

# Driving Teaching and Learning in Online mode: A Case Study

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**Abstract—** This Innovative Practice Work in Progress paper addresses the challenges faced in Online teaching. The issues faced in Online teaching are multidirectional. Both the teacher and the learner have their set of challenges. These need to be addressed effectively. This paper presents the scenario of an institution implementing innovative strategies in online teaching resolving the challenges faced by both the teachers and the learners resulting in effective training of the teachers in delivering their content in the online mode of instruction, as well as improved student participation. These implementation strategies, and their implications are presented in this paper as a case study.

**Keywords—** Online Teaching, challenges in online teaching, Activity based teaching, student motivation, trainings for faculty, effective teaching in online mode

## I. INTRODUCTION

Educational institutes have closed worldwide due to the outbreak of COVID-19. In this quagmire online education is the only solution for the universities across the globe. There are many challenges faced by all those involved in education due to this sudden change in the mode of delivery [11,12,15,24,26,27]. Even the best teacher is not able to deliver the best. The issues faced are multidirectional. Both the teacher and the learner have their set of challenges that need to be addressed. Efforts are being put in to address these challenges by many of those working in this field [13,14,27]. Effectiveness of Traditional classroom teachings can be enhanced using active learning strategies [1,4,5,6,7,8,9]. Recommendations for activities to be implemented for online teaching have also been proposed [22].

Studying the challenges faced in implementing online teaching, implementing research based methodologies, and innovative approaches in faculty trainings and teaching methods, online teaching could be successfully implemented. Not just teaching in online mode, but effective teaching is the concern. The need is to ensure Effective teaching in the online mode

This paper presents the case study of an institution implementing online teaching resolving the challenges faced by both the teachers and the learners with innovative approaches in training the teachers as well as in adapting teaching methods resulting in effective teaching.

The initial scenario at the institute at the time of starting online teaching is presented in section II. The methodology of the survey, and the Challenges faced by the teachers and the learners are presented in sections III, and IV. Section V presents the approach followed by the institute to overcome the challenges faced in online teaching. The analysis of the study is presented in section VI. Section VII presents the conclusions and future work.

## II. INITIAL SCENARIO AND BACKGROUND

The current scenario being presented is of an engineering college in India offering Undergraduate and post graduate programs in multiple branches of engineering. The percentage of students of the college from rural background are

about 50% with some of them helping out their families in either agriculture or family business during the pandemic period. Bandwidth and technology issues also played a major part in the students participation in online mode. No formal Learning Management System was in place but some faculty used existing tools like google classroom and canvas.

### A. Background

The college has a Teaching Learning Center named Center for Faculty Development and Management (CFDM) for regularly providing faculty trainings. The faculty of the college have undergone training in CFDM in modern teaching pedagogies, outcome based education, learner centric teaching, evidence based teaching methodologies [16, 19, 20, 21, 25]. The teaching learning process in the institute included pre-semester preparation of learning outcomes, course plan, learning material, assessment plans, and remedial measures for weak performers by the faculty that are peer reviewed for quality assurance. During the semester, the course progress is monitored for student participation in the course, formative assessment evaluation analysis, and reflect on their classes conducted. Student feedback is obtained in between the semester to understand the challenges faced by them in attaining the outcomes. All these were done in the offline mode of teaching.

Due to the sudden onset of lockdown due to covid, the classes had to be shifted to online mode which was a sudden change for both faculty as well as the students. At that time, the semester was half complete - half of the syllabus was covered in some courses and three fourth in some courses. The remaining syllabus in the courses had to be taught online. The students were given a timetable for online classes and were provided the online class links through a message to join the class. Faculty started taking the classes with the impression that the traditional classroom setup has only gone online.

Due to the sudden shift to online mode, various online teaching tools were explored. Different kinds of technologies were identified.

Technical tools were required for conducting classes online, for sharing the course material online, conducting assessments online. Learning management systems (LMS) were required. There was no formal Learning management system being used by all faculty initially. Google Classroom [18] was being used by some of the faculty and some were using the LMS Canvas. An effective strategy to gain students feedback after explaining the concept is Polling which provides teachers with a discerning window through which they can assess their teaching methodologies, assess student's comprehension, and based on the results, formulate working plans to meet students learning needs. On the other hand, the act of providing feedback empowers students with a voice, makes them feel valued and that their opinion matters and therefore engages them on a deeper level in the learning process.

With the existing tools in place, the entire teaching learning process had to be taken online suddenly without any preparation. The challenges faced by the faculty and students need to be addressed.

### III. METHODOLOGY

To find solutions to the challenges faced by the faculty as well as the students in switching to online classes, this study was taken up in two phases : The first one after a month of introducing online classes, and the second after a semester of implementing innovative approaches by the institute.

Survey instruments were developed to understand both the teachers as well as the learners perspectives. The instruments for Faculty surveys in both the phases Faculty Survey-1 and Faculty Survey-2 involved online forms with questionnaires that required descriptive answers from the faculty about their experiences. The responses were categorised and analysed manually. The instruments for Student Survey-1 and Student Survey-2 were online forms consisting of likert scale questions and short answer questions. The short answer questions were summarised manually.

This study was conducted with 126 faculty (their experiences ranging from 5 years to 20 years) teaching undergraduate students from all engineering disciplines of the college (computer science, electronics and communication, electrical, mechanical, and civil engineering). 980 students of second and third year undergraduate programs participated in the survey.

### IV. CHALLENGES FACED

While the traditional classroom learning set-up still works, the needs of students and faculty members are changing. The challenges faced by the teachers as well as the learners during the online classes were observed through Faculty Survey-1 and Student Survey-1.

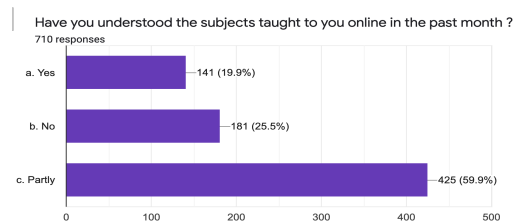
The teachers and the learners were independently surveyed after a month of starting online classes to understand the challenges faced by them and to understand the reasons for ineffective online classes. The survey form was filled by the faculty mentioning their experiences in online classes and the difficulties they faced conducting the classes online. The responses of faculty in Faculty Survey-1 are summarised in table 1. Students were also surveyed about the online classes using Student Survey-1 to study the levels of understanding of the subject, their interest in participating in online classes, and about how they think online classes should be.

I. TABLE 1 FACULTY SURVEY-1

Reason	Challenges faced by faculty
Adapting New Technologies	During initial times, it was difficult to teach online because of new way of teaching.
	Preparing slides which can make students to concentrate for entire time of class was also a challenging task. Had to Spend many hours in preparation of slides.
	Very less students were using of LMS platform
	Students were continuously complaining about the issues in connections mic, network, data etc.
No Physical Interaction	Teaching students without seeing their faces was a big challenge.
	Unable to see the students physically whether they are listening or not.

Lack of Motivation	Students used to give excuses like no data, no signal etc to avoid classes
	Less attendance of students

Students perception of their understanding of the subject can be seen in fig 1. The summary of the students responses is presented in table 2.



I. Fig.1 : Results from Student Survey - 1

II. TABLE 2 STUDENTS SURVEY-1

About Online Classes	How the class should be
<p>Not interested in Online Classes for the following reasons:</p> <ul style="list-style-type: none"> <li>• feel disconnected with the teacher as the usual black-board teaching is missing</li> <li>• Technical problems associated with the Internet Connection</li> <li>• All students cannot afford to have a desktop/laptop or internet facilities</li> </ul> <p>Comments on Online classes timings</p> <ul style="list-style-type: none"> <li>• prefer to have online classes in the morning and not more than 2-3 hours of theory in a day with one lab session with a break of 10-15 minutes between the sessions</li> <li>• class duration to be somewhere between 30-40 minutes only</li> <li>• afternoon session can be utilised for activities</li> </ul>	<ul style="list-style-type: none"> <li>• online classes are very convenient as it saves their time</li> <li>• video lecture and the teaching material should be posted online after the session as this would help them to listen to the class whenever they want</li> <li>• classes should be very interesting and interactive .</li> <li>• presentations can be made more interesting</li> <li>• teacher should have one-to-one interaction with students,</li> <li>• teacher should make the students do presentations</li> <li>• Have separate sessions for doubts clarification</li> <li>• frequent quizzes and less written assignments</li> <li>• every session must be used to explain not more than 2 topics</li> <li>• Want the teacher to simulate black-board teaching using some available apps</li> <li>• classes to be structured with short explanations followed by some tasks /assignments</li> </ul>

One of the common challenges faced by both teachers and learners include adapting to the technology usage. Others include challenges faced due to lack of physical interaction. The teachers get demotivated as he/she cannot see the students reaction to his/her teaching, or the students get disturbed as they know they are not being watched by their teacher, or there could be many other reasons for ineffective classes in the online mode. The challenge from the students end was passive listening, low attendance, and almost no participation in class.

The faculty and the students faced challenges in adapting themselves to the online mode of teaching and in incorporating the teaching learning process they are used to following in the offline mode. Both the students and the faculty felt that the teaching was not as effective in online mode compared to the offline mode. Interestingly, students suggested more interaction with the faculty, and activity based teaching.

### V. THE APPROACH

The need was to ensure effective teaching overcoming the challenges faced by the faculty and the students. Challenges faced by the faculty could be broadly classified into

three categories : Adapting new technologies, lack of physical interaction with students, lack of motivation in students.

Training the faculty in adapting new technologies and to use them for effective content delivery and learning was the identified need.

The challenge of lack of physical classroom interaction among the students and faculty could be addressed in online mode by making the students participate in the online class. For making the students participate during the classes, polling tools were prescribed.

For effective online teaching, the ICAP (Interactive, Constructive, Active, Passive) Taxonomy which is one system for categorising the quality of student engagement activities based on student behaviour during the activities [1, 2, 3, 10, 24], was also needed to be incorporated into the online classes.

The challenge of student motivation could be addressed by actively engaging them in class and other methods like keen mentoring. Each faculty in the departments is assigned 15 to 20 students as mentees. This faculty keeps track of the students for their attendance and performance in classes. Mentoring has been taken up in a regular basis by each faculty understanding their problems and providing them guidance. This was taken up to improve student attendance in classes.

Additional faculty were deputed in online classes to help the course faculty to conduct online class, monitor the students during the class, collect attendance, and help in conducting activities. Activity hours were scheduled in three timetables to ensure that the activities are implemented in classes.

Faculty of the institute were made to undergo an effective learning by doing training method, resulting in following all the teaching learning processes followed offline and effectively involving student participation in classes. Student Mentoring was regularly taken up to control absenteeism and ensure participation.

#### *A. Using technology effectively*

Technology played a major role in online mode of teaching. Knowing the required technologies was the first requirement for teachers, and understanding them to practical use was another.

Faculty were initially informed to switch to the Learning Management System Canvas by publishing their course, inviting their students, and start posting their course updates and material through canvas. Students were to join these courses.

The first challenge for the teachers was to understand and use technology to teach online. To make the faculty aware of the technologies they could use for online teaching, online webinars were conducted for them through the various online teaching tools like google meet, zoom, Webex, etc, and their usage was explained.

A group of faculty coordinators were identified under the teaching learning centre - CFDM of the institute. This group was deputed for trainings by experts in online teaching. This group of faculty trained the entire faculty of the institute by giving webinars on usage of various tools for teaching online.

Canvas was selected to be the LMS for the entire institute and Faculty were given webinars on the usage of LMS to be used. Though the usage of the LMS was demonstrated to all the faculty, the usage was still an issue. A maximum of

60 percent of the faculty used the LMS for their courses after a few months when the next semester started.

#### *B. Innovative approach*

As an innovative approach, based on the theory of Learning by Doing [23], the faculty were made to undergo training in usage of technology through learning by doing mode. All the teaching learning activity to be done by the faculty in regular offline mode that is monitored by the teaching learning centre of the institute (CFDM) was taken up through the LMS.

All the faculty of the institute were made to join a course under the teaching learning centre. They were added as students to the course with a few senior faculty as teachers in the course. The various features of the LMS were familiarised to the faculty by making them participate. Various features of the LMS like discussions, assignment submissions, peer reviews. Training material of the CFDM was posted as the course material.

To enable the faculty understand about discussions and use them in their course on the LMS, most of the regular activities of the institute which needed faculty to respond were posted as discussions. Their progress on the usage of the LMS was also posted under these discussion threads.

Assignments were posted for the faculty to submit by the given timelines. The assignments given were not an additional exercise for the faculty. The regular teaching learning process that involved any submissions by faculty were given as assignments on the LMS. Detailed Rubrics were defined for the assignments.

As a preparation for teaching a course in a semester, the faculty are supposed to prepare their course plans, and the assessment plans for review. The plans are reviewed for quality assurance and faculty are asked to resubmit if changes are required. This process was completely done using the LMS canvas.

Faculty submitted their course plans as assignments. The course plans were peer reviewed anonymously through the LMS. Based on the review feedback, the assignments were resubmitted where ever required. Assessment plans were also reviewed in a similar process.

This process in offline mode was a tedious job keeping track of all the courses and their multiple reviews. The approach followed not only improved the efficiency of the process but also ensured that the faculty learnt the usage of the LMS.

#### *C. Active Classrooms with E-Bridge Activities*

Students participation in the online classes needed improvement. This was understood from the initial surveys undertaken, and the student attendance for online classes. The students in the survey expressed the need for interactive sessions.

Faculty often use active learning techniques like Think Pair Share, One Minute Paper, Role Play, Brain storming, reflection, jigsaw reading, etc in offline classes to make the class more participative.

Recommendations for active student engagement in online classes [22] have been incorporated into the online classes of the institute. The recommendations listed in [22] have been classified according to the ICAP model as Interactive-Constructive-Active-Passive categorising them as the Interactive activity being the most effective in I-C-A-P and the passive being the least.

E-Bridge is an activity proposed [17] to enhance the employability skills of the students by involving them in

activity based learning environment. Complete guidelines for conducting these activities are provided to the faculty at the beginning of semester. Four events are conducted under the E-Bridge program: Group Discussion, Debate, Quiz, and Two- minute Elevator pitch. Faculty have to select technical topics (advanced topics in the course being taught), and announce in the class in advance so that the students can prepare before participating in the events (which is the important part). Students are made to coordinate and conduct these activities in class. The various activities proposed in E-Bridge can be classified under Interactive and Constructive activities which are the most effective methods as per the recommendations of [22]. E-Bridge activity has been implemented in all the courses being offered online. The activities that have been implemented by our faculty (including the E-Bridge Activity) in online classes are presented in the Table 3.

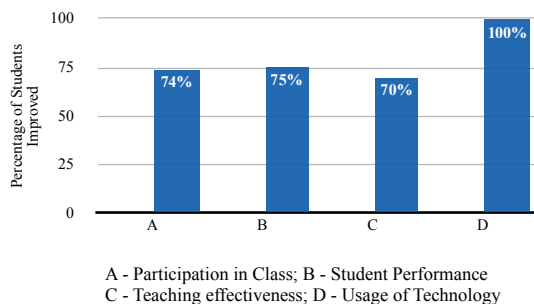
III. TABLE 3 ACTIVITIES IMPLEMENTED BY FACULTY

Activity	Online Tool for Implementation	Quality of Student Engagement Activity
Think-Pair-Share	Online Meeting Room (Breakout Rooms)	Interactive
Online Discusion Board	Discussions on LMS	Interactive
Virtual Labs	Virtual Lab Platforms	Constructive
Peer Reviews	Assignments Peer Reviews on LMS	Interactive
<b>E-Bridge Activity</b>		
Group Discussions	Online Meeting Room	Interactive
Elevator Pitch	Online Meeting Room	Constructive
Debate	Online Meeting Room	Interactive
Quiz	Online Meeting Room	Interactive

These activities were implemented for the entire semester, and another survey was conducted in the next semester to study the effectiveness of these approaches.

#### VI. IMPLEMENTATION RESULTS

Surveys have been conducted after implementing the approaches presented in the paper. Summary of the Faculty and student surveys are presented in this section. The components that have been studied and compared are: students perception of their performance, usage of the technical tools for online teaching and grading, student participation in class, effectiveness of teaching [Fig.2]. Summary of Faculty experiences and observations captured as text answers in Faculty Survey-2 are presented in table 4.



2. Fig.2 : Results from Student Survey - 2

As far as the usage of technical tools is concerned, it was observed that every faculty of the college has adapted the LMS canvas, posting material, conducting discussions, posting assignments, online quizzes, and grading on the LMS platform. The students participation in using the LMS also

increased to 100 percent. Every student started using the LMS as every class activity for each course involved its usage. Constant mentoring of the faculty also played a role in this improvement. Students now are adapted to using devices for online classes and do not escape from the class citing the reasons of device or network issues.

IV. TABLE 4 FACULTY SURVEY-2 SUMMARY

Challenges faced initially	Current Status
Difficulty in using new technologies	Started to use online platforms (Canvas) and also used the polling questions in between the classes. Assignments and activities are given by using the on-line platforms
	Now, we are using polls, survey monkey tools for online interaction with the students.
	We are finding more appropriate tools and softwares for better teaching
	Efficiently using advanced tools and systems by exploring various new features. Got good awareness, thanks to CFDM.
Student Participation in class	Students started to involve in the classes due to improvement and implementing active learning teaching methods
	E- bridge activities have been scheduled Regularly and conducted as per the schedule.
Student Motivation	Engaging the class with effective presentations, video demonstration, continuously engaging the students with positive attitude and motivation played a vital role for improving the classes compared to last semester
	students attendance percentage has improved compared to last march-april-may 2020
	some of the students are even participating in the virtual activities and events related to technical aspects in their respective streams
	Mentoring has been done daily, ensuring maximum strength in the class.

Student participation in class has improved with E-Bridge activities being implemented by all the faculty in their courses. Student Attendance that was at an average of 40 percent increased to 80 percent. The students attribute this to constant mentoring by the faculty, and the activities being conducted. Students mentioned that they participated in the activities the faculty were trained in for active online classrooms - online polls, discussions, debates, quiz, elevator pitch, case study presentations, think-pair-share, one minute paper activity, virtual labs, peer reviews, and online assessments. The students also expressed that the faculty have improved their presentations in online mode and their teaching is more effective now resulting in their better performance.

#### VII. CONCLUSIONS AND FUTURE WORK

Implementing innovative approach in training the faculty, and including activity based teaching strategies have shown to improve the effectiveness of online teaching. The results in this paper show that training of faculty for online teaching can be done effectively through nontraditional approaches like the ones presented in this paper. Also, it is evident that the students need to have participative learning experiences in the online class similar to activities in physical classroom learning for effective learning in the online mode. The approaches presented can be used for online classes in any Engineering programme. Further study needs to be conducted considering the attainment levels of the student learning outcomes.

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