, lifestyles, livelihood, and life itself (Roy, 2020) .

The social purpose of education and its powerful impact on the structure of everyday life

The lockdowns have indeed brought forth the hidden linkages. It has made explicit the social value of classrooms and the strong linkage to the education system. More importantly, it has reminded everyone, the students as also the universities, of the critical ability to alter the structure of how the day-to-day life in society is organized and structured around the educational infrastructure in day-to-day life. This is tremendous. Educational organizations in their frenzy need to be mature and clear to recognize as to which current mass education and institutional teaching and learning options and pieces fit into their own jigsaw puzzle of pedagogy, student interactions, learning environment, and teacher interactions and assessments. Unless the course handling is done with the intended learning pedagogy and college objectives in mind, it could fritter away into an assumed sharing of reading notes, videos, and examination guides. The tendency to treat the online and alternate modes as a content-driven self-education was also soon observed and trod with caution. It is certainly true that many institutions did not switch to any magic mode substitute but tried instead to create classroom environments through social media platforms such as, say, Zoom or Google and, in the process, got the empathy of the learners.

Need to be agile against opportunistic ‘corporate’ moves to fill the gap: the thought dynamics.

Corporations’ eagerness to see educational institutions as another market had taken roots long back in the 1980s. The expectations then were made to look like ‘it is inevitable to influence teaching and learning, but it happened far differently. Schools have custodial and socialization functions that are critical for any democratic society (Cuban & Jandric, 2015). The “datafication” [which has been used to denote the ongoing compulsions of recording life processes into streams of computerize data inputs], (Couldry, 2018) of education, value propositions developed in learning analytics are linked to building goals for educational objectives. This has been intended to be enabling (goals) factors such as student engagement and its enhancement, conceiving and formulating teaching practice and personalizing learning, and reinforcing the expectations of

educational technology vendors. These, in turn, get intertwined to 'business intelligence.' It is useful to recall in recent times, even at World Economic Forum gatherings, the epitaph 'data is the new oil' was powerfully floated. This has decisively influenced educational technology, pedagogy, and even national economic management.

The protagonists for E-learning

There have been other rushed studies (Narayanan, 2020), not quite well structured in studying this area and 'assuming' the 'e-learning' and 'virtual learning' is the way after the pandemic, but these have no significant body of research to support the conclusions. As has been observed in 'India today Web desk 'around the 11th of May 2021 (India Today, 2021) , the pandemic resurgence has put a question mark on the returning to school (college/university). It makes a pertinent remark that while online education has tried and played effective supplement to physical presence in the classroom and face to face education, it is not going to replace the melting pot of ideas and perspectives that serves to broaden the learner's perspective, nor will it provide social skills and holistic growth.

While Research firm McKinsey has estimated a loss of about 6 to 8 months of learning for schools in the USA, especially to the economically disadvantaged groups, while planning for returning to school, the inequities in India, in terms of greater inequities, return to hostels from home towns for residential higher educational institutions and formulation of appropriate pedagogy and curriculum for return to classes anyway, the absence of classroom education and ideation, laboratory and practical as also field experiences that constitute higher education pedagogy is anyway is the ultimate challenge.

India has numerous management and technical institutions which provide higher education to students. They majorly focus on students' academic well-being and their professional development. These institutions make sure that students participate in various programs that will further enhance their skills and confidence. Group discussions, debates, guest lectures were the ones in which students involve attentively. But due to COVID-19, these programs lack progress because students did not pay much attention. The main goal of higher education is to make students capable enough to get employment. Modified curriculum, syllabus, and different activities play their part in preparing the student for their future work. However, institutions are making every effort for their learners, but COVID-19 has a severe impact on the education system. Although, classes have taken the virtual way like classes through various online applications such as Zoom, Webex, google meet, etc. Offline education can never be replaced through online mode. Engineering and Management students are best prepared by their institutions for campus placements. Various sessions of professional and personal development classes were conducted by the educational institutions. Nowadays, there exists a lack of relationship and a lack of sense of achievement. There is no doubt that online education is trying to give maximum to the students to recover the damage of offline education, but still, there are major differences in online and offline education mode.

These online classes and resources had also been used for, at times conducting objective-type tests covering the curriculum. The student community welcomed the digital participation as the students noted that it enables the continuity of the semesters as also helps minimize the risk of academic year loss or movement from undergraduate to graduate stages of education. The notable exceptions have been for the positive steps of having a larger mix of physical presence in universities goes to enabling Ph.D. research scholars in technology and engineering/ science

research laboratories to continue the research and submission obligations without too much discontinuity and move towards assessments of the research as per requirement. Thus, in conclusion, the reviews indicate a definite move to absorb the variations and develop choices for the evolving digital needs rapidly in the Indian institutions.

Table 1: Literature Review

Sr. No.	Author(s)	Arguments
1	Ayedee & Kumar, 2020	Use of technology in sustaining the education and completing the academic curriculum during the lock down
2	Teräs, et al., 2020	Absence of viable alternatives – except as supplements: “technologization,” for instance, proceeds on the assumption that education is disrupted and hence can be fixed with technology.
3	Aithal & Aithal, 2019	The Indian government also came up with the National Education Policy, which is encouraging and emphasizing the increased usage of technology in the education sector
4	Stough, 2018	Sustainability in higher education is a challenge in this twenty-first century, and with global development, there is an increasing environmental predicament and discrimination
5	Roy, 2020	The educational leaders need to think responsibly at this juncture as to what should be the path and enablement to enable vibrant education in the light of the constraints imposed due to Covid 19
6	Bayne, 2015	Computerization of education and use of technology
7	Dhawan, 2020	Impact of online classes on the students - made them lethargic and loss of focus
8	Ayedee & Kumar, 2020	During the pandemic lockdown, the universities and institutes of higher learning had to conduct classes online using various tools like Zoom, google meet, etc.
9	Dhawan, S., 2020	The author conducted the SWOT analysis of e-learning

Compiled by Author

Gaps identified

The review of literature suggests that some of the outcomes due to technology were certainly not on desirable social, and ethical lines. It is instructive to recall that when computerization for education was pushed, policymakers had assumed that desired outcomes would follow (Cuban, 2004). Computerization has not helped student participation and in fact, even noted that technology impact on learning’, may inhibit discussion on educational technology and perhaps constrain it (Bayne, 2015). In fact, digital learning platforms have been the subject of reviews by researchers.

They have been held to be holding the notion that the educational practices should rather conveniently align with the aspired educational technology revolution idea and evolving narrative (Knox, 2020). They are further seen to try and attempt psychological behavior management techniques to alter the student behavior in tune to fit with the technology system (Manolev, 2019). Some studies, however, have held the view that teachers and students have been subject to surveillance using technology, and it could largely lead to the alienation of students. Based on review of literature and these gaps, the study intends to focus on the following objectives.

Objectives

The main focus of this study is to understand and study the role of technology in the higher education. During Covid 19 pandemic the physical classes came to a halt and the education system came to a standstill. The main objectives of this study are:

To study the impact of Covid 19 pandemic on the education sector.

To understand factors leading to use of technology in achieving sustainability in education.

To study the major differences in online & offline education mode and the challenges faced due to the online education.

To study the students' perception about the effectiveness of the online classes/ education.

India has numerous management and technical institutions which provide higher education to students. They majorly focus on students' academic well-being and their professional development. These institutions make sure that students participate in various programs that will further enhance their skills and confidence. Group discussions, debates, guest lectures were the ones in which students involve attentively. But due to COVID-19, these programs lack progress because students did not pay much attention. The main goal of higher education is to make students capable enough to get employment. Modified curriculum, syllabus, and different activities play their part in preparing the student for their future work. However, institutions are making every effort for their learners, but COVID-19 has a severe impact on the education system. Although, classes have taken the virtual way like classes through various online applications such as Zoom, Webex, google meet, etc. Offline education can never be replaced through online mode. Engineering and Management students are best prepared by their institutions for campus placements. Various sessions of professional and personal development classes were conducted by the educational institutions. Nowadays, there exists a lack of relationship and a lack of sense of achievement. There is no doubt that online education is trying to give maximum to the students to recover the damage of offline education, but still, there are major differences in online and offline education mode.

The students were more attentive in offline class than online. Online mode sometimes poses disturbances such as network issues, data plans, etc. In online mode, the instructors have faced unforeseen disturbances. Many students do not turn on their cameras, and they are often involved in other activities behind the curtain. The control of the instructor is missing in online mode. The human and the physical touch are missing in online education. The relationship between students and teachers through offline mode is far different from that of online mode. Students can immediately be looked upon by the teachers and vice versa.

Measures and Hypotheses

Clarity of concepts

Solving problems and the clarity of concepts in technical subjects through offline mode was comparatively easier than that of online mode. Students can approach the instructor anytime in offline mode, but it is not possible in online mode. In many of the subjects where practical approach and problem solving is required the students feel confused and are not able to grasp the subject matter.

H1 : The online classes influenced the students perception about their clarity of concepts.

The sample items include ‘I find the concepts taught in the online class too technical’. The items were measures on a 5-point Likert’s scale that ranged from 1= Strongly Disagree to 5 = Strongly Agree. The higher scores reflect higher values of study construct: Clarity of concepts. Cronbach alpha value is observed to be 0.79. This means that reliability of questionnaire is categorized into reliable level.

Physical Health

Another major issue that impacted students is their health. Long sitting hours in front of laptops, computers, or cell phones create health issues like eye problems, backache, migraine, etc. Offline mode helps students to be healthy enough because of their peer groups, time management, and physical activities, etc. The social connect is completely missing in online mode. In the longer term, if the online mode will continue, then students will face many health problems.

H2 : Attending online classes influenced the student’s perception of physical health .

This construct was measured using the five point liker scale. The sample item included ‘ I feel discomfort in my body after attending online classes’. The items were measures on a 5-point Likert’s scale that ranged from 1= Strongly Disagree to 5 = Strongly Agree. The higher scores reflect higher values of study construct: Physical health. Cronbach alpha value is observed to be 0.77. This means that reliability of questionnaire is categorized into reliable level.

Interaction

The respondents also claimed that in offline mode, communication is much better, and students can clear their concepts with more ease than in online mode. Making a concept understandable is also a bit complex in online mode. Students hesitate to discuss things, and without having a physical connection, it becomes difficult for the instructors as well to get to know their students’ understanding level.

H3 : Attending online classes influenced the students interaction with the teacher.

The construct was measured using a 5-point likert scale ranging from 1= Strongly Disagree to 5 = Strongly Agree. The higher scores reflect higher values of study construct. The observed Cronbach alpha value of 0.81 indicated the reliability of the measure.

Mental Health

Another flip side of the online mode of classes was lack of time management and boredom, while in the offline mode the students needed to come to school as per the timings, whereas in the online classes there was no such need, the students could attend the classes from anywhere as long as they had the devices and an active internet connection. Online classes made the students lethargic,

and the students often felt bored in online classes (Dhawan, 2020) . They just must sit in one place with their speakers and video on. Lack of activity caused mental fatigue in the students.

H4 : Attending online classes impacted the perception of mental health.

This construct was measured using the five point liker scale. The sample item included ‘ I fee distracted while attending online classes’. The items were measures on a 5-point Likert’s scale that ranged from 1= Strongly Disagree to 5 = Strongly Agree. The higher scores reflect higher values of study construct: Mental health. Cronbach alpha value is observed to be 0.79. This means that reliability of questionnaire is categorized into reliable level.

Effectiveness

The respondents perceived offline classroom learning as more effective than virtual classes. Effectiveness has a long-term impact on the students’ learning. Online classes lack effectiveness in both teaching and students’ learning, whereas online classes are cost-effective. One can say technology is saving both time and money for the instructors and students, and it is more sustainable in nature. Technology saves the wastage of physical resources. However, the students’ can have an overall development in case there are many meetings with their teachers or peer groups. Their knowledge skills and abilities can be enhanced if they actively participate in programs organized by the institutions. Online learning also provides breakout rooms for discussions, but still sitting in front of laptops and just virtual communications make things ineffective. Offline learning develops the students physically and mentally, while online learning only focuses on the mental development.

H5 : Attending online classes influenced the students perception of effectiveness of the online classes.

The sample items include ‘Learning takes place better in physical class rather than online class’. The items were measures on a 5-point Likert’s scale that ranged from 1= Strongly Disagree to 5 = Strongly Agree. The higher scores reflect higher values of study construct: Effectiveness. Cronbach alpha value is observed to be 0.83. This means that reliability of questionnaire is categorized into reliable level.

Hypotheses :

H1 : The online classes influenced the students perception about their clarity of concepts.

H2 : Attending online classes influenced the student’s perception of physical health .

H3 : Attending online classes influenced the students interaction with the teacher.

H4 : Attending online classes impacted the perception of mental health.

H5 : Attending online classes influenced the students perception of effectiveness of the online classes.

The general linear model equation is :

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 = \epsilon_i$$

There are four predictor terms (β_1 through β_4): Clarity of concepts (X_1), Interaction (X_2), Physical Health (X_3), and the Mental Health (X_4).

2. Methodology

The research methodology of the present study on the role of technology in the higher education segment adopts the exploratory research and the reflective thinking method using the qualitative analysis of the existing literature. The discussion also draws on the findings of the pilot survey research using the interview method wherein a select group of key stakeholders from the academia, industry and the corporate were interviewed regarding the challenges they faced in adopting to the technology and finding solutions to continue the academic process in the institutes of higher education. These results were then used to construct the questionnaire for understanding the students perception about the effectiveness of the online classes and the factors impacting it.

A telephonic examination of university academicians contacted (seventy of them from Delhi NCR), as also some Industry chamber organizations, and university administrators revealed that for meeting specific topic delivery objectives Google meet, Zoom and Microsoft Team software social meet concepts have been used. The respondents were asked to share their views and observations on the challenges faced by them, the students and the teachers for adoption of the technology for conducting the online classes, elaborate the use of the online meetings for various purposes, the issues faced in the training of the participants, availability of infrastructure to switch to the online mode, etc. The sample of respondents was collected using the convenience sampling. Further, pilot study was used as an exploratory quantitative research design to determine the relationship between the students perception of effectiveness of the online classes/ education with the various variables of interest. The study used the cross-sectional design for data collection from the panel of 300 students who were pursuing their post-graduation diploma in management form various institutes in the Delhi NCR region of India. The data was collected over a period of three months form March 2021 to May 2021.

3. Results & Discussion

SPSS 22.0 was used for the statistical analysis of the study variables. Regression analysis were used to measure the strength of the linear association between variables: effectiveness, clarity of concepts, interaction, mental and physical health.

The survey was taken by 300 students; however only 237 data responses were used in the study. The mean age of the respondents was 21.3 years (SD: 1.06). 46% of the respondents were female and 54% of them were male.

The students had a mixed opinion about the effectiveness of the online classes during the Covid-19 pandemic, although it helped them utilize the year and complete the coursework, a majority of the students felt that the physical classes are more effective than the online classes (78%) and there was better understanding and clarity of concepts in the physical classes (69%). The students missed the interaction and the physical environment of the classes during the online education (73%) and also reported physical (75%) and mental fatigue (77%).

On running the linear regression analysis of the dependent variable – effectiveness of online classes based on the survey information of the participants and the independent variables, it was revealed that the independent predictor variables are able to explain 45% variance (r^2 change = .450) in the effectiveness of online education.

Table 2 : Model Summary of Results

Model Summary				
Model	R	R Square	Adjusted R Square	Std. error of the Estimates
1	0.735	0.540	0.450	1.03

a. Predictors: (Constant), Clarity of concepts, interaction, physical health, mental health.

4. Conclusion

Online mode of learning can be more suitable for working professionals but for students whose keen objective is to learn a subject, offline mode targets learning among them. For target learning, there must be a proper learning environment and concept clearance at that time; offline mode suits best for it. With respect to the academic performance, students tend to perform better at offline mode as compared to online mode of learning. The possible cause behind it can be peer pressure, competition, or the prevailing environment. Also, interaction with faculty made a huge impact on students rather than just learning virtually. The students' physical and mental health was also impacted due to the prolonged exposure to the electronic screens and the lack of much physical activity.

The task for the future

- Pedagogical pathway for student academic and group learning and social 'fun' upon return to physical classrooms and laboratories
- Research on the appropriate place for technology and e-learning in the higher education process and sensitization and management development education needs for higher education faculty and administrators
- Research on classroom learning, group learning, and associated games and sports processes for the active returning to physical classes phase its duration and goals and content
- Research on student and faculty dilemmas faced during the long-drawn pandemic interruption to learning and education.

Based on the overall discussion, it can be concluded that the online mode of education came up as a panacea for educational institutes in the higher education segment in India. The effectiveness of online education over offline education is still a concern. In the longer term, sitting long hours and grasping concepts online can create illness in the students. The physical model of education cannot be undervalued. It is true that the online mode of education helped in the wastage of resources and will help this sector in achieving sustainability. From the authors' perspective, a hybrid education model can help in the future, but before that lot of challenges need to be overcome by the educational leader.

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