



Second Wave Covid-19 Pandemic: Opportunities and Challenges in Higher Education

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Abstract: COVID-19 pandemic has disrupted the education system where all educational institutions from elementary to university level were closed in India and worldwide. However, this pandemic has paved the way for educational institutions to adopt online education. Although university teachers were not ready with a digital platform at the onset of Covid-19, they have embraced digital methods to continue teaching. In this context, this study was conducted to analyze the opportunities and challenges of online education among the higher education teachers who switched to online education during the second wave of the COVID-19 pandemic. This study aims to analyze the online teaching and learning methods teachers adopt and the challenges they face in higher education while imparting the course online from various disciplines. This study used a survey-based online questionnaire to collect data from 175 higher education teachers. The analysis was carried out using a descriptive statistical method that included simple percentages and means. The study's findings revealed that online teaching and learning have opportunities such as allowing teachers and students to continue their education online using various platforms even during a lockdown, using online interactive education through audio, video and other potential learning platforms. It also revealed the challenges that include technical, academic and financial challenges that influence and affect online teaching during COVID19 lockdown.

Keywords: Online learning, COVID-19 and Higher Education, Digital platform, Opportunities and Challenges

1. Introduction

Education is a fundamental right for everyone, and everyone must live a happy and stable existence. The COVID-19 pandemic has disrupted the entire educational system, with all educational institutions from elementary to university level being closed not only in India but around the world following the World Health Organization's (WHO) announcement that all institutions would be closed as a measure to stop COVID-19 from spreading. The only alternative available to all institutions is to work online, and educational institutions have adopted online teaching and learning, resulting in a shift from face-to-face to newly emerging digital learning, which has become mandatory and vital for breaking the chain of new viral transmission (Sobaih *et al.*, 2020; Bao, 2020; Wang *et al.*, 2020). Even though the pandemic has disrupted numerous systems of practice, it has allowed educational institutions to implement digital learning. The shift to a digital learning system occurred during the first wave of the pandemic, and the teachers started practicing it. University teachers though they were not ready with a digital platform at the onset of Covid-19, have adopted some form of digital methods to continue education and faced some challenges such as lack of technical facilities, inadequate knowledge, skills and software application, appropriate teaching methods, etc. (Hodges *et al.*, 2020; Zhang *et al.*, 2020). During the transition phase, teachers were taught how to use digital platforms and technologies to overcome the challenges and deliver quality education online.

Online instruction is different because the teacher is not there to inform the students. Since the teacher must gather information, prepare lessons, and conduct online teaching \ using the e-learning approach, their job is more complex (Adedoyin & Soykan, 2020; Bdair, 2021). Due to the complexity of online instruction, teachers' workloads



have increased. The teachers unfamiliar with online teaching had difficult hurdles because they had to pick up teaching online while giving the lectures. Despite the challenges, faculties have opportunities for experimental teaching thanks to the digital platform for teaching, which makes it possible to teach in various settings and platforms (Archambault & Kennedy, 2014; Graham *et al.*, 2019; Pulham & Graham, 2018). The teachers were motivated to help the transition to online education (Trust *et al.*, 2016). Teachers' perspectives toward using social media for online learning have changed due to physical distance during the pandemic (Jogezaj *et al.*, 2021). While many struggled with inadequately developed digital competence and institutional assistance, teachers endeavoured to build learning environments that promoted knowledge transfer and interaction and sought to overcome challenges on their own and with the support of their colleagues and network (Damsa *et al.*, 2021).

Teachers can adopt both asynchronous and synchronous modes of online instruction. Any non-live, non-real-time learning or communication assisted by video, audio, a document, a program, an application, or engagement tools like discussion boards, virtual chat rooms, or email is asynchronous. Students can participate in learning in asynchronous online classes without needing other people to be in the virtual classroom. Conversely, synchronous learning involves real-time or concurrent engagement with a person or group of individuals. Classes are provided in a way that allows students to communicate online simultaneously. Some real-time technologies include webinars, video chats, live streaming, and tools built into social media platforms (Vivolo, 2019).

Various studies carried out during the first wave of a pandemic have highlighted some key prospects and challenges educational institutions face during the online teaching and learning process. COVID-19 pandemic has numerous advantages and disadvantages, according to Gurung (2021). The Indian education system has been completely transformed due to this pandemic. The classroom teaching methodology has radically altered. On the one hand, the teachers are teaching students from the comfort of their homes through the internet; on the other hand, they encounter numerous challenges. Teachers who have been used to delivering classroom instruction for many years find online mode difficult, which is a considerable challenge.

According to India Today Web Desk (March 2021), a shocking 84 % of teachers are having difficulty delivering education online, with nearly half having troubles with the internet, including signal issues and bandwidth costs. Two out of every five teachers do not have the appropriate gadgets to give education digitally; the situation is particularly dire in Uttar Pradesh and Chhattisgarh, where 80 % and 67 % of teachers, respectively, do not have the necessary devices to deliver education online. The teachers agree that the challenges of implementing online learning are divided into three segments, according to Rosalina *et al.*, (2020). They are the supporting infrastructure, such as internet access, student device standards and internet quotas. When the activities are being conducted, the learning process is less communicative since the teachers and students have limited time to connect, cannot explain the subject in detail and cannot sense and manage the students' affective aspects during the learning process.

According to Hayashi *et al.*, (2022), online higher education cannot wholly replace current higher education delivery systems. Giving practical sessions and online tests, for instance, was difficult. Additionally, it is observed that after June 2020, students' satisfaction with online higher education dropped and that online social connections were particularly challenging. As a result, higher education delivered online needs a different methodology than in conventional classroom settings. It could be necessary to significantly expand teacher training in online pedagogy to facilitate blended learning. When it comes to weaker or less privileged students who do not have access to computers or the internet or who have problems grasping the subjects in online education, a hybrid (online and offline) teaching method is the most preferred option for the students. 81.4 % of students are in favour of teaching offline for less capable students or in situations where there is no access to the internet or other resources. In this COVID-19 pandemic, online teaching is the primary delivery mode for the remaining students (Gope *et al.*, 2021).

According to Muthuprasad and his colleagues, there are opportunities for online learning, and the majority of respondents (70 %) are prepared to select online classes to handle the curriculum during this pandemic (Muthuprasad *et al.*, 2021). The great majority of students preferred to learn online using their smart phones. Through content analysis, they discovered that students prefer recorded lessons with a quiz at the end of each lesson to improve learning effectiveness. The students claim that while issues with internet connectivity in rural areas make it challenging for students to participate in online learning programs, the flexibility and accessibility of online classes make them a desirable alternative. This flexibility includes being free from the constraints of traditional classroom time and space (Hofer *et al.*, 2021). Games, interactive models, computer simulations and animations, and audio



and video clips are excellent pedagogical and instructional tools teachers can use to help students develop meaningful knowledge (Vivolo, 2019). Regarding evaluation, computer-adaptive instruction used in online education helps individual students' learning experiences be optimized or personalized, and it can facilitate evaluation by giving specific feedback (Dietrich *et al.*, 2021).

As the world was devastated by the second pandemic wave, educational institutions in India were forced to continue to engage students digitally. According to Pravat Kumar Jena (2020), the existing choice of digital platforms will be detrimental to the students who are less privileged than the others. On the other hand, academic institutions and the Indian government are always looking for a solution to this problem. The primary goal should be to use digital technology to provide millions of Indian students with a competitive edge. Educational institutions' knowledge and IT infrastructure must be improved if they are ready for COVID-19 events. In this context, this study was conducted to analyze the opportunities and challenges of online education among higher education teachers during the second wave of the COVID-19 pandemic. This study aims to explore the online teaching and learning opportunities and methods adopted by the teachers from various disciplines and the challenges they face in higher education while imparting the course online.

2. Methods

2.1. Theoretical Framework

Connectivism Learning Theory is the theoretical foundation for this paper. It is a learning theory introduced by two theorists, George Siemens and Stephen Downes, in 2005. Connectivism is nothing more than the ability to learn more knowledge than the one already has through various sources such as social media, media and the internet. During the second wave of the COVID-19 pandemic, Students were kept at home and could continue their education using technological tools. They gradually learned how to use several online platforms such as Google Meet, Zoom and other platforms to join in the live classrooms. The teachers learned to switch from traditional face-to-face teaching to online teaching with the support of these platforms. The theory recognizes that technology is a crucial aspect of the learning process and that constant connectivity allows stakeholders to make decisions regarding our education. It also encompasses the technological and pedagogical revolutions. Technology is changing how people live, study, and interact and instructional strategies for improving teaching and learning (Siemens, 2005). Technological tools help in designing the curriculum that enhances teaching and learning. It also encourages collaboration and conversation between teachers and students, allowing for various opinions and perspectives regarding decision-making, problem-solving and information interpretation. Connectivism encourages students to learn outside of the classroom, whether it is through social media, online networks, blogs, or knowledge databases.

2.2. Research Design

The research adopted a descriptive research design, performed among higher education teachers from several universities and colleges in Tamil Nadu with the following objectives:

1. To find out the opportunities and challenges of using a digital learning platform by higher education teachers during the COVID-19 second wave pandemic lockdown.
2. To suggest strategies to overcome the barriers in digital learning practice.

The study had a total sample size of 175 faculty members, both male and female. The sample was drawn at random from various institutions, including both private and public. A google form was developed and circulated to collect qualitative and quantitative data for this study. The information gathered covered the prospects, experiences and challenges of digital learning. The data were retrieved and coded for analysis using SPSS version 22. The data collected were analyzed using descriptive methods such as percentages and mean. The limitation of the study is that it is carried out only among the teachers to focus on the opportunities and challenges they face on the digital platform during the COVID-19 pandemic.

2.3. Socio-demographic characteristics of the Respondents

Teachers of higher education institutions from Tamil Nadu took part in this study. Table 1 shows the socio-demographic characteristics of the respondents, where most of them were females (83.4 %), majority of the



respondents were young, with a mean age of 36.57. The majority of them are from private colleges. PhD holders account for one-fourth of the respondents, followed by postgraduation (50 %), with the majority holding the position of Assistant Professor (46.5 %). More than one-third of the participants are new to teaching and more than a quarter of the participants have ten to fifteen years of experience in teaching. The responses come from various backgrounds, including Arts and Sciences, Engineering, Paramedicine, and Management.

Table 1 Socio demographic Characteristics of the Respondents.

| Variable | Category | Frequency (n=175) | % |
|---------------------|--------------------|-------------------|------|
| Age | Below 25 | 12 | 6.9 |
| | 26-35 | 78 | 44.6 |
| | 36-45 | 59 | 33.7 |
| | 46-55 | 20 | 11.4 |
| | Above 55 | 6 | 3.4 |
| Gender | Male | 29 | 16.6 |
| | Female | 146 | 83.4 |
| Qualification | UG | 19 | 10.9 |
| | PG | 91 | 52.0 |
| | M.Phil | 20 | 11.4 |
| | Ph.D | 44 | 25.1 |
| | Post-Doctoral | 1 | .6 |
| Teaching Experience | Less than 5 years | 66 | 37.7 |
| | 6 to 10 years | 46 | 26.3 |
| | 11-15 years | 42 | 24.0 |
| | 16-20 years | 8 | 4.6 |
| | 21 and Above years | 13 | 7.4 |
| Type of Institution | Government | 29 | 16.6 |
| | Government-aided | 30 | 17.1 |
| | Private | 116 | 66.3 |
| Position Held | Asst. Prof | 81 | 46.3 |
| | Asso. Prof | 21 | 12.0 |
| | Prof | 22 | 12.6 |
| | Others | 44 | 25.1 |
| | Principal/VP | 7 | 4.0 |

3. Results And Discussion

The following sections present the research findings based on two research objectives related to the opportunities and challenges of the digital learning system among the teachers of higher education institutions during the second wave of the pandemic and the possible strategies to overcome those challenges.

3.1. Opportunities in Digital Learning Systems

This section discusses the opportunities for online teaching methods in the context of the COVID-19 pandemic. COVID-19 has indeed thrown millions of students away from classrooms, but it has promoted the opportunities for teachers and students to adopt online mode. Closures of educational institutions have sparked innovation and accelerated the digitalization of the educational sector.

3.1.1. Improved Technical skill

The online education transition has provided teachers opportunities to improve the technical skills required for education online. Teachers have learned to administer the learning management system and create, edit and upload videos through training. Berge (1995) has emphasized that teachers' technological self-efficacy impacts students' learning. The study reveals that more than half of the teachers (57 %) received training to prepare for the



shift from traditional to online mode to become familiar with the online tools and learning management systems used by their respective institutions. One-fifth of the teachers learned through their colleagues, and another one-fifth learned by themselves through internet resources. It was also discovered that the majority of the teachers, 39 % were moderately comfortable teaching online and more than one-fourth of them are comfortable teaching online, which is also an indicator of improved technical skills.

3.1.2. Use of Digital device and platform

As shown in Table 2, nearly two-thirds of the participants (72.57 %) used a smart phone for online teaching purposes, followed by a tablet (45.71 %) and a laptop (20 %). This demonstrates that the teachers are equipped to connect with students through electronic devices for teaching and learning. Similarly, the teachers adopted different learning platforms to connect students, such as Google Meet, Zoom, Microsoft teams, etc., where most teachers (90.85 %) used the Google meet platform to connect students. In this process, fortunately or unfortunately, teachers are compelled to acquire more knowledge on online methods than before to engage students.

3.1.3. Use of Digital teaching method

In online teaching and learning, course delivery is more vital. Some courses may require technology or videos, while others may require different approaches. However, the COVID-19 pandemic is pressuring teachers to use technology across all courses as everyone is concerned about engaging students in a meaningful way. According to [Banna *et al.*, \(2015\)](#), using video conferencing or chat room functions to engage students in synchronous online classroom discussions is one technique to improve it, which is also observed in this study where the vast majority of the teachers used live classes with power-point presentations (91.43 %) with follow-up discussions. Almost half of the respondents said they had uploaded recorded presentations and had a live discussion at a predetermined time. Before the live classes, the lecturers had given students tasks on the themes to help them prepare and familiarize themselves with the material. Over time, the teachers had opportunities to use other digital methods appropriate for their courses, such as animations (35.43 %), whiteboard and pen (21.71 %), and Digital pen and slate (8.57 %) and Screening of short films and documentaries (1.14 %). However, live discussion with power-point presentations was widely used to improve the connection between the teachers and students to ensure that learning was successful, as shown in Table 2.

Table 2 Distribution of Participants Using digital learning system.

| | |
|--|----------|
| Ways of improving ICT Skill | % |
| Attended training | 57.14 |
| learnt from colleagues | 21.14 |
| self-learning | 21.72 |
| Devices used for online teaching* | % |
| Laptop/ Desktop | 20.57 |
| Smart Phone | 72.57 |
| Tablet | 45.71 |
| Platform adopted for online teaching* | % |
| Google Meet | 90.85 |
| Microsoft teams | 10.28 |
| Zoom | 41.14 |
| WebEx | 1.71 |
| Teaching Method adopted* | % |
| Assignment and live discussion | 48.57 |
| Live discussion | 63.43 |
| uploading of recorded presentation | 48.57 |
| Digital method adopted* | % |
| Animations | 35.43 |
| Power-point presentation | 91.43 |



| | |
|---|----------|
| Whiteboard and pen | 21.71 |
| Digital Pen and Slate | 8.57 |
| Screening of short films, documentaries etc | 1.14 |
| Comfortability in teaching online | % |
| Not at all comfortable | 9.7 |
| Slightly comfortable | 12.0 |
| Moderately comfortable | 39.4 |
| Comfortable | 29.7 |
| Very comfortable | 9.1 |

* Multiple responses

3.1.4. Managing Time in Digital Learning System

Time Management is more important in course delivery. In this study, it was found that nearly half of the teachers (46.3 %) conducted their classes on scheduled time (Figure 1). Others were unable to conduct classes on time for various reasons, including issues relating to technical, network, and power supply interruptions and personal commitments.

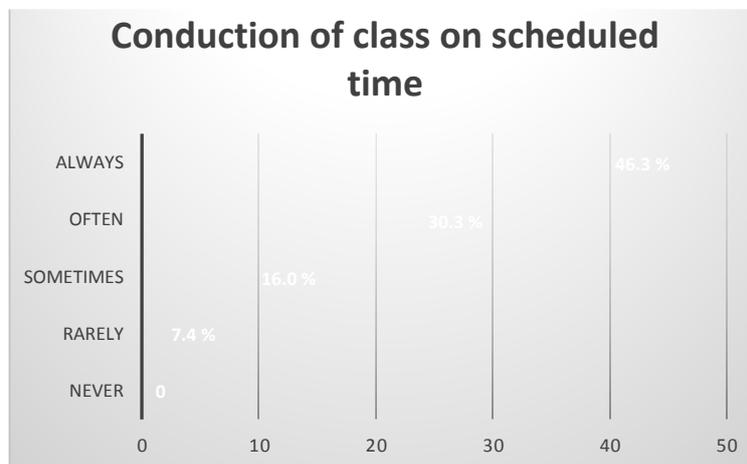


Figure 1 Conducting of class at a scheduled time.

3.1.5. Managing Course in Digital Learning System

During the COVID -19 pandemic interruptions, designing and providing course content online was critical. E-Learning content is a crucial component of online teaching and learning because it allows teachers and students to engage in online education. E-content integrates materials with technological applications, and teachers involved in creating E-content must have the requisite technical skills.



Figure 2 Satisfaction with Effective Content Delivery.



In this study, almost all the teachers built their e-content for their students and delivered the content using the digital applications/ learning platforms as in Table 2. All teachers could deliver the content, and they were asked how satisfied they were with how well it was delivered. It was discovered that two-thirds of the teachers were satisfied with their course delivery (28 % were delighted, and 37 % were satisfied with effective content delivery). Only one-third are unsatisfied and need to be trained on effective content delivery, as shown in Figure 2.

Another course management action that must be done regularly is updating resource materials. There are a variety of E-resources available on the internet, including e-books, reference books, and e-journals. Still, students must choose the most appropriate with the help of their teachers. Teachers must also keep their resource materials up to date to improve students' understanding, and according to this study, over 80 % of teachers do so regularly, as shown in Figure 3.

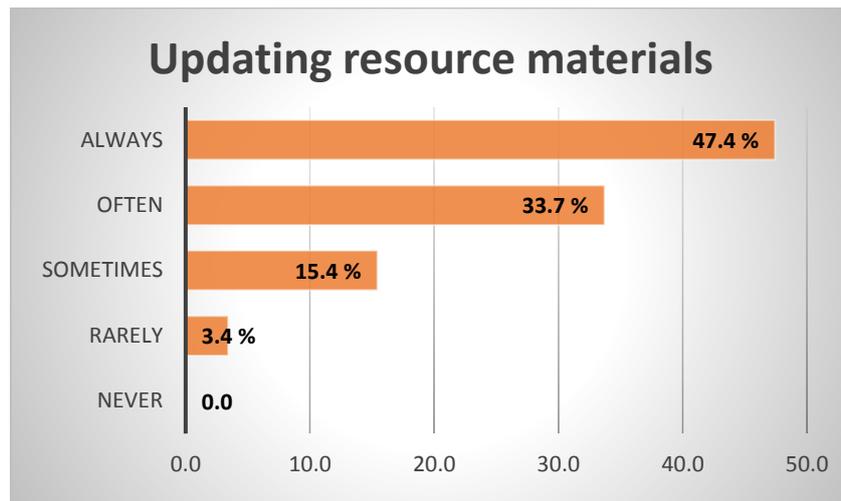


Figure 3 Resource Material updating in an online system.

3.1.6. Managing Students in Digital Learning System

Managing students online is not an easy task. Teachers need to engage students online through interactions. In this study, students participated in both synchronous and asynchronous activities, and it was discovered that most students somewhat attended synchronous activities. In contrast, many students attended asynchronous activities, as shown in figure 4. Attendance in class does not imply that students participated and comprehended the material. They are expected to join in the conversations and ask questions to clarify any doubts they may have. Students were inattentive in live classrooms, according to the majority of teachers (71 %) and one-fourth of the teachers indicated that the students got distracted, as shown in Figure 4.

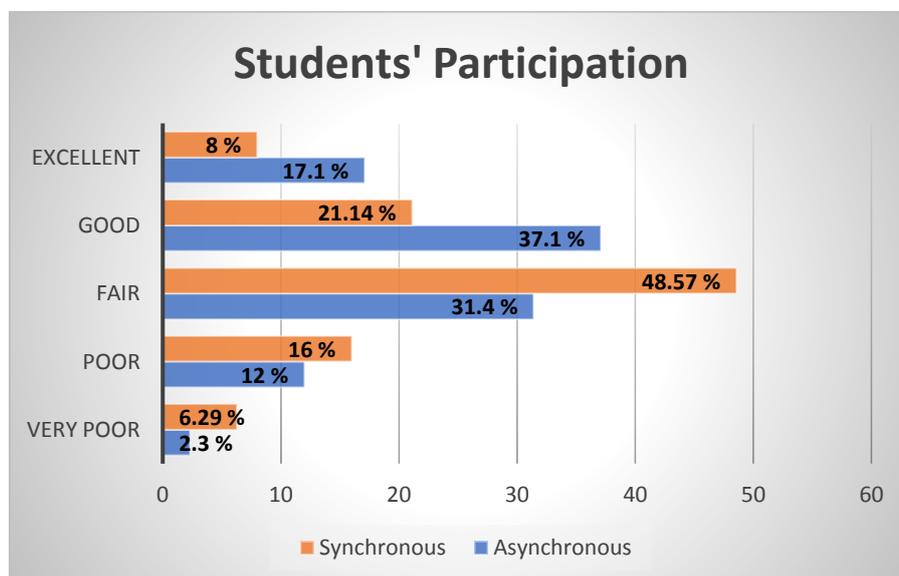


Figure 4 Student's participation in Synchronous and Asynchronous activities.



3.1.7. Conduction of Online assessment method

Assessment is one of the essential components of education. Grading is one aspect of the assessment. This new online learning system requires several continuous assessment approaches (Cho and Shen, 2013). In this study, the teachers had the opportunity to conduct various continuous assessments online, such as quizzes, multiple-choice questions (MCQ), short and essay-type exams, oral presentations, students' participation in the learning activities etc., where multiple-choice questions (MCQs) (70.86 %) were widely used to assess student learning followed by quizzes and oral presentations (Table 3). However, an equal number of respondents used synchronous (live) and asynchronous semi-online exams. The teachers had gained experience in conducting online assessments, became an expert in determining the best approach in the online mode of conducting exams, and understood the challenges and needs of the newly adopted education system. In the whole process of transition into online mode, the teachers engaged in imparting online education by learning and gaining knowledge through training, self-learning through the internet, social media, and colleagues and they have realized that digital learning cannot be ignored in this digital age and therefore involve in updating of knowledge and skills related to digital education.

Table 3 Online assessment method.

| Method adopted for Online Exam * | % |
|---|-------|
| MCQ online quiz | 70.86 |
| Short answers online Quiz | 53.14 |
| Asynchronous semi-online exam (download, pen and paper, Scan, upload) | 20.00 |
| Synchronous (live) semi online exam (download, pen and paper, scan, upload) | 19.43 |
| Oral Presentations | 29.14 |

* Multiple responses

3.1.8. Overall satisfaction and benefits of the Digital learning system

All participants were asked for their feedback on their overall satisfaction with digital learning systems as well as the benefits of digital learning systems. The answers to the question were online teaching levels (highly satisfied, satisfied, moderately satisfied, and not at all satisfied). From Figure 5, It was revealed that over half of the participants were moderately satisfied. Around a quarter of the respondents said they were satisfied and highly satisfied. Various challenges such as technical issues, inattentiveness of students, distractions and constraints in online curriculum and other factors have been cited as reasons for not having satisfaction with online teaching/learning (refer 4.2). A few mentioned a lack of technical skills in online session tools to deliver content successfully.

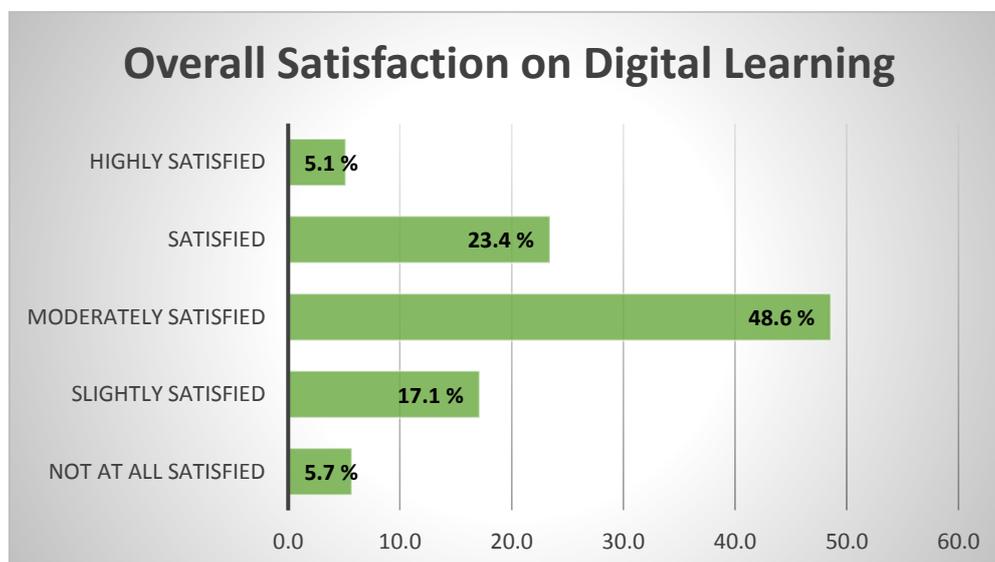


Figure 5 Overall satisfaction with the Digital Learning system.

When asked about the advantages of online teaching, most of them stated that it is an alternative to the traditional classroom since it allows them to choose a flexible time in a remote format, reducing travel time. It will give teachers and students convenient time and location, allowing them to organize and execute their work more meaningfully. Teachers can take on various roles in this digital learning system, including supplying syllabi, instructional resources, communication tools, learning methodologies, monitoring and measuring learning, and offering feedback (Wilson & Stacey, 2004).

3.2. Challenges in digital learning method

3.2.1. Technical Challenges

In online learning, dealing with unstable internet connections was a hurdle that might harm the quality of the lessons (Yeung & Yau, 2021). Live classes, in particular, require a significant amount of data, necessitating the purchase of suitable internet service. In this study, classes were disrupted by poor internet connections, which impacted the quality of the lessons. Figure 6 shows that the teachers had problems with inadequate network coverage (56.57 %), heavy data usage (52.57 %), and slow internet (41.14 %), among other issues. One of the significant challenges in Tamil Nadu is power outages; during the pandemic, most people are confined to their homes and work from there. Less than a fifth (17.71 %) of the participants could not complete the sessions on time due to a power outage. According to a previous study, technical issues were not only the most significant impediment to students' online learning but also the most important factor in whether or not they were satisfied with it (Song *et al.*, 2004), which is also evident in this study that technical challenges lead to dissatisfaction in online teaching process among teachers as discussed in 4.1.8.

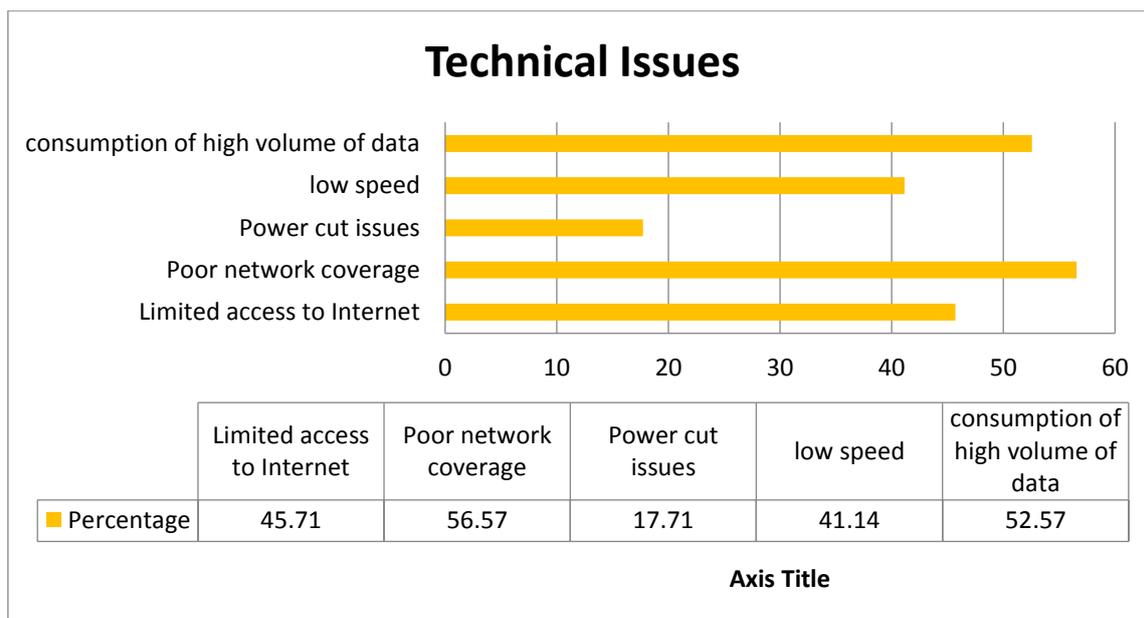


Figure 6 Technical challenges faced by the participants.

3.2.2. Challenges in handling courses

Teachers with sufficient expertise and a preference for traditional methods of instruction may find it challenging to adapt to an online mode of instruction (Duraku & Hoxha, 2020) which is also found in this study as the majority of them prefer to go back to the traditional method of face-to-face learning method because of the immense challenges they face in online teaching and learning. More than one-fourth of the teachers said that they could not deliver the complete content of the topic within the scheduled time due to various technical challenges. This is also because the classes were conducted in digital mode for the first time, and they did not have enough experience to deliver the content within the timeframe. Another one-fourth of the teachers from a particular discipline, such as science, medicine and mathematics, said that due to a lack of hands-on expertise and relevant software, they found it challenging to present analytical and mathematical problems and laboratory activities which can also hamper the quality of learning. This finding corroborates with Mishra *et al.*, (2020) findings that teachers raised the issue of performing online practical sessions during the lockdown time, stating that it was difficult because



it required systematic demonstration of the entire process in front of the students. According to Leszczyski *et al.*, (2018), online learning is compatible with social science and humanities. Still, researchers have questioned whether it is compatible with sports, engineering, and medical sciences, which require hands-on practical experiences as part of instructional activities. Apart from that, online learning has been discovered to have issues with student-to-teacher engagement due to distractions and disruptions. Around one-fourth of the participants had lesson planning constraints due to the COVID-19 pandemic disruptions, as shown in Figure 7.

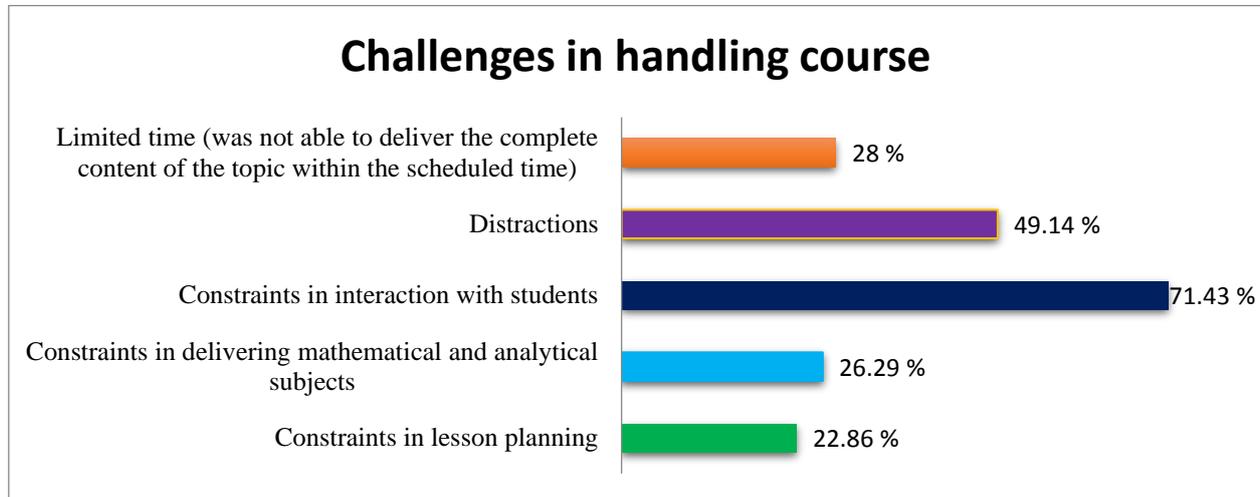


Figure 7 Challenges in handling courses.

3.2.3. Challenges in handling students

Figure 8 shows that Students were inattentive in live classrooms, according to most professors (71 %), and one-fourth of the teachers indicated that students got distracted. Teachers could not communicate with students and sometimes could not assess their understanding of the topic due to their attentiveness. Furthermore, internet concerns such as inadequate network access disrupt student interaction, particularly noticeable in remote locations. Teachers also took steps to improve student participation in live classes, such as constantly asking questions and showing videos relevant to the content to stimulate discussion. Still, only one-fifth of the respondents are completely satisfied with their student's participation through this medium.

Another important issue that all academic institutions should be concerned is about the fairness of online exams because there are more risks of students plagiarizing or cheating. Teachers took steps to prevent plagiarism, such as requiring students to submit work within a specific time frame, cross-checking, asking students new questions, and making oral presentations.

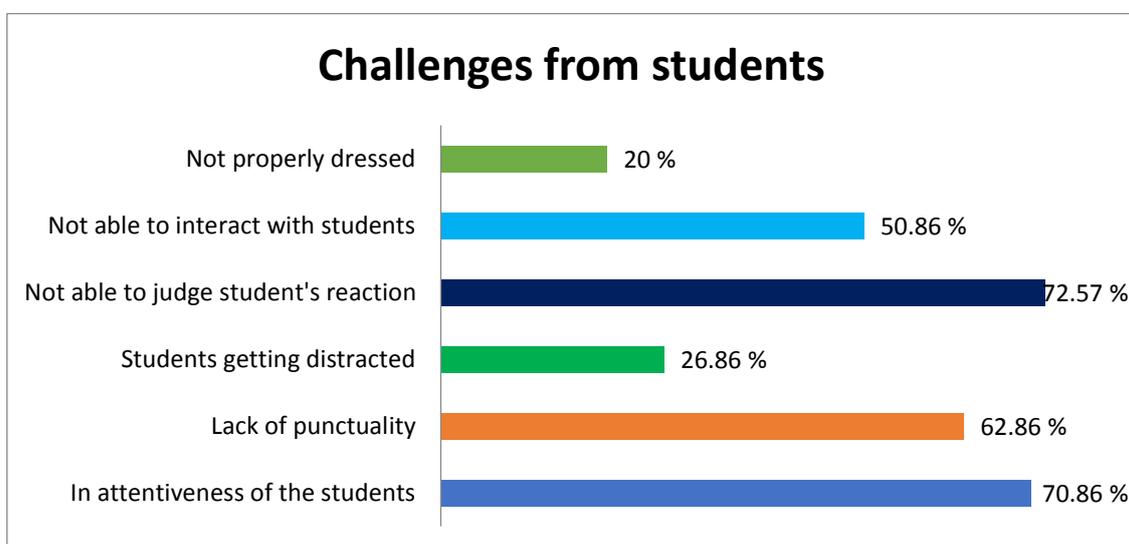


Figure 8 Challenges from Students.

3.2.4. Financial Challenges

According to Akkoyunlu and Soylu (2006), the quick and sudden digital transformation process of universities places a massive workload on the ICT unit of the institutions to build e-platforms and integrate existing external applications into their systems, and complete migration to external applications. Instructors share a portion of the workload because they are in charge of transforming their course contents to be e-platform friendly. This enormous workload is likely to result in unanticipated financial and time costs. Due to the large data consumption, teachers were required to use their own money to purchase internet packages to manage online classes during the lockdown. In this study, three-fourths of the professors purchased data between Rs. 200 and Rs. 1000 per month. However, there were problems with the network in rural areas. However, over half of the participants indicated they had paid partially during the pandemic lockdown and experienced increased financial stress on meeting the scheduled time. In addition, they also faced problems in their families meeting their economic needs. About one-fifth of the participants stated that online classes are always under surveillance and that the students' and teachers' privacy is violated.

4. Conclusion

The Covid-19 epidemic has opened a new era in Indian education, shifting from face-to-face to digital learning. Although the pandemic caused a great deal of destruction and disruption, it also provided chances for improved access to information technology in the educational system. Simultaneously, online learning presented several difficulties. The paper discusses the opportunities and challenges in using a digital learning platform for higher education instructors. The study identified several options the digital platform gave, including increased technological competence among teachers, online teacher-student engagement, learning and adoption of new platforms and applications, and creating and delivering E-content. More than half of the teachers could present the curriculum using an online platform. In contrast, the other half found it challenging owing to insufficient content, technological issues, and student inattentiveness, inhibiting interaction. Above all, the availability of resources; ICT infrastructure with internet access is more crucial for teachers and students to adopt online teaching and learning properly. Therefore, the following recommendations are made by this study: (1) Assisting teachers with content creation and teaching them in digital delivery methods that should be interactive. (2) To encourage online learning, institutions must provide adequate IT technical support to professors and students and increase internet bandwidth and other essential IT infrastructure. (3) To promote students' engagement and interaction, learning management systems must contain high interactivity in both synchronous and asynchronous types of teaching and learning. They must also supply adequate resources, include an E-assessment process, and monitor students.

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