

ASSESSING THE IMPACTS OF VIRTUAL LEARNING DURING COVID-19 PANDEMIC ON STUDENTS AND TEACHERS

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The COVID-19 pandemic forced the closure of educational institutes all around the world. As a result, education had and is still experiencing considerable transformation with the introduction of e-learning, which confined students to receive instructions remotely via digital platforms. Some students and teachers were apprehensive that if online learning adoption will continue post-pandemic it may affect the global education business, given the abrupt shift away from the classroom in many parts of the world. This study was done to find out the impacts of virtual learning on the students and teachers, and the challenges faced by them during the transition from physical to virtual modes of learning. The questionnaire was designed in two google forms — one for teachers, and one for graduate and postgraduate students, which were circulated via various social media platforms. The purpose of this study was to see how online classrooms fared for professors and students in India. Furthermore, it attempted to comprehend the users' experiences as well as the specific set of obstacles that this style of teaching presents. e-learning assisted both teachers and students in developing new skills and capacities that aided them and expanded their knowledge.

Keywords: Virtual Mode, Physical Mode, Learning, Students, Teachers

Introduction

The outbreak of the Coronavirus disrupted people's daily lives, but the virtual world stepped into aid. Shopping, leisure, employment and education shifted online throughout the world. COVID-19's rapid spread has globally impacted on the education system significantly. Many people resorted to technology in order to keep the teaching and learning process going while educational institutions shuttered (Jain, Lall and Singh, 2021). The pandemic led to the disruption of the education system worldwide and has affected nearly 1.6 billion learners across 200 countries. More than 94 per cent of the students' population

worldwide were affected as a result of sudden closure of schools, institutions and other learning spaces (Pokhrel and Chhetri, 2021). It has been observed that more than 32 crores of Indian students were affected by the lockdown and as a result of which their education has been interrupted (Jena, 2020).

Following the closure of schools and colleges, the transition from traditional learning to virtual learning has not been smooth. In this modality, both teaching and learning take place via electronic devices, which are relatively new to the teaching-learning community as a whole. However, people who did not have access to e-media suffered

much and were left behind, especially those belonging to low income groups and residing in poor and remote areas. More than 90 per cent of countries acquired digital or broadcast learning schemes and out of which only 60 per cent executed it for the pre-primary education sector. Worldwide, 31 per cent (approximately 463 billion) of school-going children were unable to stick out to the e-learning methods due to the lack of necessary resources. (<https://data.unicef.org/resources/remote-learning-reachability-factsheet/>)

Educational institutes faced a lot of challenges to adjust to this change to virtual education and tried hard to choose the right technical approaches to appeal to their students in e-learning. Dependence on e-learning during the pandemic was associated with various shortcomings in terms of availability, unavailability and affordability of cybernetic technologies for virtual education, that led to huge 'digital inequity' (Rashid and Yadav, 2020). The pandemic has badly affected the education of students worldwide as well as the life of both students and teachers in terms of psychological, social, mental and economic aspects. The sudden shift in learning process from traditional classroom to online classes has led to a plethora of changes in their lives and overall process of learning and teaching.

Stress, apprehensions and depression are very common in the teaching profession because of job insecurity, salary issues, enormous work pressure, etc. Increased work pressure during this pandemic has severely affected the health of teachers. The stress caused due to sudden transition to online mode has been manifested in various

ways like sleep problems, eating disorders, lifestyle, anxiety and many more (Ozamiz-Etxebarria et al., 2021). Also, teachers were required to create content for online classes by using PowerPoint presentations, videos, etc. However, this was not easy as all the teachers are not techno savvy (Koul and Bapat, 2020). Thus, teaching had become a very challenging task (Aperribai et al., 2020). Confusion regarding academics, technical challenges, financial problems and anxiety related to career and jobs also led to increased stress levels. This shift was not easy, even for the students as they did not have gadgets like laptops and access to internet facilities. This led to difficulties in attending classes, confusion about online assignments and projects which ultimately affected their interest and performance (Alghamdi, 2021). Moreover, students tend to lose interest in class easily, and get distracted by social media, since the teacher is not physically present to ensure discipline (Koul and Bapat, 2020). Further changes in routine activities including reduced physical activity, disrupted sleep cycle and spending more time on social media has affected their mental as well as physical health (Chaturvedi, Vishwakarma and Singh, 2021).

However, in spite of the above mentioned drawbacks, blended teaching will evolve and will lead to innovative and creative learning. Students and teachers were able to utilise the time to brush up their technical skills. Portals created for online teaching will come handy for the students in coming future, making the process of learning and teaching easier and comfortable (Koul and Bapat, 2020). When it comes to the Indian educational system,

online classes are a relatively new method of teaching. Investigating and evaluating how online classes are perceived and experienced by students and faculty across India's colleges and universities would help educational specialists better understand and adapt to the needs of both teachers and students (Nambiar, 2020). Students' viewpoint along with the opinion of the teachers is equally crucial because if they, as learners, are dissatisfied and find the online method undesirable, the educational foundation itself will be weakened. This introduction of online classrooms has been equally challenging for the professors, who are also under pressure to adapt to this new teaching approach. With this objective, the current study was performed to find out how teachers and students felt about online classrooms in contrast to face-to-face classroom teaching. The purpose of this study was to analyse both teachers' and students' attitudes regarding online learning. This study investigated survey responses from individuals ranging from graduate to post graduate students, as well as school teachers and professors. This paper summarises the findings of the survey conducted to determine how well this new method is being adopted by both teachers and students, as well as the common issues they face while taking online classes, in order to assist educational instructors and facilitators, as well as college and university administrations.

Methodology

This study was conducted to analyse the overall impact of virtual learning adopted due to COVID-19 outbreak on the students

(undergraduate and postgraduate only) and the teachers. Two google forms were circulated via various social media platforms in the months July to September 2021, one for students and another for teachers. Each form comprised of two sections; one section covered the personal details of the respondents which were similar in both the forms and the other section was concerned with the questions related to students and teachers, respectively. Google forms for students and teachers contained 30 and 28 questions, respectively. The questions were framed in such a way that they covered all the parameters, including the physical, mental and social impact on students as well as teachers, and how the shift from physical learning to e-learning has affected their personal and professional relationships. A certain set of questions was kept common for both students and teachers to get an idea about the common view they share on the aspect of e-learning like, their experiences with e-learning (including both positive and negative), comfort and shortcomings of e-learning, and how blended learning (i.e., use of smart media for teaching) will look like post-pandemic and whether inadequate knowledge of technology causes techno-stress during virtual learning. The study also aimed to compare both online and offline mode of education. All the questions in both forms were compulsory to answer, except for a few related to personal information. All the respondents were assured that the data was used for analysis purposes only. A total of 456 responses were received out of which 390 responses were received from students and 66 from teachers.

Results

Personal details of respondents (students and teachers)

A total of 456 responses were received, 390 from students and 66 from teachers. The majority of students i.e. 99.70 per cent belonged to the age group 17–30 years and the rest 0.30 per cent were from age group 30+ years. Among students, 88.40 per cent were female, 10.60 percent were male and 1 per cent did not prefer to reveal their gender. 90.00 per cent of the respondents were undergraduates and rest 10.00 per cent were postgraduates.

A total of 66 responses were received from teachers among which 59.40 per cent of the respondents belonged to the age group 30–45 years, 37.40 per cent belonged to age group 45+ years and rest 3.20 per cent were of less than 30 years of age. Some other variables were also included like teacher's marital status, whether they work in government or private institution and if they are permanent, temporary or adhoc faculty.

Internet access is a vital prerequisite for online classrooms and also one of major challenge which both students and teachers faced during online classes. 6.10 per cent of the students reported that they had poor network connectivity, 42.10 per cent had good network connectivity while 51.80 per cent did not have consistent network connectivity. Approximately 63 per cent teachers had good connectivity while the remaining 37 per cent had network issues, with good and poor connectivity at times.

Contentment with virtual learning and teaching process

The unexpected transition from physical mode of learning to virtual learning during the pandemic, which made the world come to a

standstill. Academic institutions, universities, colleges, etc. were compelled to shift to online mode to continue with the teaching-learning process. They tried their best to make this process easy with the available infrastructure. To get an insight into this, the respondents (both students and teachers) were asked if they were satisfied with the virtual mode of teaching at their college or university. To this query, 68.70 per cent of students responded that they were not satisfied while 31.30 per cent were satisfied with the current mode of teaching adopted by their college or university. 53.00 per cent of the teachers were not satisfied with the current teaching mode in their college or university and rest 47.00 per cent were satisfied with the current teaching mode.

Changes observed in the personal lives of students and teachers

When asked if virtual learning has affected their personal lives, the majority of students responded yes, among which 69.50 per cent of students reported a negative change, 16.70 per cent reported a positive change. A total of 77.30 per cent of teachers responded yes, out of which, 28.80 per cent stated negative changes and 48.50 per cent stated positive changes, while 13.80 per cent of students and 22.70 per cent of teachers did not experience any such change (Table 1).

Table 1: Data Representing Percentage of Students and Teachers Based on the Type of Changes Observed by them in their Personal Lives

Types of changes observed	Students (percentage)	Teachers (percentage)
Yes, positive change	16.70	48.50
Yes, negative change	69.50	28.80
No change	13.80	22.70

Impact of virtual learning

Students were asked if they attended the classes on regular basis, were able to understand the concepts and could convey their queries. 74.40 per cent of the students reported that they attended their classes regularly in the virtual mode of education and could concentrate on their studies, while 25.60 per cent did not agree with the question (Fig. 1A). Only 4.70 per cent of them were able to understand the concepts clearly, 81.50 per cent of them were unable to understand the concepts and

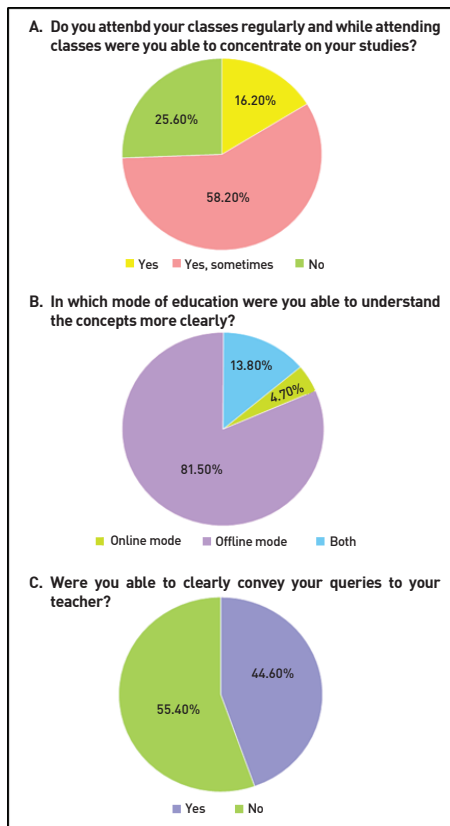


Fig. 1. Data on the percentage of students that attended virtual classes on a regular basis, their understanding of concepts and verbalising their queries clearly during those classes

the understanding of remaining 13.80 per cent of students was not affected by this transition (Fig. 1B). 44.60 per cent of students responded that they were able to explain their queries clearly to teachers irrespective of the mode of education, whereas more than 50 percent (i.e. 55.4 per cent) of students could not (Fig. 1C).

When teachers were asked whether they were able to explain the concepts confidently to their students. To this, 86.40 per cent responded 'yes' and only 13.60 per cent responded with 'no' (Fig. 2A). Next question was whether their students were attentive and were able to understand the topics effectively. To this, only 15.20 per cent responded with 'yes', 9.10 per cent responded 'no' and 75.80 per cent specifically replied that 'not all the students' suggesting that only a certain proportion of students were able to follow (Fig. 2B).

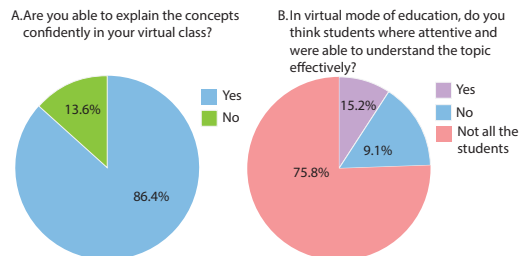


Fig. 2. Data representing the confidence level of teachers, and alertness of students and their understanding of topic during virtual classes

Challenges Faced During Virtual Mode of Education

Challenges faced by students

For virtual mode of education, strong internet connectivity is mandatory and not every student lives in an area with good internet access. Hence, students were asked whether they helped their friends who were unable to attend their classes due to poor internet

connectivity in their area of residence, 84.10 per cent of them responded 'yes' (they assisted their friends whenever needed), but 15.90 per cent replied 'no' (Fig. 3A). Moreover, sudden closure of colleges and universities due to the COVID-19 has also led to the closure of laboratories, thus student did not get hands-on training on their relevant subject topics which is one of the limitations of virtual learning especially in field of science where hands-on training is a must. Thus, when students were asked about whether they were lagging behind in hands-on training and if there was a greater emphasis on theory, 91.30 per cent of respondents responded

'yes' and 8.70 per cent of them denied (Fig. 3B). Furthermore, due to the scenario caused by COVID-19, it was not recommended safe to conduct exams in physical mode. There were constant reports on rescheduling and cancellation of exams, that were hampering students' preparation for the exams and thus consequently creating frustration and chaos among students. 85.10 per cent students felt irritability and frustration whereas 14.90 per cent of respondents responded that did not face any such kind of issues (Fig. 3C). Virtual learning can induce mental stress. In the survey conducted, 56.90 per cent of students reported that virtual classes led to mental

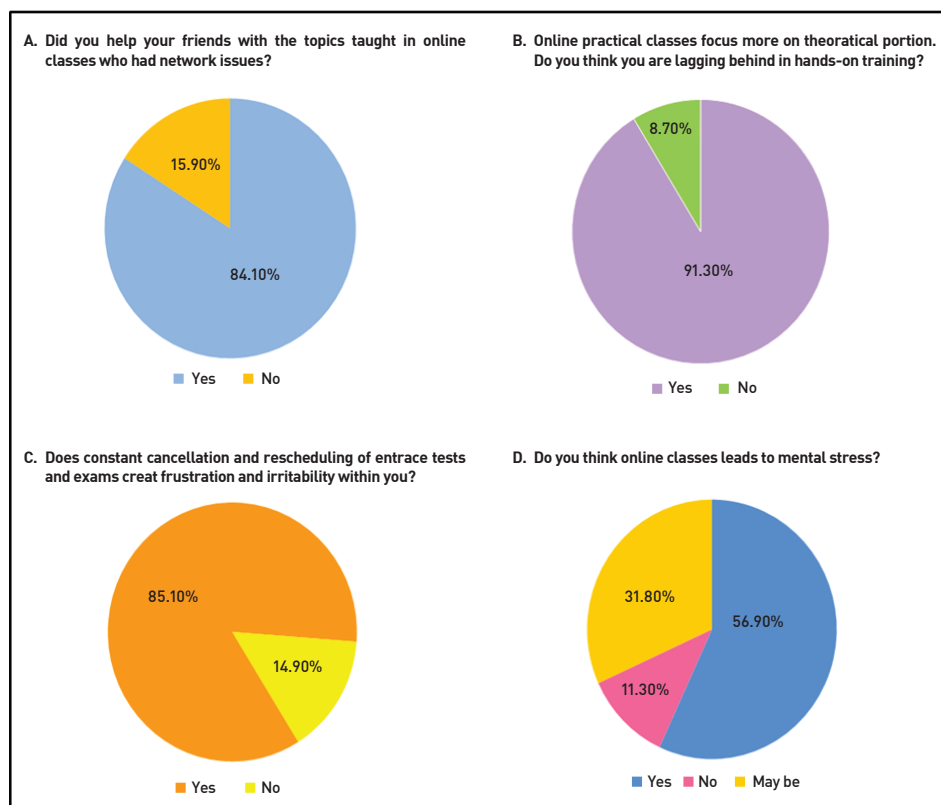


Fig. 3. Data representing the challenges faced by students in virtual mode of learning

stress, 31.80 per cent were not sure enough if it did and 11.30 per cent did not feel the same (Fig. 3D).

Challenges faced by teachers during web-based teaching

In any career, professional development is critical to one's success. When teachers were asked how they felt about their professional development during the pandemic, more than 50 per cent (i.e. 51.5 per cent) responded that it was 'quite valuable', 27.30 per cent said it was 'not so valuable' and 21.2 per cent of teachers could not say anything (Fig. 4A). Teachers' job instability has intensified due to sudden transition to virtual teaching, 57.60 per cent of the teachers agreed that they feel sense of job insecurity, 21.20 per cent disagreed and rest 21.20 per cent were

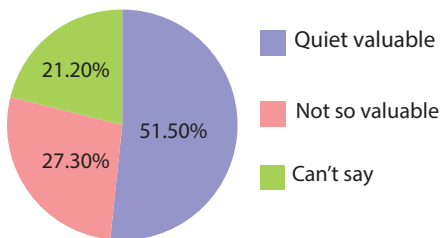
undecided and responded 'can't say' (Fig. 4B). They were further asked if they observed any change in the number of students attending the classes; in 53.00 per cent of cases, the number of students was less in virtual classes while for 28.80 per cent, the case was just the opposite. No such change was observed in 18.2 per cent cases (Fig. 4C).

Common challenges encountered by students and teachers during virtual mode of education are presented in Table 2.

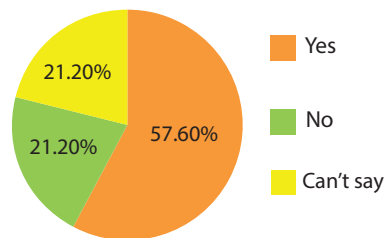
Hesitancy in speaking in front of the class

In addition, it was also analysed whether the respondents felt any hesitation while speaking in front of the class. The percentage of respondents students and teachers respectively

A. How valuable your professional development has been during the pandemic ?



B. Do you think pandemic has led to job insecurity ?



C. Did you observe any change in the number of student attending the classes in the online mode in contrast to offline mode?

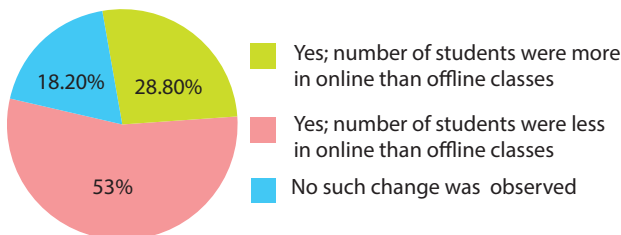


Fig. 4. Data representing the challenges faced by teachers during web-based teaching

Table 2: Data Representing Percentage of Students and Teachers Encountering Various Challenges During Virtual Mode of Education

S. No.	Questions asked from respondents	Percentage of responses received (per cent)			
		Students		Teachers	
		Yes	No	Yes	No
1.	Do you think maintaining a strong student-teacher relationship is difficult during online mode when compared to offline mode?	93.30	6.70	95.50	4.50
2.	Have you developed any kind of techno-stress (due to your inability to learn new technologies or any other reason) due to the online mode of education?	20.80	79.20	31.80	68.20
3.	Does purchasing technical gadgets required in the online mode of education put extra burden on your financial health?	61.50	38.50	71.20	28.80

who felt hesitant to speak in front of the class are 43.40 per cent and 22.70 per cent. On the contrary 12.10 per cent of students and 45.50 per cent of teachers did not feel the same.

Positive and negative experiences of students and teachers with virtual education

Apart from the serious healthcare damage and a huge disruption caused by COVID-19 in educational and various other sectors, there have been certain experiences that can be stated as positive. Hence, a list of related options was provided to the respondents and they were supposed to select the ones they were in agreement with. 'Convenience of time and place' was the one selected by most of the respondents (58.7 per cent students

and 71.20 per cent teachers). 5.40 per cent students and 9 per cent teachers also opted for 'other experience(s)' that was/were not among the given set of options (Fig. 5 and 6).

In accordance with positive outcomes of virtual learning, negative outcomes were also experienced by both students and teachers. This was seen in the responses received from students and teachers in which majority i.e., 75.60 per cent of students and 71.20 per cent of teachers suffered irritation due to increase in screen time. Another significant percentage of respondents (75.40 per cent of students and 69.70 per cent of teachers) said that the virtual education has led to the reduction of personal interaction between students and teachers (Fig. 5 and 6).

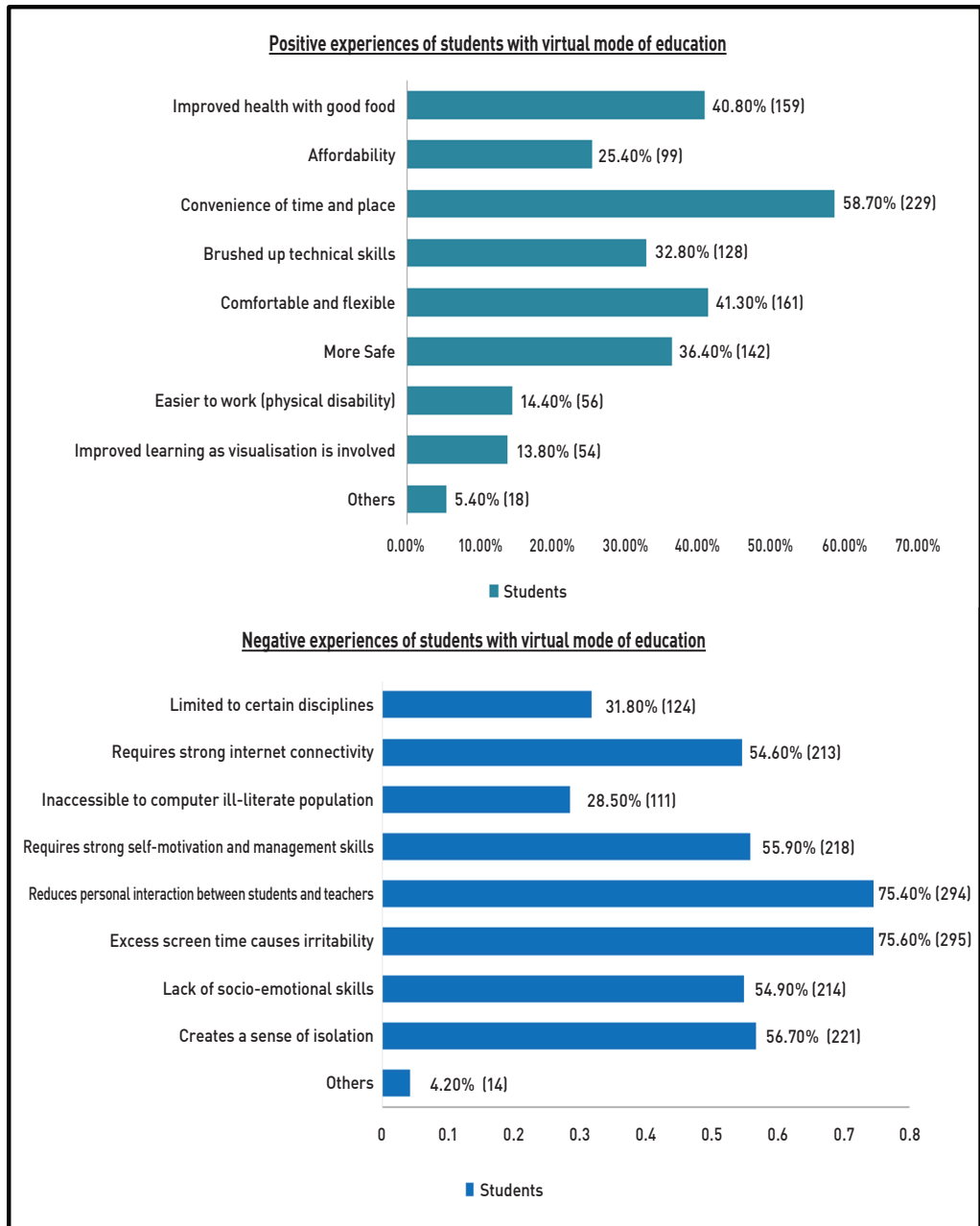


Fig. 5. Graphical representation of positive and negative responses of students to virtual education

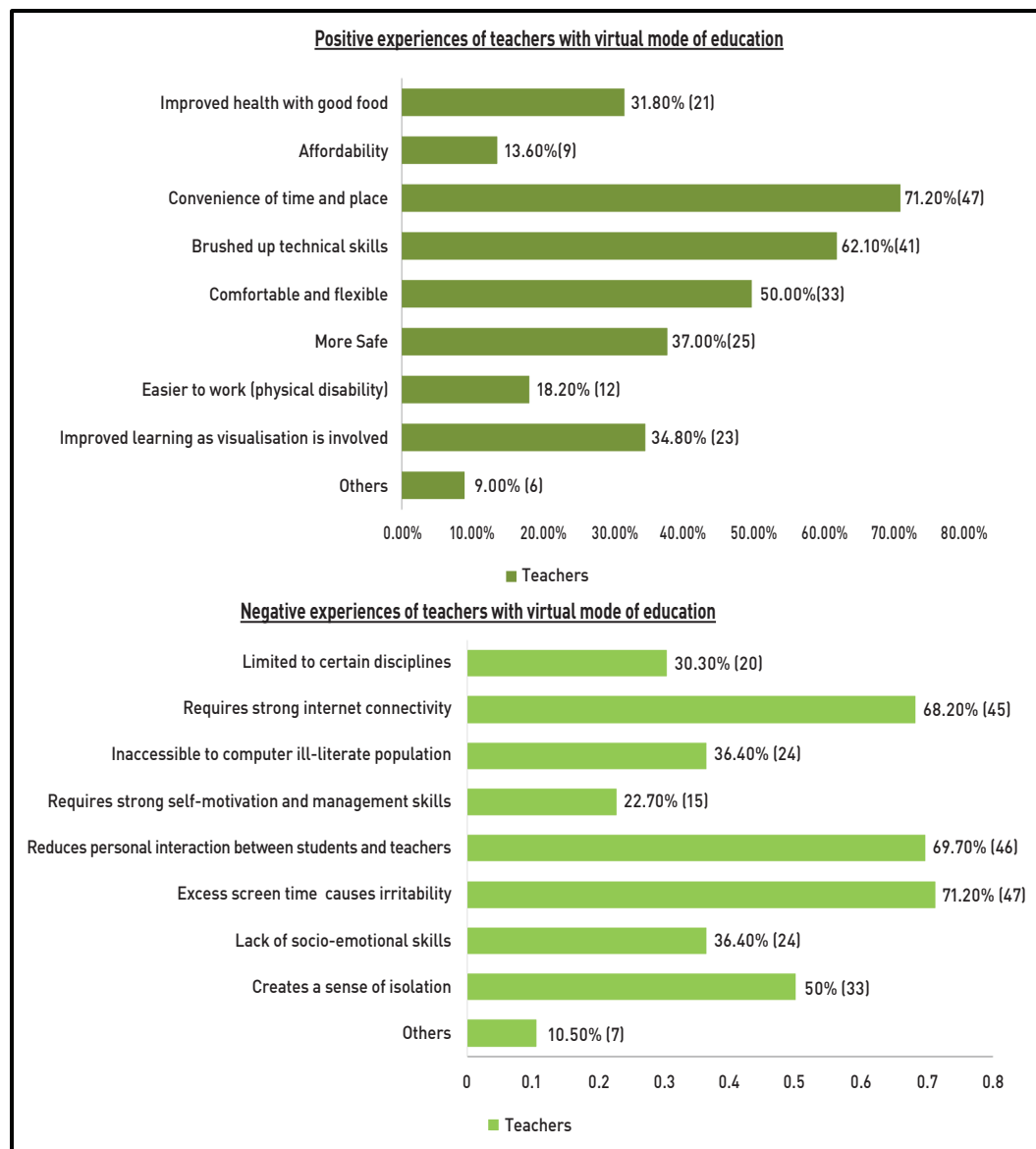


Fig. 6. Graphical representation of positive and negative responses of teachers to virtual education

Post-pandemic blended learning

According to the results, majority of the respondents (41.02 per cent students and 63.63

per cent teachers) showed positive attitude towards blended learning, while others (18.46 per cent students and 13.64 per cent teachers) had a negative attitude and a combination of

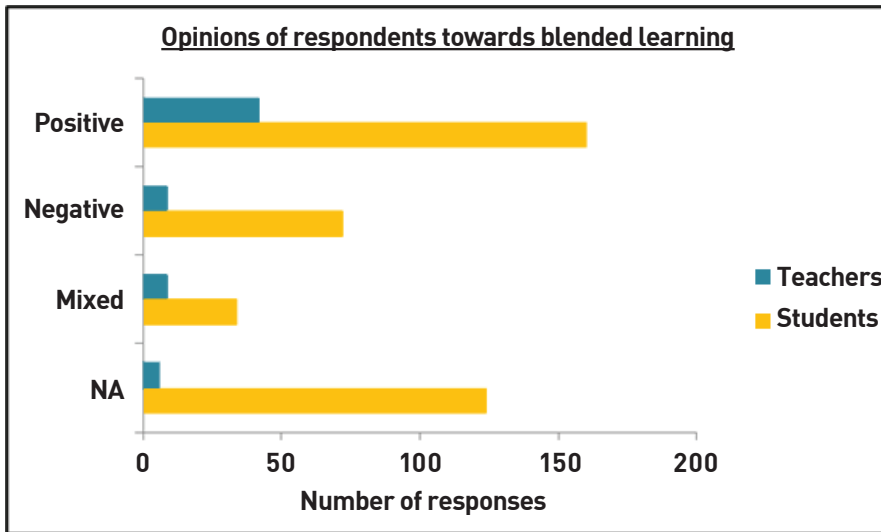


Fig. 7. Opinions of teachers and students towards blended learning

positive and negative comments were observed from 8.72 per cent students and 13.64 per cent teachers (Fig. 7). However, some of them were hesitant due to the prolonged lack of face-to-face engagement throughout the pandemic. Students were asked to share their views on post-pandemic blended learning. Most of them seemed to have adapted to the e-learning as they became techno-friendly which was needed for virtual mode of education. According to the students, blending learning would involve a mix of smart boards, video clips, classroom projectors and regular writing boards. They stated that post-pandemic classes would be a hybrid of physical and online teaching. Use of digital tools would increase post-pandemic and will also help in better understanding of concepts. They find it interesting and efficient. Though, a proportion of students were yet not comfortable with this method as they find it non-interactive, unreliable and troublesome for technologically challenged people.

Likewise, teachers stated that the blended learning would be a combination of the presentations, videos, animations, etc., that they have used in their teaching during the pandemic along with the conventional approaches. Many of the teacher-respondents expressed the view that blended learning will make a larger space for itself in the teaching scenario, but the infrastructure needs to be developed. Since, online teaching exposed them to a variety of technologies, they will be able to create a better understanding of subject matter in students. Use of these digital tools would make the subject easier as well as interesting. Keeping in mind the safety concerns of COVID-19, a few of them also suggested to conduct virtual and on-campus teaching on alternate days as a way of blended learning. On the other hand, they also mentioned that the course of virtual learning has made students lose their habits of drawing, writing and memory retention.

When it was asked from our respondents about how blended learning would look like post-pandemic, some of the fascinating responses received from students and teachers are listed below.

al. (2021). For some students, the shift to virtual learning was quite an unforeseen experience, especially for those residing in rural areas as reported by Nambiar (2020). Extensively, 3 out of 4 students who were

Table 3: Responses Received from Students and Teachers

S. No.	Responses received
1.	"Not necessarily. Understanding of theory with hands-on experience of the subject matter would be blended learning post-pandemic. Depending upon the institution, smart boards and video clips could also be included."
2.	"Blended learning is a very fascinating concept. For me, the situation has left the students with a choice as to adopt self-paced learning. So, I think a simultaneous online and offline classroom teaching gives a lot of opportunity to students not in a position to attend physically. Well-equipped classroom is a must for this. Well, many private schools in urban areas have smart boards and they used this technology even much before the pandemic started. So, this is what my perspective is."
3.	"I did use the ITC tools earlier as well like presentations, YouTube videos to explain or provide variety to the topic and would continue to use these platforms. It only brings more material to the table."
4.	"Yes. I think it will be better as teachers are getting technology savvy. It's going to be beneficial as pandemic and online mode of teaching has taught us how to use e-tools to make subject more interesting. So, post-pandemic we can utilise these and can better our mode of teaching to make it more interesting."
5.	"Previously, we were not so technology friendly but due to this pandemic we have learnt a lot but according to me chalk and board learning is the best; video clip can be added to that but one cannot depend on technology to interact with students. Students are losing the habit of writing, drawing and memory retention."

Discussion

COVID-19 has resulted in a significant shift in the educational system not only in India but across the world. The results of the present study shows that not all the students and teachers were satisfied with the virtual mode of teaching adopted by their college or university which is in line with another study conducted by Ozamiz-Etxebarria et

unable to access the e-learning schemes came from remote or rural areas (<https://data.unicef.org/topic/education/covid-19/>). 50 per cent of our student-respondents believed that students belonging to rural areas were at loss. The results also showed a decline in the attentiveness of students in their classes. This could be due to a variety of issues they faced during virtual classes, such as lack of stable internet connectivity in their region of

residence, which made it difficult for them to stay, focused during lectures. Similar result was also reported by Balan, Jacintos and Montemayor (2020) in their study. Many students reported having developed signs of mental stress such as anxiety, irritability, depression and headaches during online education. Lack of usual social classroom interactions and attending classes in isolation at their homes has created a feeling of loneliness among them. They are losing focus, motivation as well as confidence which are consistent with the findings of Ozamiz-Etxebarria et al. (2021) in their research. Limited social interaction with the teachers and colleagues and not being able to keep up with the process of virtual learning have made the majority of student-respondents concerned about their socio-emotional well-being and academic careers.

People's reliance on technology has expanded dramatically since the switch to virtual mode, and, in various ways, technology has become one of the causes of stress in people. Teachers were under a lot of stress since they had to acquire new technology tools because virtual education was the only way to provide material. As per the results, the technical glitches faced by the students during their online classes created a feeling of anxiety and stress in them. Some students were not very well-versed in handling the technological devices, especially those from rural areas. The course of virtual learning posed many other challenges and difficulties for students including the financial burden of buying adequate gadgets, inability to understand and convey queries effectively, connectivity issues, more emphasis laid on the theoretical portion by institutions, the fear of missing out on practical knowledge and

others. Numerous studies support the fact that closure of laboratories in educational institutions affected nearly all the educational sectors throughout the country. However, science being a largely practical-based subject, suffered the biggest setback. Various disciplines of science such as physics, chemistry, microbiology, immunology, engineering and technology, etc., require intense lab work by students in order to observe and develop a better understanding of the scientific theories as is seen in the studies by Millar (2004) and Shana and Abulibdeh (2020). Practical hands-on experiences in labs provide a platform to students to apply the concepts and derive results. Shutting down of labs left behind the students with a mere theoretical knowledge of scientific concepts and lack of hands-on training which led to the deterioration in their practical and analytical skills. Similar findings have been observed by Chadwick and McLoughlin (2021) and Opere (2021). After the hitch observed by the laboratories, various virtual labs including PraxiLabs (<https://praxilabs.com/>), MERLOT (<https://virtualabs.merlot.org/>), Skillscommons (http://als.skillscommons.org/virtual_labs.html), Virtual Amrita Laboratory Universalising Education (Value @ Amrita) (<https://vlab.amrita.edu/>) and many others took up the task to provide close hands-on experience to students using simulations digitally. They served as accessible and affordable virtual platforms that allowed students to work on their laboratory skills while learning remotely. Babateen (2011), Ramadhan and Irwanto (2017), Coleman and Smith (2019), and Usman, Suyanta and Huda (2021) are some of the studies stating the same. Virtual laboratories are available online for a variety of scientific and non-scientific disciplines like astronomy, biology, chemistry,

physics, psychology, philosophy, political science, business, finance, engineering and environmental sciences, thus acting as multidisciplinary resources. Many virtual labs like labsonlaptop and olabs were also established for the school students to provide them hands-on experience. These labs were accessible by the students of Central Board of Secondary Education (CBSE), Indian Certificate of Secondary Education (ICSE) and other boards. These virtual labs came with their own challenges and limitations. A number of research studies such as those of Ngoyi (2013) and Alshurman, Al-Saree and Alshurfat (2020) summarised the struggles faced by corresponding students and teachers in order to get familiar with these digital tools.

For comprehensive learning to take place, teachers need to maintain an understanding and one-to-one interaction with students which has become very difficult in virtual teaching because of the lack of physical interaction between teachers and students. Teachers can help by providing psychological and social assistance or counselling so that the students can express their feelings and grievances related to studies, career opportunities, etc. Moreover, various activities can be included in the teaching procedure to make the subject more interesting and interactive. A huge proportion of students and teachers believed that it was difficult to maintain a student-teacher relationship during the virtual mode of education which was also reported in the study of Aperribai et al. (2020).

This study also attempted to gather individual opinions of respondents on the concept of blended learning, which could serve as an effective model of education in institutions

post-pandemic. In simple terms, blended learning can be understood as a combination of e-learning and traditional learning:

e-learning + Traditional learning = Blended learning (Tayebinik and Puteh, 2012)

Most of our respondents held a positive attitude towards blending learning and found it fairly effective.

Overall, the pandemic necessitated the development of infrastructure to ensure the seamless operation of the teaching-learning process. In terms of technology, people have gained a wide range of new talents. This will be beneficial in the future and will open up opportunities for blended learning, which will eventually aid in the improvement of educational delivery.

Conclusion

This study concludes that the transition from physical mode to a virtual mode of learning affected the personal lives of both students and teachers in positive and negative ways. Adapting to the virtual mode was observed to be rather easy for the majority of the respondents (students and teachers), since they did not report any kind of techno-stress or mental stress, but it was not that straightforward for some of the respondents. Maintaining a strong student-teacher relationship in a virtual classroom was more difficult in comparison to traditional classroom. According to this study, students and teachers faced various challenges with virtual learning during the COVID-19 pandemic. Overall, the pandemic prompted everyone to establish infrastructure and permit a seamless and consistent teaching-learning

process. Technical skills that have been honed as a result of virtual education will assist and offer new opportunities for strengthening blended learning, which will help in the better understanding of the subjects. To utilise these techniques efficiently, educational institutions and management who will be the future deliverers of online learning require a better knowledge of how students and teachers perceive and react to online classes as a learning modality.

Conflict of Interest

The authors declare no competing interests and the research received no funding.

Acknowledgements

The authors would like to thank the respondents for their cooperation and Gargi College, University of Delhi for providing an opportunity to conduct this research.

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