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Evaluation and Improvement of students' satisfaction in Online learning during COVID-19

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Abstract

With the closure of educational institutions due to COVID-19, the biggest challenge with the universities and the instructors was engaging students in virtual learning. This research aimed at supporting university students in Islamabad (Pakistan) for online learning through a collaborative approach. The university started online learning during COVID-19 and had no earlier experience of such mode of learning. The first phase was identifying the problems faced by students during online learning and seeking their suggestions for overcoming them. The next step was working on the students' opinions with a team of instructors to modify existing instructional practices during online instruction. We measured students' satisfaction level pre and post-modification to evaluate students' adoption of online learning. The data for both the phases were collected through a Google Form. The post-modification data revealed students' greater satisfaction in online learning. The findings offer useful insight related to students' adoption of online learning and making it a more meaningful, organized, and productive medium for future learning.

Keywords: COVID-19, online learning, virtual learning, satisfaction, university students, instruction

Introduction

COVID-19 stands for Corona Virus Disease 2019 (Zhong et al. 2020), which appeared as common pneumonia in December 2019 in Wuhan, China (Huang et al., 2020)). When the virus spread to other countries, the World Health Organization termed it a pandemic (WHO, 2020). The first case of COVID-19 appeared in late February 2020 in Pakistan, the neighboring country with China. The government announced the closure of educational institutions to prevent its spread. In the meantime, the ministry of education issued instructions for online learning to compensate for the educational loss. As a result, the educational institutions switched from offline to online learning (Dhawan, 2020). Teachers with no prior experience of online education started online instruction (Wang, Zhang et al., 2020). With this, the world witnessed the most massive live experiment of switching from formal to online education in human history (Jones & Sharma, 2020).

Online learning refers to learning experienced in synchronous or asynchronous environments using the internet, where students interact with instructors and fellow students from anywhere (Singh & Thurman, 2019). Based on this definition, many arguments are given in support of online learning. Some of these include being accessible, affordable, and flexible. The learners can attend online classes from anywhere. It is economical, and the learners can schedule learning as per their convenience (Dhawan, 2020).

In the wake of COVID-19, online learning is no longer an option with educational institutions; instead, there is no other option without it. The educational institutions accepted the need for digitizing their operations and initiated arrangements for digital learning (Dhawan, 2020). One can anticipate a significant shift in the instruction and learning styles due to the intensive use of technological tools and platforms. During this transformation, Carey (2020) reported that ensuring the quality of instruction and learning is not essential; instead, switching to online learning by educational institutions needs

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appreciation. However, a massive transformation to online learning without ensuring quality will be ineffective. Almost more than half of the enrolled students in online programs quit due to dissatisfaction with the education quality (Betts, 2009). For this reason, Roach and Lemasters (2006) emphasized that there will always be a need to explore students' satisfaction with online learning.

While the educational institutions switched to online instruction, the instructors and learners both resisted due to technological complexities. This research investigates the transition from formal to virtual learning in Pakistan, a developing country with the sixth-largest world population (Ahmed & Mohamad, 2011). Reaching online to a large body of students was a big challenge for educational institutions. The Higher Education Commission (HEC) of Pakistan (a statutory authority regulating the working of universities) issued directions to all the universities to start online classes. The universities asked the instructors to use any platforms such as WhatsApp, Google classroom, Zoom, Microsoft Teams, or any other to teach online.

Online learning is useful for students having the necessary resources and technological skills (Brown, 2019). However, it is challenging for others with limited technical knowledge and a lack of resources (Owusu-Fordjour et al., 2020). Online sessions bring a variety of technical problems such as login issues, low audio, and video quality, and downloading errors (Dhawan, 2020). Students feel depressed when they face such technical problems (Kim et al., 2005).

In contrast, students do not face such technical problems in formal classroom settings. In research by Abdelaziz et al. (2011), on comparing the effectiveness of online learning versus classroom learning, the nursing students reported satisfaction with online learning. However, they did not prefer to continue with such mode. The lack of technical skills prevented students' interaction with the instructor and participation in the online discussion. The students preferred recorded lectures over live online lectures. The students suggested the availability of required resources such as computers and the internet necessary for online learning. The authors recommended blended learning that integrates e-learning and the formal classroom experience.

Kim et al. (2005), in their research, found the university students highly satisfied with online learning. The students acknowledged the benefit of online learning and liked its flexibility. They suggested continuous practice with using technology and training in virtual teaming skills. However, the students reported difficulty in interacting with their peers and instructors during online learning besides delayed feedback. Dhawan (2020) also mentioned online learning unengaging due to a lack of personal attention and interaction.

Agarwal and Kaushik (2020) investigated medical students' perception of online learning during the 2020 lockdown. They used the Zoom platform for online instruction for 12 days. The participants expressed their satisfaction with online education and viewed it relevant to their learning needs. Most students reported online sessions exciting and interactive. The participants regarded online learning as a means of escaping from COVID-19 anxiety and recommended its integration in the graduate curriculum in India. However, the research did not provide information on how the satisfaction level was measured. Moreover, the data were collected after 12 days of intervention, which is a short duration to report satisfaction level and to generalize the results.

A review of previous literature shows that online learning is carried along with formal classroom learning; however, various challenges lower its effectiveness and students' satisfaction. This research adds to the previous studies to modify our existing instructional practices to achieve higher students' satisfaction with online learning. Students will adapt to online learning if they acquire a high satisfaction level. The study has two phases. The first phase focuses on exploring the challenges in online education and students' recommendations for overcoming them. The research used an online Google Form with closed and open-ended items for data collection. The second phase aims at working on students' suggestions and taking guidance from related

literature to modify instructional practices during online education. We consulted four instructors willing to incorporate students' recommendations in their instructional practices. The data was collected again through the Google Form to explore students' satisfaction with online learning. The satisfaction level is related to the interaction between instructor and students (Diekelmann & Mendias, 2005), provision of proper guidance, and students' support system (Vonderwell & Turner, 2005).

Research Objectives

1. To explore the challenges in online learning during COVID-19 lockdown
2. To seek students' suggestion for modifying existing instructional practices in online education
3. To measure students' satisfaction level with the modified instructional practices

Research Questions

The following research questions guided this study.

1. To what extent are students satisfied with online learning during COVID-19 lockdown?
2. What problems students face during online learning, and how can these problems be encountered?
3. How can we modify instructional practices to impact students' satisfaction level with online learning positively?

Theoretical Framework

We believe that learners' feedback and instructors' leadership have a significant role in the learning process. Any intervention ignoring these factors will be ineffective in warranting learners' satisfaction. Powers and Rossman (1985) discussed students' interaction with peers and with the instructor necessary for satisfaction with online learning at the graduate level. Vonderwell and Turner (2005) identified several factors that affect satisfaction levels, such as clear directions about course objectives and assessment, and active student-teacher interaction.

Keeping into consideration these factors, we chose Kranzow's (2013) guidelines as a theoretical framework due to being a more updated version. Kranzow assigns a leading role to faculty leadership in addressing students' satisfaction through two channels (Figure 1). The first relates to active faculty-students interaction. The instructor ensures that the course content is easily accessible to students. The students are familiar with technology to attend online sessions. In case the students face any technical problem, the instructors provide necessary facilitation or refer them to students' support services for expert advice. Moreover, prompt feedback is also essential in online learning to address student's queries and provide them confidence through virtual presence.

The second channel discussed by Kranzow is student-peer interaction. Again, the faculty role cannot be underestimated in establishing this interaction. The purpose of these interactions is to build a strong sense of community, which eliminates the feeling of isolation during online sessions. Building a sense of community relates to creating a community of learning and inquiry. The instructor makes his social and cognitive presence to the class and encourages them towards collaborative learning. The students assist one another with a sense of attachment and cooperation.

This research kept into consideration Kranzow (2013) model to measure students' satisfaction levels. Moreover, our modification plan for instructors also considered both elements to improve students' satisfaction levels in online learning.

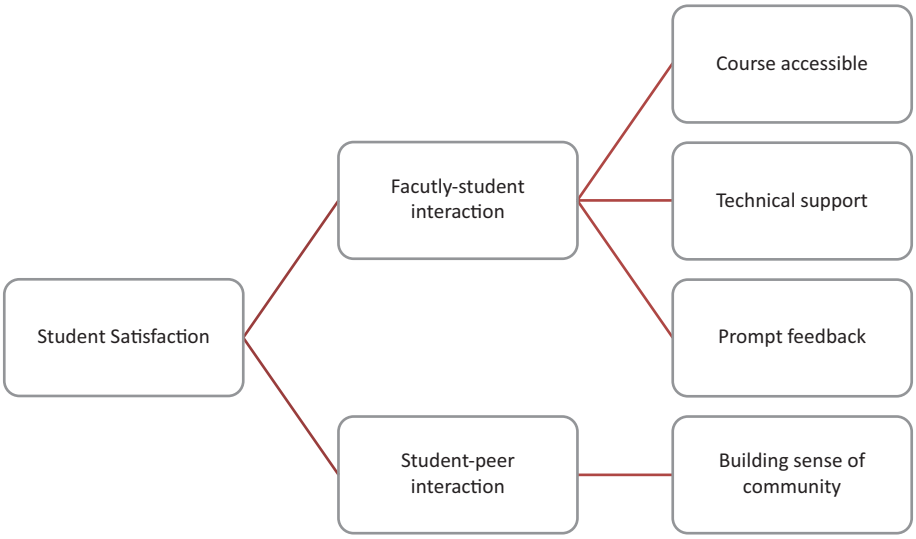

Figure 1: Model for students' satisfaction level.
Source: Kranzow (2013)

Material and methods

Procedure

The first phase corresponded to data collection during the start of online instruction. The data collection started in the 3rd week of online education. Due to the lockdown, we collected data through an online Google Form with closed and open-ended items. The class representatives helped in sharing the Google Form with their classmates. The Google Form helped in exploring students' satisfaction with online learning, the challenges encountered during online education, and students' suggestions to overcome them. The closed-ended items were related to students' satisfaction level (table 1), while the open-ended questions enquired about challenges in online learning and students' recommendations for improving online education. The instrument was constructed by keeping the Kranzow's model (2013) for students' satisfaction. These items were properly validated through a team of three experts, and then pilot tested before its administration. The reliability coefficient of the items was 0.79, which was acceptable.

The second phase was working on the students' suggestions to improve the online learning experience. With proper guidance from the university administrations, the researchers consulted four instructors willing to modify their instructional practices as per findings from phase 1. Data was re-collected in the 12th week using Google Form to explore students' satisfaction with online learning. The researchers observed ethical guidelines.

Sample

The population was all undergraduate students of a large public sector university in the federal capital of Pakistan. However, we delimit our sample to 6th and 7th semesters of Bioscience department as it was not possible to modify instructional practices across different departments due to constraint of money, time and resources. The sampled university switched to online learning during COVID-19 and had no earlier experience of such mode of learning. A total of 196 students were provided with

the link of the Google form through emails and WhatsApp numbers. The number of valid responses was 179 in the first phase and 163 in the second phase.

Analysis of Data

Students' satisfaction level was measured through seven closed-ended items (mentioned in Table 1). These items were based on a five-point Likert scale ranging from 1 to 5, with 1 representing low and 5 high satisfaction levels. The data helped in calculating the mean and t statistic using IBM SPSS version 25 (Reg.). The challenges in online learning and students' suggestion for improving online education generated qualitative data which was analyzed thematically by transcribing, coding, and then extracting themes. The themes were further converted into frequencies and percentages to find the magnitude of a specific response. Some of the verbatim responses of the students helped in a deeper understanding of the context.

Results

The results are mentioned under the following five headings:

a. Students' satisfaction level pre-modification
b. Challenges in online learning
c. Suggestions for improving online learning
d. Modifying Instructional practices as per students' suggestions
e. Post-modification result

a. Students' satisfaction levels pre-modification

Table 1 shows the mean of items related to satisfaction level pre-modification. The satisfaction level was assessed through two methods, first, by seeking students' responses on the seven items in table 1, secondly, through students' self-reported satisfaction level on a five-point Likert scale (table 2). We asked the student to express their satisfaction on a scale of 1 to 5 in the order of increasing satisfaction level.

Table 1. Students' satisfaction level pre-modification in online learning

Statement	Mean before modification
It is easy for me to access online classes	2.11
I help my peer during online learning	1.91
I understand the content taught in online learning	2.27
It is easy to use online learning resources	1.98
I can interact with the instructor during online class	1.91
I can interact with my peers during online class	1.84
My queries are adequately addressed in online learning	2.15
Total of all the items	2.03

Table 2. Comparison of students' self-reported satisfaction level and as measured from the items

Statement	Mean before modification	t-test
Satisfaction level from the items	2.03	-1.79*
Self-reported satisfaction level	1.91	
Total		

*p>.05

Table 2 shows the mean of students' satisfaction level measured through the seven items in table 1 and its comparison with students' self-reported satisfaction level on a Likert scale of 1 to 5. The self-reported mean was lower than the one measured through the items in table 1. The t-test reveals there is no significant difference in the two means, t (178) = -1.79, p>.05. This also supports our seven items scale as reliable for measuring students' satisfaction levels.

b. Challenges in Online learning

The students' responses were qualitatively analyzed to identify themes related to challenges in learning online (Figure 2).

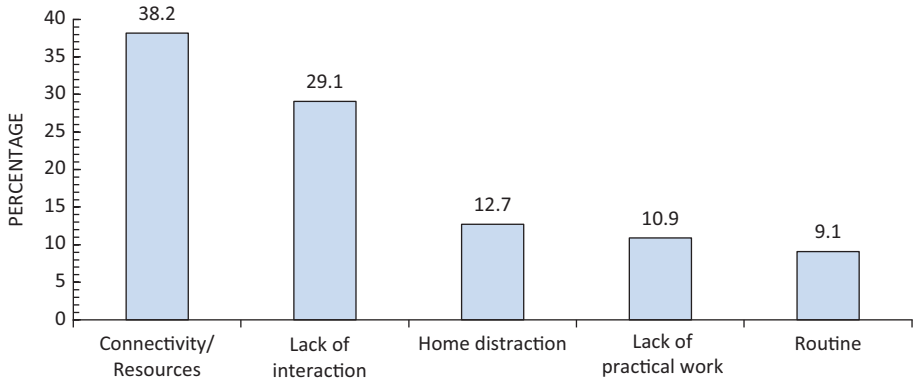

Figure 2: Challenges identified by student's in online learning.

Connectivity and the lack of resources

The most-reported problem in online learning was *connectivity and the lack of resources* (38.2%). Attending online classrooms requires a proper internet connection and ICT devices, which was not available with most of the students. Then the problem of disconnection and slow internet speed resulted in students' frustration and anxiety. Lastly, frequent power breakdown in the country also impedes access to online learning.

> Student A: 'I do not have a proper internet facility... and it is tough to study online using a mobile phone. I am anxious about my learning.'

Student B: 'Due to the lockdown, I cannot go to the campus where I have all my equipment, my laptop, and internet device.'
Student C: 'We have frequent power breakdown in our locality, so I miss my lectures.'

Lack of interaction

Interaction with the instructor and peers is a significant determinant of satisfaction with online learning. This problem appeared as another major problem during online classes (29.1%). Besides, the lack of interaction between students and teachers also hinders the learning process. Several students reported that they learn better in groups that are lacking during online sessions.

Student D: 'I am not getting anything. I miss the face to face interaction with the teacher.'
Student E: 'The worst form of learning is to sit passively and listen. I learn while interacting with others.'

Distraction

Students identified various distractions during online sessions (12.7%). These distractions were related to interference by peers during online class and the disturbance at home. The lockdown confined all the family members to stay at home and involved in different activities. Due to limited space at home, many students cannot find a separate room to interact with the instructors and their peers. This also prevents their participation in online discussions.

Student F: 'I am unable to concentrate during online classes as most of the students make fun of the procedure.'
Student G: 'It is hard to study at home because of my siblings and the background noise.'

Lack of activities

The online classes lack activities and practical work (10.9%). Due to more emphasis on theories, the students reported a lack of interest and understanding problems.

Student I: 'I cannot get hands-on experiments in my subjects.'
Student J: 'My subjects involve practical, and it becomes difficult for me to understand all theories.'

The problem in setting routine

Lastly, the students reported difficulty in setting a proper routine to attend online classes (9.1%). The students complained they have many tasks and distractions at home, making it challenging to participate in online courses. The decline of interest in studies during the pandemic also hinders in setting a routine.

Student K: 'Although I have enough time now, I cannot set a proper routine for study.'
Student L: 'It is hectic. I am the only daughter, and my mother is a nurse. I have to do all the house chores as my mother has just recovered from a long illness.'

c. Suggestions for overcoming challenges

To overcome the challenges in learning online, the students provided different suggestions (Figure 3).

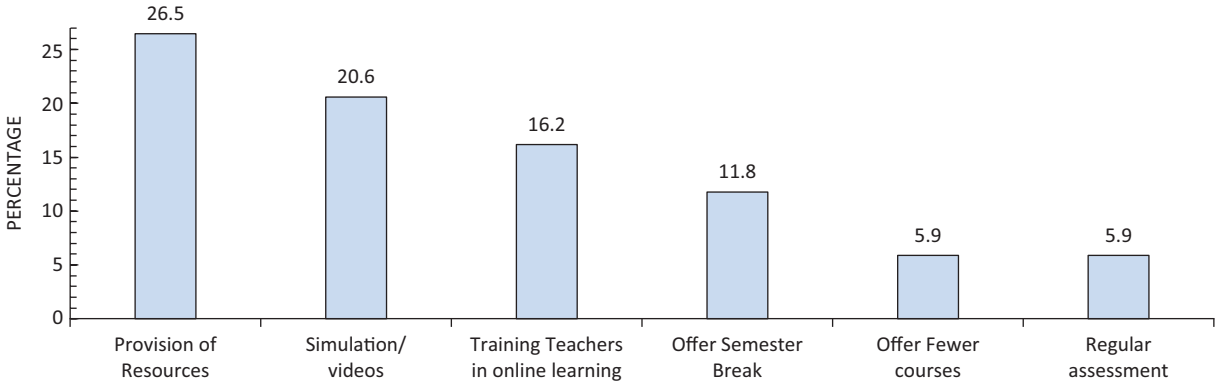

Figure 3: Student's suggestions for overcoming challenges in online learning.

i. Students suggested the availability of required resources to attend online classes (26.5%). These resources include the provision of free internet devices, the availability of internet, ICT devices, and uninterrupted power supply.

Student M: 'The students should be provided free internet devices to reach the online classroom.'

ii. To make online lectures interactive and motivating, students suggested incorporating relevant short videos and simulations (20.6%). This would help in understanding the practical aspect of a topic.

Student N: 'The major issue is a hands-on experiment, one way to tackle this is to provide simulation videos or material to get that experience at home.'

iii. Another suggestion to improve online instruction is to train teachers for online learning (16.2%). This is highly recommended, as most of the teachers never taught online.

Student O: 'May the teachers be provided some short training on how to deliver effective online.'

iv. 11.8% of students suggested there is no need for online classes at present. The pandemic is spreading, and everyone is worried about one's safety. The educational institutions shall give a break to help students cope with psychological and family problems.

Student P: 'I think the best solution for this online teaching is not to do it. We shall focus on our family'.
Student Q: 'This lockdown shall be treated as the semester break. Studies and other stuff can resume after the lockdown is over'.
Student R: 'We are worried about our life, not for studies.'

v. The students suggested fewer courses to set a proper routine and to adjust to the new experience of online learning (5.9%).

Student S: 'The students should not be bombarded with too many courses.'
Student T: 'Setting a proper routine is a must for effective studying for which the university shall offer courses in different phases.'

vi. The students proposed short breaks between the lectures (5.9%). The teachers shall add an interesting quiz or assignment to involve students during the lecture.

Student U: 'There should be short quizzes during the lecture, it will motivate everyone to listen to the teacher carefully.'

d. Modifications in instructional practices

1. Instead of taking a live teaching session, the instructors recorded their lectures using PowerPoint slide recording, video recording or using any other screen recording software. The recorded lectures were shared with the class using OneDrive link or Microsoft Teams at least two days before the scheduled online class. The students were expected to watch the recorded lecture any time convenient to them before the online live session with the instructor.
2. The duration of the online live session was reduced to 30 minutes, with a minimum of three periods per course per week. This 30-minute class was for Question-Answer and discussion on the recorded lecture with the instructors.
3. The timetable for online classes was decided by the instructors after discussions with students to ensure maximum availability during the online session.
4. All the meetings and online sessions were to be held on Microsoft Teams. All the students and faculty members were provided email accounts to work on Microsoft Teams. Moreover, the instructors and students used Microsoft teams for chats, communication, and interaction.
5. All the four instructors were provided online training in Microsoft Teams, arranging meetings, sharing files with the students, sharing laptop screens, conducting online quizzes, assignments, and sharing online resources and videos.
6. For students living in remote areas or with internet issues, the instructors will prepare CDs of the recorded lectures, which will be sent to the students by post for preparation and understanding.
7. The recorded lectures were made interactive, using videos and simulations. This helped the students learn the practical aspect of a topic and its application.
8. The instructors shared some rules for online classes with the students. They would keep their mic off to prevent distraction and would raise their hands in Microsoft Teams when they would ask a question or add to the discussion. The private chat was also an option to interact with the teacher regarding their issues and queries.
9. The instructors keep a record of their weekly lectures, the topic covered, and the students' attendance for sharing with the concerned coordinator for the official requirement.

e. Result of modification

Table 3 shows students' responses post-modification. The items provide information about students' satisfaction with online learning. The means of all items after modifications were higher than the means before modification, and these differences were significant using the t-test. The mean of all the items after modification (3.76) is higher than the mean of all the items before modification (2.03) (table 1), which indicates greater satisfaction with online learning after modification, $t(162) = 73.85$, $p < .05$.

Table 3. Students' satisfaction level post-modification in online learning

Statement	Mean after modification	t-test
Involvement in online learning is a fun	3.72	25.63*
I am comfortable with online learning	3.36	14.57*
I understand the content taught in online learning	3.82	18.21*
It is easy to use online learning resources	3.68	19.03*
I can interact with the instructor during online class	4.13	28.44*
I can interact with my peers during online class	3.78	20.30*
My queries are adequately addressed in online learning	3.88	24.20*
Total of all the items	3.76	73.85*

* $p < .05$

Discussion

The students identified some challenges in online learning such as internet connectivity, lack of resources, theory-laden lectures with no activities, weak interaction, difficulty in setting a routine, and home distraction. No doubt, internet services are not available in many parts of the country, and ICT devices are not available, especially in rural areas. Basilaia and Kvavadze (2020) also reported a lack of ICT devices in rural areas. Then comes the problem of reduced bandwidth and the inertia to use technology for learning (Chick et al., 2020). We need to learn from the Chinese government for taking prompt action during the pandemic lockdown and ensuring the availability of fast and stable network services to teachers, parents, and students to make online education successful (Zhang et al., 2020). The Guangdong government in China provided thousands of tablets to students on an emergency basis besides using satellite TV channels for online learning in remote areas (Zhang et al., 2020). Such preparation was not done by the Pakistani government, thus resulting in students' frustration with the internet services and power breakdown.

To tackle the problem of connectivity and power breakdown, we guided the instructors to avoid live teaching and instead record their lectures. These lectures were shared with the class at least two days before the scheduled day. This provided a flipped classroom experience to watch the recorded lecture in free time and use the online session for discussion and questions/answers (Chick et al., 2020). Recording video lectures also solve a variety of technical problems and help in evaluating content quality (Dhawan, 2020). The instructors were able to add relevant activities, figures, simulations, and supporting videos in their recorded lectures. This improved the quality of the recorded lectures. However, the inclusion of activities and exposure to practical work as a replacement to lab work may still take some more time (Wang, Cheng, et al., 2020).

Online learning is regarded as flexible in terms of time and space. However, the students were not able to set a proper routine due to this flexibility. Dhawan (2020) also reported that students do not find time for online learning during COVID-19 because of too much flexibility. Thus, we felt the need to allocate proper time for online classes. This was done after discussion with the students to ensure maximum availability. The instructors also reduced the duration of online classes to 30 minutes. The reduction in the length of online classes helps set a routine (Basilaia & Kvavadze, 2020). Similarly, the Zhejiang province in China also directed schools to reduce the duration of online classes between 20 to 30 minutes (Zhang et al., 2020). Our modification plan also reduced the online session to 30 minutes for the same reason and to allow the students to adjust to the new system of learning.

Moreover, the training and preparation of instructors for online teaching was also essential. The Information Technology (IT) section arranged online sessions to train the instructors in online education. However, this training was mostly focused on using online tools and not on the delivery of instruction. Online instruction is a complicated process. Even good teachers are unable to deliver quality instruction when it comes to online teaching (Wasserman et al., 2020). This creates the need to train teachers for online education and to support them continuously. As Tobin (2020) rightly concluded, "Good online teaching requires training, prep, and support. The current crisis provides none of that". Jones and Sharma (2020) commented that students are deprived of quality education at present because of inadequate preparation by educational institutions for such a mode of teaching.

It seems that countries with limited technologies are not prepared for online education during the lockdowns (Sintema, 2020), and the continued closure of schools is likely to accelerate social inequalities (Cohen & Kupferschmidt, 2020). Online learning is neither "cheaper nor easier" (Wasserman et al., 2020). The cost of online education is always higher than the formal classroom delivery. The price is either the capital incurred on the delivery or the cost of poor learning outcomes (Jones & Sharma, 2020).

The data after modification shows improvement in the means of all the items. The students expressed more interest in online learning, viewed it as a fun, and reported more significant interaction with the instructors and their peers as compared to pre-modification. The separate means of all the items after modification was higher than before modification. The result of the t-test revealed that these differences were significant. The mean of all the items (3.76) after modification was higher than the mean before modification (2.03). Thus, the modification in the online program was effective in improving students' satisfaction level and providing evidence for students' adoption of online learning during the pandemic. Kranzow (2013) also supported that satisfaction with online experience helps in adapting to the program. One crucial factor that determines satisfaction level is students' familiarity with using technology and online tools (Bolliger, 2004). The students reported their comfort level with using online tools and working on Microsoft Teams. However, despite students' satisfaction with the online learning, it cannot offer a replacement to the formal classroom learning that provides more significant interaction and prompt feedback to students' queries (Cole et al., 2014). Even students expressing a high level of satisfaction with online learning reported that it was not their preferred learning method (Strong et al., 2012). Despite that, we must struggle for learning to occur at home (Pragholapati, 2020).

Conclusion

This research is an effort to make a smooth transition from offline to online learning during the pandemic. The initial data revealed students' inertia towards attending to learning online. The challenges reported by students in online education were the lack of resources and internet services, lack of interaction during online classes, distraction at home, lack of activities, and difficulty in setting a routine for online learning. Keeping in mind the challenges faced by the students and their recommendations, we introduced modifications in the instructional practices. These modifications are recommended for instructors as helping guidelines to improve online learning. Some of these include recording lectures and then sharing with the students, reducing the duration of the online session to 30 minutes, use of Microsoft Teams for scheduling class and sharing resources, and observing the instructor's guidelines during online sessions for productive interaction. The research provides useful guidance to educational institutions, instructors, and researchers about a quick transition to virtual education.

Limitations

Post-modification data revealed students' greater satisfaction with online learning. However, the role of other variables such as practice, instructor, and parental support in affecting satisfaction with online learning cannot be ruled out. Secondly, this study collected data through a single research instrument. The collection of data through different tools and from other stakeholders will add more credibility to the findings.

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