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ONLINE EDUCATION AND INTERNET CONNECTIVITY PROBLEMS: A PERSPECTIVE OF THE TEACHERS AND UNDERGRADUATE DENTAL STUDENTS

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Abstract

Introduction: Online education has been integrated as an essential tool in dental learning, but internet connection challenges affect both students and faculty. These disruptions have implications on educational quality, student interaction, and test validity.

Objectives: The purpose of this research is to explore the effects of internet connectivity issues on online learning perceived by undergraduate dental students and faculty members in Dentistry Department, Ayub Medical College Abbottabad, Pakistan.

Materials and Methods: A survey was conducted at Dentistry Department, Ayub Medical College Abbottabad, Pakistan from June, 2024 to December, 2024 using structured self-administered questionnaires. Of the participants, 200 were students, while 50 were faculty. The participants were selected through a convenience sampling technique. For the analysis of the collected data, essential statistical tools were used.

Results: Internet disruption was a challenge that affected most of the students 72% and the faculty 60%. With limited connectivity, the learners were less engaged, missed part of the lecturer's content, and faced technical challenges in tests. The preference for blended learning was higher among the students (78%) and the faculty (60%).

Conclusion: Internet challenges greatly affect online dental education. The adoption of blended learning and infrastructural improvements are crucial for improving learning experiences.

Keywords: *Online education, internet connectivity, dental students, faculty perceptions, blended learning.*

INTRODUCTION

Online education is one of the essential components of the teaching and learning process nowadays, as the COVID-19 pandemic largely impacted direct contact education. The new shift to digital learning posed numerous problems for students and teachers, with the issue of internet connection being critical (1). Several papers have shown that dental students and teachers have found it hard to manage online learning, especially in countries that experience unstable connectivity. Concerning the shift to e-learning in dental education, the reaction to this change was also mixed, as many students have struggled with technical problems, lack of practical experience, and issues with connectivity to the instructors (2). Furthermore, variables including digital competence, internet speed, and institutional readiness affected the suitability of online learning for dental students (3). The shift from

face-to-face instruction to online sessions significantly changed the learning and teaching processes. Although continuity in academic activities was achieved through online education, it also revealed the lack of infrastructure in many countries, including Pakistan.

A study in India highlighted that challenges such as losing focus and interest resulted from poor internet connection (4). Egyptian students also reported reliability issues with online learning platforms and technical difficulties that interfered with their understanding of complex material in dentistry (5). This means that although e-learning is effective, there are some drawbacks, especially in areas that have weak web connections. Internet connectivity problems have always been a concern, especially in online learning environments, often involving skills-based learning like dentistry. A study in Jordan showed that many students struggled to attend virtual classes because of slow internet connections and connectivity issues that caused frustration and interruptions (6). Other studies in Italy revealed that students experienced technical problems, affecting their communication with instructors and other students (7).

These challenges were not specific to students only, as lecturers found it hard to present content without interruptions caused by poor internet connection. The problem was compounded by the fact that the students in urban areas received more stable internet connections than the students in rural areas (8). However, it has brought some benefits, including flexibility in learning and access to learning materials and resources. A survey of dental educators revealed that though they had difficulty adapting to teaching online, the shift was a chance to try new teaching approaches (9). For instance, pre-recorded lectures, interactive quizzes, and virtual simulations effectively managed internet connectivity challenges. However, the efficiency of these techniques mainly depended on the student's capability to get stable internet connections to complete the activities, and this remained a challenge for most of them (10).

Online versus offline dental education reveals that online learning is not preferred over in-person learning because of its practical application in moulding dental trainees (11). Students could complete most theoretical classes online, but the useful components proved challenging regarding clinical lessons, as students could not grasp the practical procedures being demonstrated online. In Bangladesh, a study revealed that a good number of students in dentistry also complained that they are not satisfied with online classes as they find network problems and a lack of interaction with the teachers (Khan et al., 2020). Further, the students claimed that the virtual assessment reduced their competency and knowledge skills, as they suggested that online examinations do not give comprehensive tests of their practical skills. The emergence of online education has raised the need to solve internet issues and cover all the essential things worth considering. Chinese dental students expressed similar experiences with their learning, with challenges such as instability of internet connection being cited as having negatively impacted the learning process and increased stress levels (14). A survey on blended learning in dental education for global education suggested that the blend of online and face-to-face teaching could be the most useful since it might provide the advantage of online learning that, at the same time, can be practised in the clinical environment (15).

Lastly, online education resolved the problem of continuing dental education in times of difficulty, though internet connectivity has remained a challenge for students and faculty. The challenges that make it difficult to achieve a high level of effectiveness in e-learning include internet connection disruption since many areas do not have stable internet connections. These connectivity challenges must be dealt with to ensure that dental class students get the best education they deserve under favourable circumstances.

Objective: The objective of this study is to assess the impact of internet connectivity issues on online education from the perspective of teachers and undergraduate dental students in a hospital setting in Pakistan.

MATERIALS AND METHODS

Study Design: Cross-sectional study.

Study setting: The present study was carried out at Dentistry Department, Ayub Medical College Abbottabad, Pakistan

Duration of the study: This study was conducted between June 2024 and December, 2024.

Inclusion Criteria:
Participants comprised undergraduate dental students in the clinical and preclinical years who had engaged in online education during the study period. Current full-time or part-time faculty members who have commenced offering teaching and learning activities online for at least six months were also involved.

Exclusion Criteria
Those who have not attended classes in Online education mode or have minimal experience with an LMS were excluded. All patients who were unable to give their consent were also excluded from the study before the study for this research was conducted.

Methods
Questionnaires were prepared in a structured format to record responses from the undergraduate dental students and faculty of Dentistry Department, Ayub Medical College Abbottabad, Pakistan. Survey questions were structured and unstructured to address internet connectivity challenges experienced, effects, and possible remedies for online learning. The participants were reached through their email addresses and social media accounts so they could fill out the survey. The targets for data collection were the students and any faculty member involved in distance learning programs in their respective institutions. Data was collected within two months, while response data was also made anonymous to meet the confidentiality requirements. Descriptive statistics such as frequency and percentages were used to analyze the collected data. The qualitative responses were coded into themes to compare challenges and experiences regarding internet connectivity. The institutional review board approved the research procedures, and consent was sought from all participants.

RESULTS
A total of 250 participants were included in the survey in which 200 under graduate dental students and 50 faculty members from Dentistry Department, Ayub Medical College Abbottabad, Pakistan. The findings reveal thatstudents face challenges of internet connectivity and its implications to online studies.

Internet Connectivity Issues Among Students and Faculty
About 72% of students and 60% of faculty members also said they experienced disruptions to their online class because of poor network connectivity almost often times. Most of the students noted their struggle in following lectures due to the issues such as buffering, disconnection, and delays in sound. Based on this, the findings indicated that 68% of students complained of slow internet connection right after considering convenience aspects of the device, while 54% of the faculty also experienced the same.

Connectivity Issue	Students (%)	Faculty (%)
Slow internet speed	68%	54%
Frequent disconnections	72%	60%
Audio/video lag	64%	50%
Inability to attend classes	55%	42%

Perceived Impact on Learning and Teaching
The study also sought to compare how connectivity complications impacted students' learning process and faculty members' effectiveness. 65% of students revealed that they tended to lose concentration

in online classes because of constant interferences. Also, it showed that 58% of the students indicated their ability to miss lecture content, which is crucial. Several faculty members also mentioned that their interaction with students was greatly affected, as more than half of them indicated poor internet connectivity in the household.

Impact on Learning/Teaching	Students (%)	Faculty (%)
Difficulty in focusing	65%	-
Missing lecture content	58%	-
Reduced student engagement	-	48%
Technical difficulties in assessments	50%	45%

Student and Faculty Preferences for Online Learning

However, it was noted that 40% of students and 35% of the faculty saw a positive side of online education, flexibility and accessibility. Nevertheless, 78% of students and 60% of the faculty chose the blended learning approach that combines online and in-person learning to avoid connectivity problems while still benefiting from online courses.

Preference for Learning Mode	Students (%)	Faculty (%)
Fully online	22%	25%
Blended (Online + Offline)	78%	60%
Fully offline (In-person)	-	15%

The study reveals that despite the flexibility offered in online education, challenges such as poor internet connection persist. The research showed that a large number of students and faculty endorse the concept of blended learning to address these difficulties while minimizing disruptions in learning.

DISCUSSION

The discovery of the new online system in dental studies and education has also brought with it a lot of challenges, the major one being internet connectivity. This paper also reveals how the two academic activities in the hospitality business among the Dentistry Department, Ayub Medical College Abbottabad, Pakistan undergraduate dental students and faculty members experienced challenges because of the instability of the internet connection. These findings agree with previous studies done in a similar context with dental students of other countries like Italy, Egypt and India. Continuous academic activities through online education during the COVID-19 crisis revealed the unpreparedness of the digital infrastructure in the system, especially in developing countries, including Pakistan.

Another important discovery that has been seen in this study is that the majority of the students (72%) complained that they often lost connectivity, and that affected their learning process, especially catching up with lectures. Other research conducted in Jordan and Bangladesh also highlighted similar problems with dental students who struggled with attentiveness caused by the delays in audio and video (3,4). Some significant issues encountered while using the technology were poor internet connection and frequent disconnections, especially during live interactive sessions, which require a high level of student interaction and active participation for understanding specific topological values in dentistry. The situation was similar for the faculty members, as 60% of them pointed out technical challenges that affected their conduct of lectures. The conclusion made is supported by studies done in China, where the faculty pointed out that interrupted sessions affected their teaching time and, thus, the time utility (5).

One of the critical needs that is mandatory while studying dentistry online is practical experience. Dental education is one of those fields that cannot be easily taught online or at least the practical part of the course due to its enormous emphasis on the practical application of acquired knowledge. This paper revealed that 58% of the participants could not access key lecture content because of

connectivity problems, which worsened the students' knowledge gap in clinical processes. Another study in India revealed a similar situation whereby students were unsatisfied with online classes, and many were concerned that their clinical competence had decreased (6). This is true since dentistry and teeth handling involves accurate skills that cannot be acquired through classroom learning. While getting virtual simulations and recorded demonstrations as alternatives, the effectiveness of these options was associated with the stability of the internet, often an issue with most of the students (7).

Lecturers also had concerns about minimizing students' interactions during online learning and teaching processes. About 48% of the instructors said they had less participation, as the students could not attend classes due to poor network connectivity or the new environment of virtual classes would not let them ask questions. This is similar to a study done in Egypt, which revealed that dental students' educators also faced issues keeping their students engaged in their online classes (8). Technological disruption and the lack of a strict structure made students equally passive in the class, although they were logged in to the class. This is compounded by online assessment, which faces connectivity hitches throughout the academic year. This means about 50% of the patients said that they experienced technical issues when taking exams, raising issues about the validity and reliability of digital assessments. This was evidenced in a UK study where students expressed concern about the property of online assessment methods in professional programs (9).

Nonetheless, some students and faculty members could identify certain advantages of online education. Students and faculty both found different benefits where 40% of the students thought that online learning was convenient and accessible and 35% of the faculty members agreed with them. This is in line with international literature stating that digital education enables students to learn at their own pace, review videos, and access additional learning material (10). Despite these strengths, they are significantly undermined by the connectivity challenges that hinder students from accessing digital learning tools. Academic isolation was also an issue, with students stating that they had lost touch with fellow students and instructors, resulting in lowered performance and high stress levels. A survey of students in Italy showed that when getting an education online, they had various challenges, including the lack of internet connection, which made them anxious and dissatisfied with their education (11).

Another significant finding is the willingness of students and teachers towards the blended learning approach, with 78% of the students and 60% of the faculty members supporting online and face-to-face learning methods. This is supported by a study done with students in China and the United States, where hybrid learning is viewed as the most effective delivery mode in dental education (12). Thus, if students undergo manual training in the necessary specialized programs, they can improve the benefits of online studying while getting sufficient clinical practice. However, there are challenges in adopting blended learning, such as poor internet connection and suitable learning platforms. Also, exceptional accessibility should be given to ensure students are connected by their educational institutions to follow stable internet establishments from those who face several instabilities (13).

Another factor that needs to be explored is how these challenges are handled through policies formulated by institutions. It was previously established that dental colleges and universities should embrace technology to improve online learning. Some possible measures include offering free or cheaper student data, developing student-centred technology centres on campus, and formulating different types of assessments that skip the need for internet access (14). Furthermore, faculty development programs should include activities to prepare educators for the challenges of the online learning environment. A survey carried out among faculty members reveals that they are confident in handling students and technical challenges once trained in digital education (15).

Moreover, online education has provided temporary continuity in dental education, but the internet connection problem is a critical factor in impacting education. Based on the research, this paper draws attention to the necessity of focusing on infrastructural development and policy changes to provide students with quality education without technical interruptions. The satisfaction of students and faculty with the blended mode indicates that the hybrid mode could be the best approach in the future.

By resolving issues that affect connectivity as well as positively impacting the available learning tools, the online environment can be improved to meet the needs of dental students.

CONCLUSION

This paper discusses the experience of interruption of internet connectivity that hinders the online education of undergraduate dental students and the faculty members Dentistry Department, Ayub Medical College Abbottabad, Pakistan. Most students and teachers reported losing connectivity, slow connection, and technical issues adversely affecting learning and teaching. These challenges included low student participation, misunderstanding of contents being delivered in class, and doubts about the credibility of online exams.

However, certain participants singled out the benefits of flexibility and access through online education. Nevertheless, the observed inclination toward blended learning indicates combining online and face-to-face classes works best for dental education. The fundamental solution to internet issues would involve hardware and software and faculty capacity building in that crucial area to impact the quality of the online lessons. This means that institutions must put into practice strategic policies to close the gap so that learners can have a proper learning system that will not interrupt their learning schedule.

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