

# Unlocking the online education space during the lockdown: Adaptation and synergies of teachers and students

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**Abstract:** Online teaching and learning existed before COVID-19 pandemic and used as a supportive option to the offline mode. During the pandemic, students and teachers were forced to adopt online methods and this called for a need to realize the impact, adaptability, challenges and effect on both faculty and students. Surveys were carried out with an objective to understand the faculty and students' transformation process from offline to the online mode of teaching and learning. Various issues including online course perceptions, delivery methods, technical adaptability, students' engagement were surveyed for both students and teachers in the engineering major.

The survey was carried out in three phases during the lockdown period, before commencement of classes, 10 days after commencement and after completion of half of the syllabus. 500 engineering undergraduates and 45 engineering teachers participated in this survey.

This survey will help teachers to understand the importance of training on the new generation tools for online teaching. Students will also realize the importance of self-learning and the way to compensate for the missing social life during the lockdown through online technical discussion during the assignments.

Training on online tools and techniques played an important role in teachers' delivery method in the online mode that resulted in improvement in their confidence according to the survey. Reflections by viewing their own recorded video played an important role for the teachers where 80% of the faculty members modified their delivery methods for online teaching. The survey showed that students embraced the new space and 85% of students got involved in online course discussions that enhanced their self-learning. 65% of students suggested that the missing on-campus social life was partially compensated due to online education. The forced online teaching and learning due to the lockdown, unlocked many prospects for teachers and students to explore the various online tools.

**Keywords:** Online teaching and learning, lockdown education, student engagement, online educational tools, training teachers

## 1. Introduction

Higher education has taken a sudden shift from traditional on-campus classrooms to the online classroom due to COVID-19 pandemic. Initially, there was an ambiguity with the number of days of lockdown hence the teachers and students were not sure about the way forward. However, after the clarity faculty members and students were left with no option but to continue the teaching and learning process through online mode. Online education existed before the COVID-19 pandemic as well.

Online education course was offered for the first time in the year 1981 and the full program was offered in the following year (Harasim, 2000). In mid-1980s several colleges and universities offered undergraduate and graduate online courses. Effective commercial usage of world wide web was witnessed in the 1990s and it facilitated to increase the educational websites around the world as per Preece et al., 2003. There were many colleges and universities around the world that offered not only online courses but also full online programs (Wallace, 2003).

Engineering educators in India were adopting various innovative practices during pre-pandemic period and various pedagogical practices were carried out successfully (Irfan et al., 2017, 2018) (Govil and Pillalamarri, 2020) (Ahmed et al., 2018) However, teachers were not fully familiar with the online mode of education (Jena, 2020). Only a few of them have undergone a limited online courses themselves to improve their understanding of the latest technology topics and to carry out online certification courses. The compulsion to adopt online education during the pandemic witnessed a major shift in the teaching and learning process (Jena, 2020).

The objective of survey carried out with students and faculty members is to understand the process involved in transformation of classes from offline to online. This surveys explores the perception of the students and faculty members

on the difficulty of conducting and adopting online classes before the actual conduction of classes and the real difficulties faced and improvement after the training. The survey will help faculty members to understand the importance of adopting new techniques by undergoing training. The impact of students' and teachers' engagement was also studied.

**2. Methodology**

The method adopted in this survey is in the form of a questionnaire to the students and teachers. Overall, 45 teachers from various engineering branches and 500 students participated in this survey. Three questionnaires were designed at three different stages after the announcement of the lockdown. The first questionnaire, further will be called phase-1, was designed and circulated before the start of online classes. At this stage, the thoughts, perception and envisaged challenges were accessed from both the student and faculty fraternities. Many problems were faced during the start of the online classes and hence the second questionnaire will be called phase-2, was circulated after the 10 days of online classes to obtain the areas of difficulties. The last questionnaire, phase-3, was circulated after the completion of half of the syllabus to obtain the actual impact on teachers and students.

**3. Results and reflections**

*Phase-1:* As a part of phase-1, the experience of online teachers was obtained and it was realised that only 6% of teachers have got the experience of online teaching, see figure 1 and according to their comments, the experience is related to one or two topics. This clearly shows that before the commencement of the online classes no one has got the experience of conducting online classes for a full course and this was reflected in their confidence levels in conducting online classes that were as low as 4 in a scale of 1 to 10 (Low to High).

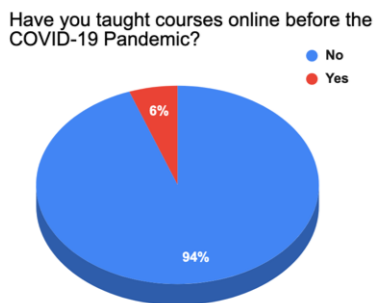


Fig. 1 Teachers' experience with online teaching and learning (pre-pandemic)

Similar was the students' experience of attending online classes. As seen in figure 2, only 10% of students have attended online classes before this pandemic and are replicated in their perception of the effectiveness of online class conduction that can be seen in figure 3.

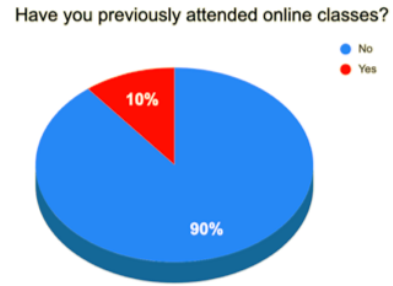


Fig. 2 Students' experience with online classes (pre-pandemic)

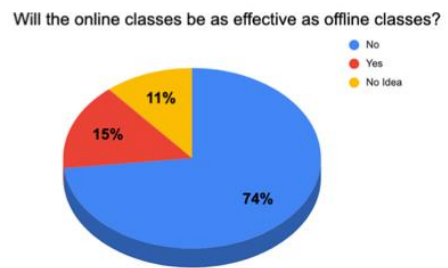


Fig. 3 Students' perception on effectiveness of online classes (pre-pandemic)

It was quite natural to see that even in online classes teachers want to use the traditional teaching practices using blackboard/whiteboard (figure 4 and 5) tools rather than online tools such as Powerpoint, Onenote, etc. Reluctant for the change in engineering education is well-established scenario (Goldberg, DE 1996) as the change forces people to move out of their comfort zone. The same is felt by teachers and they wish to settle for the traditional practices. This was re-asserted in this survey where 80% of the faculty members initially didn't opt for new online teaching and learning tools. However, this perception and reluctance didn't stand for long and they realised the importance of adaptation to new tools of online teaching which is evident and discussed in the Phase-3



Fig. 4 Teachers perception on online teaching methodology of (pre-pandemic)

Have you taught courses online before the COVID-19 Pandemic?

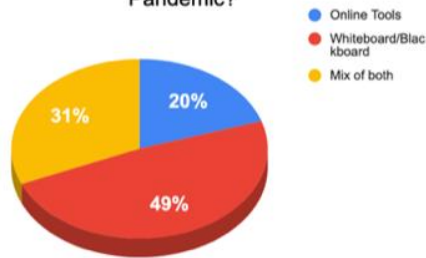


Fig. 5 Tools to be used for online teaching (pre-pandemic)

The internet plays important role in online education (Arsham, H. 2002) system and with the availability of Zoom application, an audio-video presentation tool, university envisaged using the synchronous mode of education. To use this tool a standard internet connection was needed and can be effective if they follow the lectures using a laptop. Only 8% of students have laptops and the remaining have access to Mobile phones. The other issue that would affect the quality of online classes is the speed of the internet and the data limit per day. Nearly two-thirds of the students have a speed less than a Megabytes per second and 70% of students have the data limit of 1.5 Gigabytes per day that can be seen in figures 6 and 7. This limit worried students in terms of the execution of online classes and the feasibility of online classes.

What is the speed of the Internet do you have?

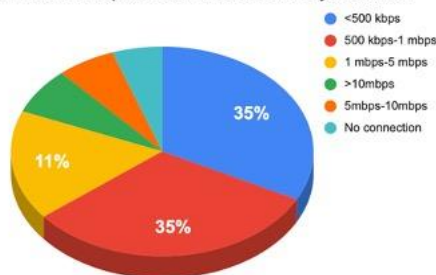


Fig. 6 Quality of internet

What is the limit of the data of your internet connection (Per day)

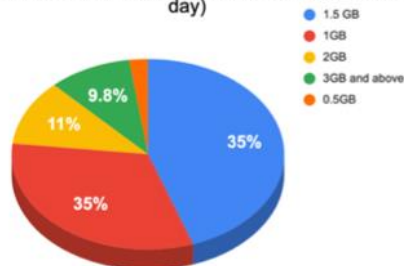


Fig. 7 Internet data limit

Teachers were also predicting these issues and were concerned about the effectiveness of the class, student engagement and challenges for delivering technical content of the class.

Phase-2: During the first few days of the commencement of online classes teachers struggled in using the traditional blackboard/whiteboard tool on audio-visual classes due to limitations of the size of the board voice projection and the same difficulty was seen from the student's side. Soon both the fraternity realised the importance of online tools such as PowerPoint and Onenote etc. and tried to use the mix of both methods after few days of class commencement that can be seen in figure 8 and 9.

Tools you have used during the first 10 classes

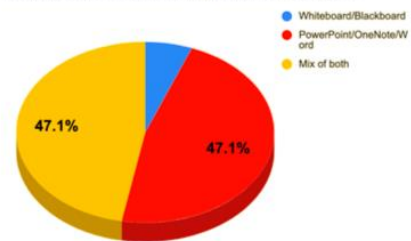


Fig. 8 Teaching tools used by teachers for online classes

One of the issues that many faculty faced is the experience of teaching without students physically present was teaching in a vacuum. The response from students was very poor in the beginning due to many issues that include poor internet connection, unfamiliarity with the Zoom tool, etc. This affected the confidence level of faculty as they were not sure if students were following their teaching as seen in figure 10. This forced teachers to think about modifying the delivery methods and incorporating various methods of interacting with students.

Which method of lecture delivery did you like during the first 10 days of classes?

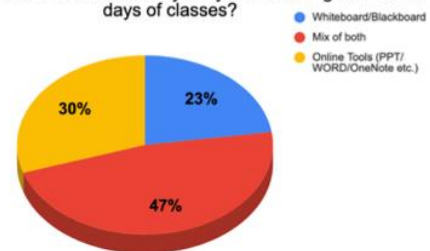


Fig. 9 Students' choice of tools for online classes

Are you feeling confident that students are listening/following your class?

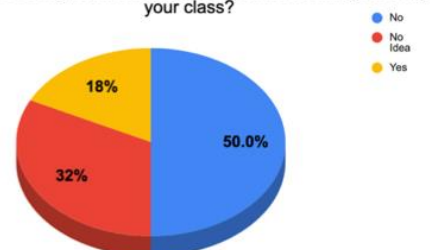


Fig. 10 Teachers' confidence on students' understanding of the content of taught during first few days of online teaching

Student's interaction with student plays an important role in students motivation and imparting knowledge (Akhtar, et al., 2019) but 80% of students felt that the interaction with the teacher was less when compared to online classes and the same was the percentage of students who were not able to

follow the content of the taught topics. Interestingly, the positive effect of this was they started to search for the content of the topics online and offline and which increased their time of self-learning when compared to offline classes which can be seen in figure 11. However, many students felt the need for extra hours or office hours to clear the uncertainties in the topics (figure 12).

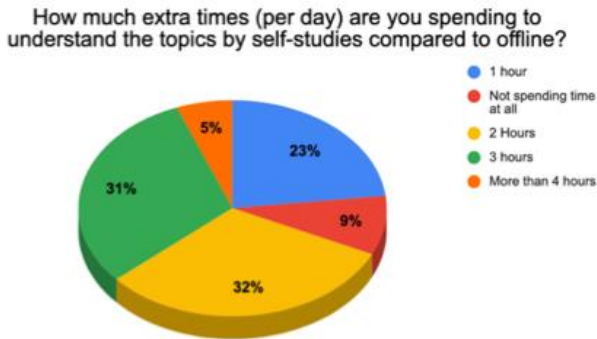


Fig. 11 Hours students spend of self-learning

Another aspect that is very important in student and teacher’s point of view was university social life. As the university stopped the face to face offline classes many students felt lonely and in fact, it affected their psychology and they felt that were left alone during the initial lockdown period of one month and also during first 10 day of classes. The confusion that resulted due to not understanding the topic and no help from colleagues had a negative effect on the students.

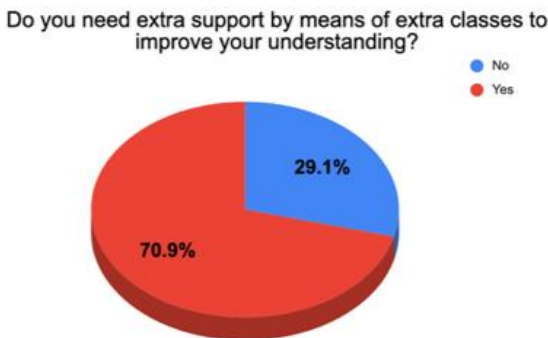


Fig. 12 Extra support/office hour need

*Phase-3:* After a few days of commencement of online classes, the university started to train faculty on various online tools such as Zoom, Canvas Learning Management System (LMS), PowerPoint, etc. This helped the faculty members to improve quality of presentation, effectiveness in delivering of topics, effective interaction and various online teaching methodologies. The result of which is seen in this phase of the survey.

Teachers started delivering the topics after the training and after each class, they observed their synchronous class videos and reflect on multiple factors that affects students understanding such as the speed of delivery, quality of presentation, expression, interaction, etc. These reflections resulted in amending their ways of teaching and learning strategies that improved their quality of teaching which can

be seen in figure 13. This level of reflection process was not carried out during offline classes.



Fig. 13 Importance of reflection during online teaching and learning

Teachers have started using various online tools and techniques for online teaching. Many of them started using the asynchronous mode of teaching where they send the recorded video and animation. With this in place, students started accessing these videos through LMS and it helped them to understand the topics thoroughly and effectively at their own pace (see figure 14). 72% percent of teachers suggested that there were plenty of online resources to deliver the technically rich content to improve the students’ understanding of difficult topics.

Another way that the teachers adopted to help the students is the office hours to clear their doubts on the topics that they didn’t understand in the class (figure 15). Students participated actively in these sessions and 70% of students opined the session to be helpful. As the class a single teacher was handling the class of between 120 to 180 students it was hard for everyone to interact during the office hours and hence 30% felt that it wasn’t helpful. This is the area where the faculty member can take the help of the co-teachers to help the students with their difficulties.

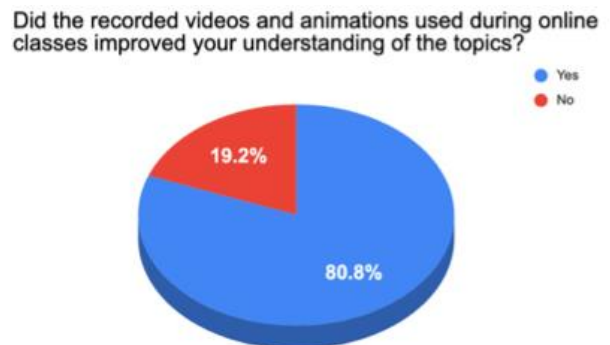


Fig. 14 Impact of recorded videos and animations

Have you started any student interaction session/extra classes to clear their doubts after the class?

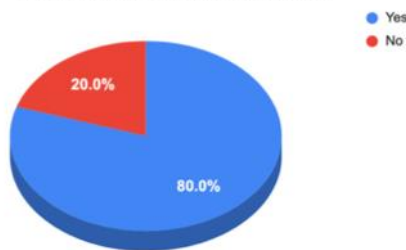


Fig. 15 Teachers starting office hours

As a part of online teaching and learning adaption, majority of teachers have posting the discussion topics on the LMS. This method encouraged 85% of students to discuss the subject with each other in various groups after class hours. This has created a competitive environment and resulted in spending more time, compared to the time they spend during offline classes, in researching the content on the topic of discussion. This method helped them to improve self-learning and also helped them to improve the rapport with the students with who they rarely interacted during the offline class. These interactions partially compensated college social life and reduced the loneliness feeling that is quite evident in figure 16 when compared with the phase-2 of online classes.

Your interaction with your colleagues and teachers during online classes improved your social interaction to make you feel life, less lonely?

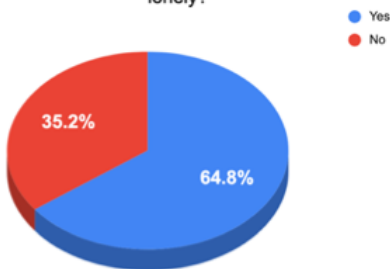


Fig. 16 Improvement on social life during pandemic

#### 4. Conclusions

It is always hard to adapt to a sudden change in any system and the education system is no exception. During the lockdown, the only option to continue education system is online teaching and learning. The online teaching opened a new regime for teachers and students in the engineering domain. Training on online tools improved the teachers' presentation skill and improved their interaction skills through various learning management system. Training had a positive impact on teachers and many started exploring various tools for a novel way of teaching, online. The effectiveness of delivering a complex topic was possible with the smart usage of online content in their presentation. Students' engagement and group discussions not only improved the subject knowledge but also helped to compensate for the missing social life during the pandemic. The major contributor for sustaining the social-connect during the lockdown was possible through online teaching and learning ecosystem.

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