

Have We Learned from The Past and Are We Ready for The Future? Online Teaching and Learning in Clinical Dental Education

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ABSTRACT

Objective: The COVID-19 pandemic compelled global educational institutions to shift to online teaching. In developing countries like Pakistan, this transition presented unique challenges. This research aims to explore the perceptions and challenges faced by faculty members engaged in online teaching, particularly in the context of clinical education, in Pakistan.

Materials and Methods: This is a qualitative, exploratory study. It seeks to analyze the experiences of medical institution that implemented online instruction for the first time during the COVID-19 pandemic. The lack of information prompted the use of descriptive phenomenology. The descriptive phenomenology assisted the participants in articulating their relevant observations, perspectives, and “lived experience”.

Each of the four groups consisted of six participants with online teaching experience and included both faculty members of basic sciences and clinicals. The acquisition of data consisted of semi-structured, open-ended interviews lasting approximately 60 to 90 minutes until data saturation was reached.

Results: The data analysis revealed significant themes related to online teaching. Faculty members identified challenges that affected the academic credibility of students and highlighted the need for adapting teaching methodologies for cognitive and skill-based learning outcomes. The absence of divergent perspectives among faculty members was evident.

Conclusion: The research concludes that faculty encountered diverse challenges while adapting to online teaching in a developing country. Tailored strategies for active student engagement, learning from developed countries, and adopting blended learning can facilitate successful integration. Continuous improvement and understanding unique challenges enable educators and policymakers to enhance online education quality in developing nations, promoting effective knowledge dissemination during future crises.

Keywords: Clinical Skills, Learning, Pandemic, Teaching

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INTRODUCTION

During the COVID-19 pandemic, the mode of education was changed globally. The online mode of teaching was adopted as traditional physical classes were not possible. In such circumstances, the virtual world revolutionized traditional teaching strategies.

Pakistan is a developing nation with limited resources in remote areas, and the majority of its educational institutions use traditional teaching methods. In response to COVID-19, Pakistani educational institutions adopted online instruction to continue the learning process. In most remote areas, people had access to communication devices, which became the only source of continuing academic activities and facilitating students' education while maintaining social distance.

In developed countries, online teaching has been practiced for decades. Despite this trend, the majority of educational facilitators also faced challenges while teaching online.¹ Unlike these countries, in developing countries where online learning is a new phenomenon, this transition was complicated by a lack of prior preparation for a new mode of teaching, minimum past exposure to technology, lack of knowledge of new didactic approaches, dearth of policies, communication gap, and lack of infrastructure.

However, as a result of the COVID-19 experience, in certain unfavorable situations such as earthquakes, floods, and political unpredictability, online education could be utilized to maintain continuity in education. In addition to teaching basic science subjects online, we could also teach clinical subjects. On the other hand, there has been little scholarly research on the topic of online clinical education in Pakistan. The purpose of this study was to investigate the obstacles and challenges encountered in online education in Pakistan along with its solutions. Moreover, it has investigated perspectives on clinical online education and assessment and innovative instructional methodologies and strategies. This research methodology may serve as a paradigm for online teaching preparation in comparable developing. In this context, we examine how these challenges acted as a driving force for the development of innovative solutions, such as the Blended learning, designed to address the complexities brought about by the pandemic and transform the landscape of dental education. nations. It is therefore expected to play a crucial role in the dissemination of

knowledge in the event of a future major crisis.

The review of relevant literature addresses various aspects of online learning and teaching. Online education seeks to establish an environment that is more engaging than traditional education². Nonetheless, it presents unique obstacles, such as a lack of experience and preparation, as well as institutional and technological barriers.³ According to Guskey, the transition to online learning requires taking into account learner skills such as self-regulation, IT skills, workload management, blended learning awareness, gender, and age. Learner contentment is crucial to the success of integrated or online learning, and dissatisfaction can arise when students struggle to use online methods effectively.⁴ The lack of timely instructor feedback and limited student-instructor interaction negatively affects learning outcomes.⁵

Some educational institutions were not adequately equipped for online teaching, resulting in setbacks in learning.⁶ This highlights the importance of institutional support in effectively implementing online teaching models. Another scholarly investigation was conducted to analyze the merits, limitations, potential advantages, and obstacles encountered in the realm of remote instruction during the COVID-19 global health crisis.⁷ In addition to the benefits of location flexibility, extensive content availability, and potential for innovative pedagogical methods, several limitations were identified. These include learners' varying capabilities and confidence levels, challenges associated with digital literacy, disparities in the distribution of IT infrastructure, the existence of a digital divide, and concerns regarding the quality of education.

In Pakistan, online learning faces diverse challenges, with internet accessibility being a major issue that disproportionately affects students from marginalized communities and remote areas.⁸

MATERIALS AND METHODS

We employed qualitative methodology based on a constructivist grounded theory approach. This is an exploratory qualitative research design. It investigates the online teaching experiences of Pakistani institution faculty members during the COVID-19 pandemic. Due to a dearth of understanding, descriptive phenomenology was used.⁹⁻¹¹ which allowed participants to convey their

experiences, observations and perspectives on online teaching to gain insight of that event in past and check their motivations. The sample collection method was purposive.

The criteria for the inclusion of participants was limited to the faculty members having online teaching experience. Four groups of participants were made, consisting of faculty members of basic sciences and clinical sciences. Each group comprises six participants having online teaching experience. In the first two groups, junior faculty members were included who had less than five years of teaching. The other two groups included senior faculty members having more than five years of experience. The written consent was taken prior to the interview. Each participant was informed that the data will remain confidential and safe.

This study was conducted at Hamdard College of Medicine and Dentistry The study was approved by the institutional ethical review committee having ERC NO ERC/BDS/02-2023. The interview was based on semi-structured, open-ended interview questions. Pilot testing was done to analyze the study guide questions for their readability and comprehension. Each interview session was audio recorded. At the end of the interview sessions,

data saturation was reached, and field notes were also taken during and after the interviews. Each session was approximately 60 to 90 minutes long.

The data analysis was performed in several steps. Firstly, the data were transcribed in detail. Transcription was done verbatim using audio recordings. The second step was to organize the data by grouping answers across the respondents. Lastly, the coding of data was done in the thematic pattern. The thematic map was developed through the careful consideration of data step-wise. (Figure 1). Confidentiality was maintained with a password system for authorized access. Member checking ensured interpretation accuracy and validity. Theme refinement was carried out during the written phase.

The data that was gathered provided valuable insights into online teaching, specifically among faculty members, and identified the key factors that are associated with online clinical teaching and assessment. Furthermore, it is advisable to adequately equip ourselves in anticipation of prospects.

The faculty members have identified several issues that present challenges to the facilitator and have a significant impact on the academic credibility of students.

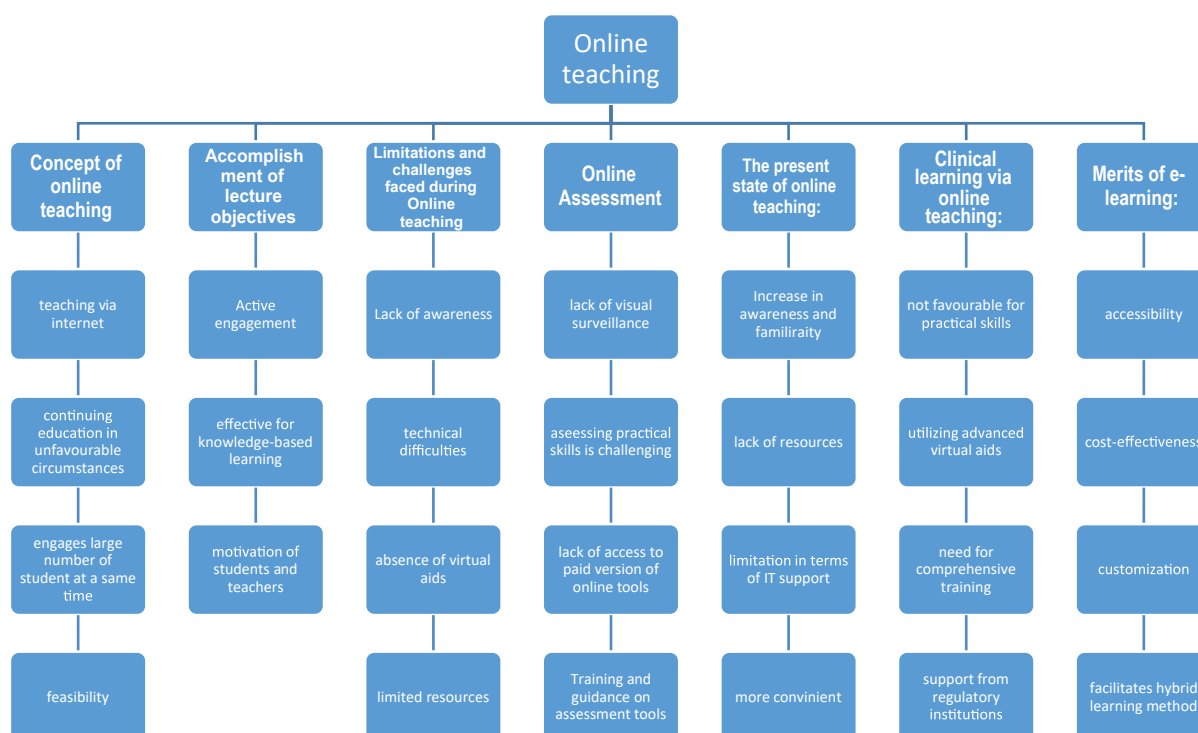


Figure 1: Thematic Map

FINDINGS: THEMES AND SUB-THEMES

Concept of online teaching

Online teaching refers to the *teaching via Internet* through various mediums like Zoom, Skype, conference calls, and Google Meet through webinars and video calls. Online teaching plays a vital role in continuing *education in unfavorable circumstances* where physical classes are not possible, like climatic conditions, political situations, or any pandemic disease, etc. Also, it engages a *larger number of students at the same time*, irrespective of their geographical locations. Furthermore, this mode of teaching facilitates the teacher to conduct their classes at their own pace and with much *feasibility*. For example, one of the participants stated that;

“Regarding online teaching, my concept is that it facilitates us, no matter wherever we are, it saves our time, it is cost-effective and we can also engage different groups of students on various locations”

Accomplishment of learning objectives

According to the participant, the facilitator needs to develop certain strategies to fulfill the learning objectives that promote student engagement and interaction in online learning environments. It is essential for every student to participate equally and there should be opportunities for *active engagement*. While comparing the *effectiveness of online teaching* for cognitive (knowledge-based) versus skill-based learning, cognitive learning may be more successful in online teaching, whereas skill-based learning may require more in-person instruction or resources. The participants emphasize the *role of teacher and student motivation* in achieving learning objectives in online teaching. The teacher and the student need to be motivated and engaged for online teaching to be successful. Moreover, *Limited resources* can impact the ability to fulfill certain learning objectives in online teaching, particularly for practical skills.

Limitations and challenges faced during Online teaching:

The facilitator faced challenges in the beginning due to *a lack of awareness and technical difficulties* in utilizing digital tools such as Zoom, Google Meet, and other online platforms. Both students and instructors faced challenges in acquiring the necessary skills to effectively navigate these platforms. Additionally, students residing in remote areas with *limited resources* encountered further

difficulties stemming from internet connectivity issues. Consequently, these connectivity issues resulted in delays and breaks during online lectures. The *prolonged duration of screen time* required for both students and teachers, as well as the need to effectively demonstrate procedures and models during online lectures, posed significant challenges in conducting lectures. The facilitator found it challenging to keep students engaged and motivated during the online lectures as they *lacked interest* and were unresponsive. Another major obstacle in learning was the *absence of virtual aids for practical classes* during online teaching. Additionally, instructors were deprived of the ability to leverage non-verbal cues and body language to facilitate effective communication and interaction among students in the virtual classroom setting. Moreover, the facilitators encountered difficulties as a result of students engaging in *doodling activities* during the online lectures.

Online Assessment

The process of conducting online assessments presented challenges due to the potential for students to engage in *deceptive behavior*, as the lack of direct monitoring makes it difficult to ensure academic integrity. The lack of *visual surveillance* posed a significant obstacle in ensuring that students refrain from seeking external assistance or utilizing unauthorized resources during online assessments. The utilization of online teaching methods, such as the implementation of assessment tools like Google Forms and Kahoot, may prove to be effective in evaluating students' theoretical knowledge. However, the evaluation of *practical skills presents a challenge* in the online teaching environment, as it necessitates the physical presence of students. The *absence of availability of paid software versions and restricted IT support* posed obstacles to the successful execution of online assessment methodologies. Facilitators frequently found themselves dependent on their endeavors to adequately prepare and administer assessments.

The assessment process is impeded by a lack of familiarity with the software. The transition from conventional paper-and-pencil assessments to online assessment modalities necessitates the acquisition of skills and knowledge related to learning management systems (LMS) and digital tools. The acquisition of knowledge and skills, both for faculty members and students, can present difficulties.

The present state of online teaching:

Different individuals hold *varying opinions* regarding the present state of online teaching. Some believe that physical classes are superior in terms of student understanding, interaction, and assessment, while others find online teaching more favorable due to increased software proficiency and student awareness. There is a noticeable increase in *awareness and familiarity with online teaching tools and platforms*. However, the lack of resources, IT guidance, and support from universities still hamper the overall favorability of online teaching. Over the past two years, there has been *progress* in terms of awareness, but resource constraints remain unchanged. While there is improved knowledge and proficiency in utilizing online platforms, the limited options and lack of updated versions of the software are still perceived as *limitations*. Online teaching offers *conveniences* such as time-saving, flexible access to recorded lectures, and cost reduction. However, despite these advantages, there are still shortcomings and potential for progress in terms of software advancements and overall effectiveness. Many believe that a *blended approach*, combining both online and physical lectures, is more effective than solely relying on online teaching. For instance, one of the participants said;

“Online teaching is more favorable than traditional teaching but I would like to add that blended type of teaching is more effective, which includes conducting a few online and some physical lectures. Online teaching had its own positive and negative values, some of them are that it’s not time-bound, if students are available, you can conduct the lecture, for a physical lecture, we need to have a lecture hall and multimedia availability.”

The present state of online teaching reflects a significant shift in education due to the impact of the COVID-19 pandemic. While there has been *adaptation* and increased familiarity, there is still *room for improvement*, particularly in terms of system infrastructure, software tools, and facilitation, to match the standards of the Western world.

Clinical learning via online teaching:

Faculty members express that online teaching is *not favorable for imparting clinical knowledge*, as practical skills, hands-on experience, and patient interaction are crucial aspects that cannot be fully conveyed through online methods, one of the participants stated;

“For clinical knowledge, we can make videos and make them learn, but when it comes to performance, their presence is highly important because the clinical work is to be performed on the patient, so videos can only guide you.”

While recognizing the potential of online teaching for clinical practice, faculty members emphasize the importance of *utilizing advanced virtual aids*, such as globally available videos and haptic technology, to enhance the learning experience and simulate clinical scenarios. Also, there is a lack of policy for resources, financial support, and infrastructure in their context, hindering the implementation of effective online teaching for clinical subjects. Faculty members acknowledge the *need for comprehensive training*, participation from government bodies, and support from regulatory institutions to facilitate the successful integration of online teaching for clinical education.

Merits of e-learning:

The numerous advantages of e-learning have been highlighted, including accessibility, convenience, continuity, cost-effectiveness, flexibility, customization, time-saving, increased reach, safety, and its potential to complement traditional education systems. E-learning allows students to attend lectures from anywhere, saving time and offering flexibility in terms of program selection and learning pace. E-learning ensures the smooth continuation of education in various circumstances, such as climatic changes, political conditions, or unexpected events like the COVID-19 pandemic where social distancing is a concern. Online teaching is considered more cost-effective than traditional education systems. It eliminates the need for travel and accommodation expenses and allows targeting a larger audience through virtual platforms. Recordings of lectures also enable students to review the material at their own pace. Online teaching allows for a wider reach and access to a larger audience. It transcends geographical boundaries and enables participation from remote areas. Lastly, E-learning facilitates *hybrid learning models*, where students can attend classes online or in person as per their availability. It can *supplement physical classes*, ensuring continuity in education when either faculty or students are unable to attend in person.

RESULTS

This study provides insights into online teaching within

medical and dental colleges, highlighting its importance in education continuity under adverse conditions. Key findings include the effectiveness of online teaching for cognitive learning but limitations in skill-based learning due to challenges like internet connectivity, engagement, and practical skill demonstration. The facilitators emphasize the numerous factors that are facilitating online teaching: having a policy for online teaching, adequate infrastructure and resources such as stable internet connection, separate rooms for online teaching, proper equipment, and access to reliable software like paid versions of Zoom. Proper training and guidance regarding online teaching and assessment tools, platforms, and techniques are necessary for teachers to effectively assess students' knowledge and clinical skills. Also, there is a need for training sessions for students to effectively utilize online learning tools. It also emphasizes the role of IT staff in providing guidance and technical support. Another factor is the faculty and student motivation and their willingness to actively engage in online teaching and learning. The impact of the teaching environment, whether

at home or in a dedicated space, on the effectiveness of online teaching; therefore, factors like a quiet and conducive environment contribute to a better learning experience. Cooperation and support from the university and the provision of virtual aids and appropriate online teaching tools are also crucial in facilitating the online clinical teaching process. A blended learning approach should be adopted as it offers innovative opportunities for teaching and learning. Particularly, flipped learning creates an experience in which the student learns the concept independently and then applies and reinforces it in the clinics. Blended learning allows for greater flexibility while acknowledging the positive and negative aspects of online teaching, such as non-reliance on fixed schedules and the need for proper infrastructure.

To put it in a nutshell, the SWOT analysis was performed in order to identify the strengths, weaknesses, threats, and opportunities regarding online teaching in medical and dental colleges. (Figure 2)

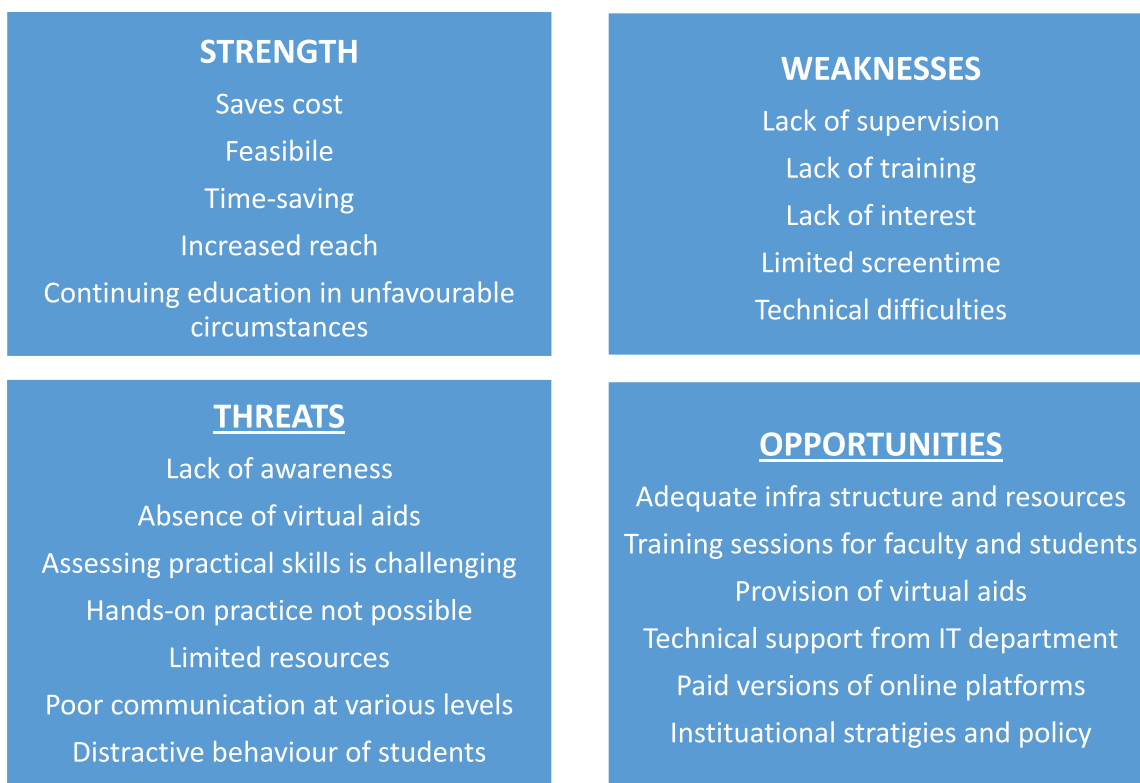


Figure 2: SWOT Analysis

DISCUSSION

The students admitted in 2019 faced a deficiency in clinical knowledge and practical skills due to interrupted

clinical rotations and limited interactions with patients and hands-on experiences¹² Medical and dental education typically involves a combination of classroom instruction

and practical sessions, with limited use of online resources. The COVID-19 pandemic further highlighted the need to adapt to online learning, impacting students at various stages of their educational journey.

During the early stages of the COVID-19 pandemic, students were not involved in patient care due to a shortage of personal protective equipment (PPE). As infection rates increased, educational institutions globally withdrew students from clinical settings. Social distancing emerged as a crucial preventive measure, leading to restrictions on student gatherings in educational environments until the development of vaccines or treatments.¹³

The advent of online learning has provided students with enhanced accessibility to a broader range and increased volume of material, hence facilitating a more efficient and effective learning experience. The transition from conventional to digital learning posed challenges. Students and instructors face increasing time restrictions, forcing departments to develop innovative methods to offer a personalized, self-directed learning experience. Some instructors encouraged students to use new technologies, but they stressed the necessity for robust institutional support. Implementation was seldom successful without institutional support and guidance. Online learning requires an institutional approach.¹⁴⁻¹⁶ To provide a coherent education, inter-faculty collaboration is essential.^{14, 17} Pettersson and Olofsson¹⁸ also identified poor educator skills as a barrier. Childs et al. suggest that the implementation or improvement of training programs might serve as a potential remedy in cases where a lack of training has been recognized as an issue.¹⁸

Childs et al.¹⁵ also recommended the implementation of a fundamental computer literacy policy. Time also hinders e-learning technology application, according to Pettersson & Olofsson¹⁸. Faculty had little time to master new technology, which lowers self-confidence. Distance teaching's pedagogical and organizational challenges worried teachers due to time constraints. Institutions should have given instructors protected time to build new technology skills, understand ideas, and reflect on procedures.¹⁷

Medical education in developed countries swiftly transitioned pre-clerkship curricula online, covering basic sciences, health systems sciences, and behavioral

sciences. Students demonstrated resilience and dedication by actively participating in diverse educational activities, including small-group discussions, laboratory sessions, simulations, and exploring innovative technologies like bedside ultrasonography. While online content updates and virtual activities proved beneficial, these changes necessitate further evaluation.¹²

Blended learning employs a student-centered approach to foster the development of clinical competencies in medical students. The utilization of advanced technological methods, such as the implementation of screen-based simulations for clinical skills and the integration of the Internet, has been observed to enhance students' motivation to learn, facilitate active engagement in the learning process, and enhance their clinical proficiency. The implementation of blended learning has the potential to address inadequacies in the practice of clinical skills, mitigate constraints related to time and space, and enhance the effectiveness and caliber of instruction.¹⁹⁻²⁴

During the later stages of the COVID-19 pandemic, faculty in developed countries embraced the "flipping" classroom model, which is a type of blended learning approach that offers personalized instruction for learning asynchronously.

The flipped clinical learning approach has demonstrated potential as a viable method for delivering remote clinical instruction to students in situations such as public health emergencies, instances of clinical site shortages, or as a substitute for missed clinical hours.²⁵

Inverted or "flipped classrooms" in medical education have raised the possibility of integrating Massive Open Online Courses (MOOCs) into medical training.¹⁶

The available evidence suggests that online teaching of clinical skills is just as effective as traditional methods. This review highlights the dearth of evidence regarding the implementation of a blended learning approach to teaching clinical skills in undergraduate education.²⁶

Numerous online assessment tools, such as Quizlet Live, Kahoot, and Nearpod, are available for educational purposes. Google quizzes conducted through Google forums are comparable to those of other educational tools. In addition, there are specific instruments for

conducting summative assessments that evaluate students' understanding of the subject knowledge. These tools include open book exams, essay questions, and assignments. The assessment of the psychomotor domain poses significant difficulties within the context of online education. The utilization of virtual objective structured clinical exams (OSCEs) and virtual patients has been identified as a viable approach for the evaluation of clinical reasoning abilities.

According to research, one of the most important factors for the success of the e-learning module is creating an environment in which all department leaders can communicate efficiently and effectively. This requires an institutional strategy to ensure that all departments can coordinate without difficulty through a formal mechanism. The formation of a team can help overcome the communication barrier.²⁷

CONCLUSION

A significant finding of the research emphasized the necessity for teachers to develop specific strategies to promote student engagement and interaction in online learning environments. By fostering active participation and ensuring equal opportunities for all students, faculty members can enhance the overall effectiveness of online teaching. Moreover, the study noted that while cognitive learning may excel in online settings, skill-based learning might still require in-person instruction or resources, highlighting the need for tailored teaching approaches for diverse learning outcomes. Embracing a blended learning approach is a crucial step toward successful online teaching in developing nations.

DISCLAIMER

None.

CONFLICT OF INTEREST

None to declare.

ETHICAL STATEMENT

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Analysis and interpretation of data: A. Farrukh, D. Abdullah, F. Nasir

Drafting of the manuscript: D. Abdullah, F. Nasir

Critical review of the manuscript: D. Abdullah, F. Nasir, Q. Anwar

Approval of the final version of the manuscript to be published: A. Farrukh, D. Abdullah, F. Nasir, Q. Anwar

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