ORIGINAL RESEARCH

Blackboard in Dental Education: Educators' Perspectives During the COVID-19 Pandemic: A Qualitative Study

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Introduction: E-learning systems play a vital role in education during the COVID-19 pandemic. These systems allow educators to plan, deliver, and follow up on the education process during the closure of universities and schools. This study aims to report the experiences of dental faculty members using the Blackboard system.

Methods: The study used a descriptive qualitative design. Data were collected from staff members at the Dental Faculty of Umm Al Qura University through semi-structured focus group discussions that were audio-recorded and transcribed verbatim for thematic content analysis.

Results: The analysis revealed three barriers: (1) pedagogical, (2) technical, and (3) individual. For the advantages, three themes emerged: (1) ease of use, (2) ongoing support, and (3) usefulness. Most participants were satisfied with using Blackboard and believed it to be a valuable and complementary educational tool in dentistry.

Conclusion: The reported experiences and recommendations are helpful for university leaders, policymakers, and program designers in improving the quality of e-learning in the future.

Keywords: Blackboard, dentistry, e-learning, faculty members, qualitative study

Introduction

The Coronavirus disease 2019 (COVID-19) outbreak started in Wuhan, China. Patients infected with COVID-19 present with fever, dry cough, and generalized fatigue.[1] COVID-19 has become a significant public health problem for all countries worldwide. In Saudi Arabia, the first case was diagnosed on March 2, 2020. The number of COVID-19 cases is increasing daily around the world. In Saudi Arabia, it reached 435,027 confirmed cases by the 18th of May 2021.[2] The Saudi government created several civil laws in education, one of the most important of which was to activate distance electronic learning and prohibit the physical attendance of students. Multiple social media accounts and electronic programmers started streaming educational material through live interactive or recorded sessions. E-learning systems played a vital role during this pandemic. These systems allow providers to achieve, plan, deliver, and follow up on the educational progress during university and school closures.

One of these popular systems is Blackboard, which offered multiple beneficial features for users during the pandemic. The Blackboard collaboration system is used in many dental schools in Saudi Arabia, including King Abdulaziz University, King Saud University, and Umm Al Qura University. It is also the program of choice in other dental schools worldwide, such as the University of Maryland, USA, the University of Sydney, Australia and Yorkshire University, England. Blackboard offers an excellent collaboration platform that permits lecturers to create an online session using audio, video, a whiteboard, screen sharing, application sharing, private and public chat, and a recording and archiving feature. Each course on Blackboard has a private room where only registered students can join and a room for the instructor where any student can participate via a shared link. Lecturers can manage the settings and

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security of the session by restricting student access, cameras, chatting and the role the students will have in the session (participant or moderator). Using this system might be more convenient and efficient with student–instructor engagement using a laptop or mobile device. In addition, students can easily access learning content from their mobile applications.

There is a lack of consensus about the challenges and factors that determine the effective procedure of e-learning systems during the COVID-19 pandemic. According to Al-Araibi et al, 45% of e-learning projects in developing countries were total failures, 40% were partial failures, and only 15% were successful.[3] Alhabeeb and Rowley reported that students' and academic instructors' knowledge of technology, computer systems, and technical setup were significant factors in enabling the delivery of successful e-learning in Saudi Arabian universities.[4] Challenges related to implementing the e-learning system were reported. Almaiah et al classified these challenges into the following categories: 1) technological, 2) individual, 3) cultural and 4) course. These challenges varied from one country to another.[5] Students reported facing more technical issues using e-learning systems than tutors. In addition, students lacking specialized experience and skills were discouraged from being responsible for their own e-learning.[6] Lack of customization of course content along with student requirements was stated as one of the significant disadvantages reported by educators, as well as insufficient skills of faculty members.[3,7]

Blended learning strategies have already been used in some Umm Al Qura (UQU) University courses. However, a total shift from actual class and blended learning to a virtual classroom at all academic levels and subjects was a new experience for both students and tutors. Since Blackboard is the most common educational system used in Saudi colleges and is sufficiently integrated into teaching at Umm Al Qura University, this study aimed to explore the perceptions of dental educators using Blackboard as the primary teaching tool during the COVID-19 crisis. A knowledge gap was identified in successfully utilizing e-learning and Blackboard systems in specific dental education during the pandemic. It is crucial to understand the strengths and weaknesses of teaching dental subjects using the Blackboard system, since many universities in Saudi Arabia and worldwide use it.

Materials and Methods
Design
A qualitative descriptive study design was adopted to describe the barriers and advantages of using the Blackboard electronic system during the COVID-19 pandemic. As described by Sandelowski, a qualitative descriptive design is the method of choice when a researcher seeks a straight description of a phenomenon.[8] This research design is suitable when little is known about a phenomenon.[8] As there is limited knowledge about the use of Blackboard in dental education, this approach was used to gain an in-depth understanding of dental educators' experiences with Blackboard through focus group discussion. This research was approved by the Institutional Review Board of Umm al Qura University (IRB no. 179–20).

Sampling
We employed a purposive maximum variation sample strategy to select dental instructors from the Faculty of Dentistry, Umm Al Qura University, Makkah region, Saudi Arabia. We included faculty members with different academic levels and work experience from various departments clinically and theoretically, both males and females. This strategy helped ensure a diverse sample and information-rich cases, providing deeper insight into the subject. We chose the Makkah region because it was the most cost-effective and feasible region for the researchers. It was also familiar to the authors, who used her intimate knowledge to probe sensitive issues.

Recruitment
We obtained a list of dental educators working at Umm Al Qura University from the Faculty of Dentistry's academic office. The research team approached the participants via telephone, inviting them to participate in the study. When a response was received, the participants were invited to participate in the focus group discussions. Information about the purpose and importance of the study was explained to the faculty members during the phone calls. The focus group

discussions continued until saturation was reached or until no new themes emerged from successive discussions, and further group discussions were unlikely to yield new information.

Data Collection

Data were collected through four focus group discussions, which helped provide an interactive and more in-depth exploration of the participants' experiences. Focus group discussions helped clarify individuals' views that may not emerge from an individual interview. It also facilitated the discussion of personal opinions about specific issues.

The data collection was conducted between January and March 2020 and was scheduled online through the Zoom platform because of social distancing due to the pandemic. Focus groups were formed based on the homogeneity of participants (ie, participants teaching in the same year) to ensure a sense of community and facilitate open discussion. The focus group discussions were conducted in English at a time convenient to the participants. A description of the purpose of the study was explained to the participants, and verbal informed consent was obtained from them before the beginning of the focus group discussion. They were assured that their information would be kept confidential and that their identities would not be revealed. Informed consent also included the publication of anonymized responses. The group discussions lasted approximately 60–90 minutes and were recorded with permission from the participants.

A topic guide with several key questions was used to define areas that needed to be explored. The guide included the following aspects: the use of the Blackboard system during the COVID-19 pandemic, the main challenges that faced them, and the primary factors that affected the successful use of the Blackboard system during the COVID-19 pandemic. The topic guide included the following core open-ended questions:

1. What is your job title?
2. Did you use the Blackboard system before this pandemic for your course, and what are the differences between delivering the material before and during the pandemic?
3. Did you attend any Blackboard workshops to help you with the technical aspects of the system, and did you find the workshop useful?
4. What lecturing format did you use, and what were the pros and cons, in your opinion, as an instructor?
5. Are you satisfied with content delivery, student interaction and learning outcomes?
6. Do you have any suggestions for Blackboard users to improve their teaching of dental subjects during this pandemic and later?

Two moderators (AN and MR) conducted the focus group discussion; one facilitated the discussion and encouraged the participants to express their thoughts. The other ensured that all questions in the guide were covered. The facilitator used probes during the group discussion to strengthen her understanding of the collected information and to explore issues in greater detail. She also encouraged the participants to share their experiences freely and openly. Because the facilitator is a faculty member at Umm Al Qura University, she wrote reflective memos at the end of each discussion to record her thoughts from an insider perspective.

Data Analysis

A thematic content analysis was conducted.[8] It helped to stay close to the participants' meaning with minimal interpretation.[9] The following steps described by Zhang and Wildemuth[10] were followed:

Data Preparation
All the focus group discussions were transcribed verbatim.

Unit of Analysis
The transcripts were reviewed and summarized, and any unrelated text was removed. Keywords, phrases, and paragraphs were highlighted and identified as coding units.

Developing Categories and Coding Schemes

We utilized a hybrid approach to deductive and inductive analysis. Deductive analysis was done manually through line-by-line coding. The coded data were then placed into the framework categories previously identified by Ali et al[11] and analyzed inductively using the constant comparison approach. Therefore, the data were grouped into categories based on similarities and differences, and themes were generated.

Testing the Coding Scheme and Coding the Whole Text

We tested the initial scheme by coding some sample texts. The initial version was discussed, reviewed, and refined until consensus and consistency were reached. The final coding scheme was applied to the whole text. The iterative content analysis process was conducted independently to ensure trustworthiness. We used member checking to establish the trustworthiness and credibility of the data collection method. The results were returned to the participants to check for accuracy and confirm that they genuinely represented their experience.[12]

Drawing Conclusions

The conclusions of the study are presented in the Results section.

Ethical Considerations

The research was approved by the Institutional Review Board of Umm al Qura University, Faculty of Dentistry (IRB no. 179–20) via verbal consent, given that the group discussions were conducted during the lockdown period. A description of the study's purpose was explained to the participants. They were assured that their information would be confidential and that their identities would not be revealed. All respondents were assured that their participation in the study was entirely voluntary.

Results

Sample Characteristics

Thirty-five faculty members were contacted by email, and 13 agreed to participate. In total, four online focus groups were conducted. Each group included three to four participants. The staff demographic characteristics are summarized in Table 1. The participants were Saudi and non-Saudi faculty members between 40 and 60 years old. The analysis identified two major themes: 1) barriers to using Blackboard (Figure 1) and 2) advantages of using Blackboard (Figure 2).

Barriers to the Use of Blackboard

Pedagogical Barriers

Content Understanding

All participants believed Blackboard was an ideal tool for teaching theory because it contains many relevant tools for teaching (eg, sharing files and chatting). Other participants, however, believed that using Blackboard was inadequate for explaining some courses' clinical aspects. They said it was difficult to explain the practical elements, which left them uncertain whether the students understood the given materials. They turned to additional platforms, such as YouTube, to present the clinical aspects. All participants agreed that they needed to teach the clinical aspects face-to-face in classrooms to ensure that they understood the course content while teaching theory using Blackboard. A maxillofacial surgeon (Participant 2) said:

> It was difficult for me to follow up with the students and see if they understood the procedure I explained. I downloaded a YouTube video to show them the clinical steps of the procedure I was explaining to them.

Lack of Attention

Another barrier the participants experienced was maintaining students' attention throughout the lectures. Many participants agreed that students are more attentive and interactive during traditional classes than in Blackboard. Some

Table 1 Demographic Characteristics of the Study Participants

Sociodemographic Profile	Number
Gender	
Male	3
Female	10
Academic rank	
Assistant professor	10
Associate professor	2
Professor	1
Specialty	
*Clinical	8
**Theoretical	5
Teaching experience	
1–3 years	2
≥ **4 years**	11

Notes: *Oral surgery, periodontics, prosthodontics, restorative dentistry, endodontics, orthodontics. **Dental public health, oral pathology, oral biology, dental anatomy.

participants were concerned about whether students were really in front of the screen attending their lectures or busy with something else. Using Blackboard for teaching was challenging. Participants were surfing for new strategies to capture students' attention and encourage them to interact during the lecture (Participant 5, oral pathologist, Participant 7, a prosthodontist). For example, one participant used the Kahoot website to ensure that all students were concentrating and engaged during the lecture. This sentiment is expressed in the following quote by Participant 10, an endodontist:

> It is difficult to ensure that they are concentrating, I feel I am saying something important, but they do not pay attention to it. You need to find new ways to engage them, and I wish there were a feature that lets the students and me open our cameras and see each other for better interaction.

Absence of Supervision

One of the drawbacks of Blackboard is its inability to monitor and supervise students closely. All participants raised concerns about cheating during exams when using Blackboard because there was no camera feature. Some instructors proctored their students using a webcam in Zoom during the exam to ensure they were not cheating (Participant 4, a periodontist). The participants raised concerns that students seem to use different approaches to cheat. There are features on Blackboard where you can set a time limit, attempts, and availability. The participants needed to see their students' faces to trust that they were not cheating. Possible solutions were discussed, such as having webcams in Blackboard or doing on-campus exams through Blackboard under instructors' supervision and preventive measures. In this regard, Participant 13, an orthodontist, commented:

> Blackboard is full of troubles and cannot be used as an examining tool!. Students should take exams under ideal circumstances. There is a student who fails each year, and this year he got A+ in all courses. It is impossible!
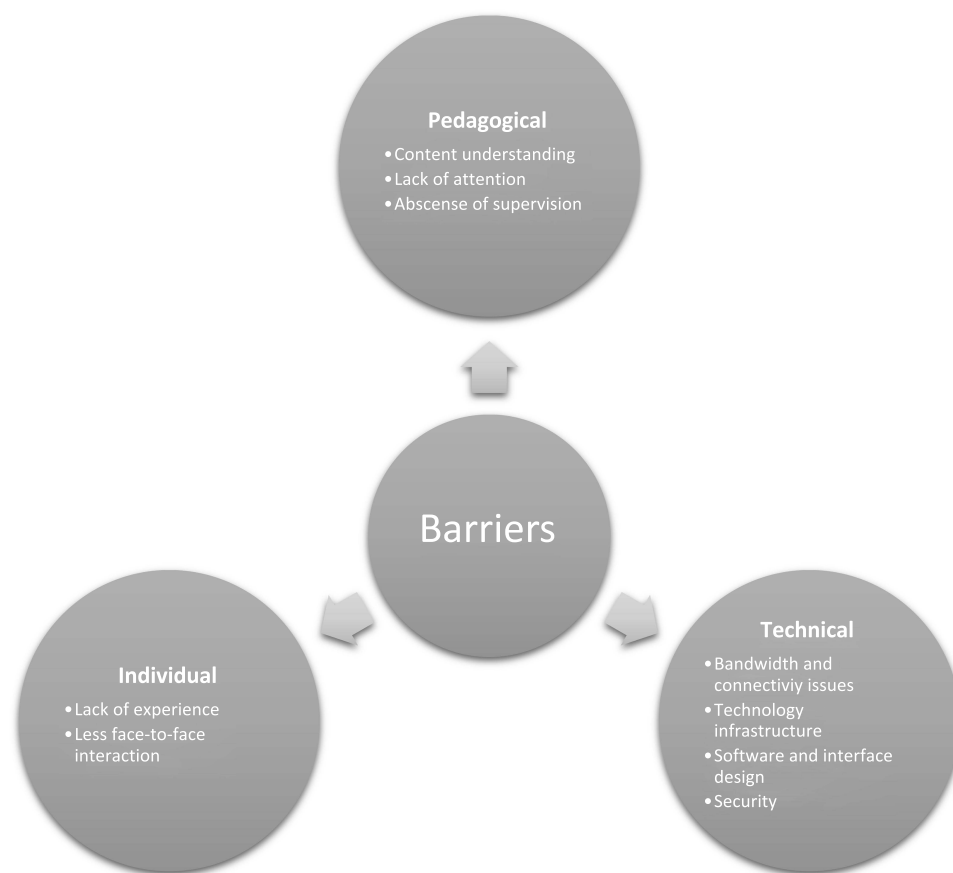
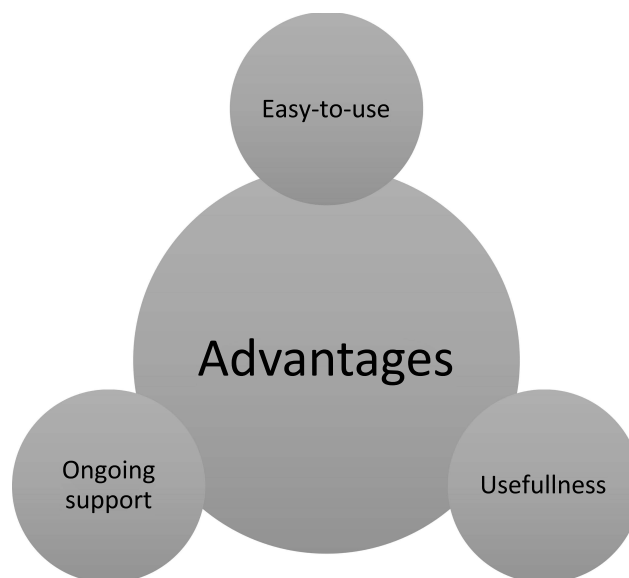**Figure 1** Barriers to using the Blackboard platform.

Figure 2 Advantages of using the Blackboard platform.

Technology Barriers

Bandwidth or Connectivity Issues

Another common problem discussed by the participants was the technical hindrance of the Internet. Many participants mentioned that they faced bandwidth and connectivity problems when they took virtual classes through Blackboard.

Internet connections were lost when they attempted to open their cameras or share large media files. Accordingly, uploading materials and giving online lectures took longer, disturbed the ease of learning, and created frustration among the participants. It was unclear to the participants whether this was due to the Blackboard system or individual connection issues. As a result, some participants recorded their lectures and shared them with their students instead of giving virtual live lectures (Participant 8, oral biologist). Some participants thought that recording a class was a positive feature of Blackboard because it allowed students to access their lectures at any time. This matter is evident from the following statement by Participant 1, a public health dentist:

> "I"m not quite sure what "I"m facing is an internet problem or a Blackboard problem. I am disappointed with the connections and the sound that occurs at the beginning of the lecture. I noticed that the lecturers were slow and not smooth running when I opened my camera so I had to close my camera.

Technology Infrastructure

Some participants also agreed that the limited space available on Blackboard was another drawback. They mentioned that the Blackboard infrastructure would not upload files (such as audios, videos, or PowerPoints) larger than 600 MB. Therefore, they had to share poor-quality media with a low resolution. Other participants showed concerns about combining two courses to present once for male and female groups. Social and religious beliefs in Saudi Arabia dictate gender segregation. As a result, gender segregation exists in public and private institutions. Gender-specific lectures are crucial since communication with unrelated males is prohibited. For these reasons, women and their families favor the asynchronous method of e-learning, especially in Makkah city, where Islam's most sacred shrine is. Therefore, giving the same lectures twice required extra effort and imposed a burden on the participants. These findings are illustrated in the following quotes by Participant 3, a restorative dentist, and Participant 2, a maxillofacial surgeon:

> We were tired by the end of the semester; the whole department was complaining of limited space to upload the teaching material. We spent a long time figuring out how to upload the rest of the material.

I called technical support because I wanted to join the male and female classes together. They could not join the classes. Thus, I had to give the lecture twice, which was not easy.

Another struggle the participants faced was while recording their lectures. If they opened a session to record a lecture and became distracted during the recording, they would have to re-record the whole session. Some participants said that their time is precious and that they need a system that meets their expectations and enhances their experiences. Participant 13, an orthodontist, said:

> I wish there were an option where you could pause the lecture while recording because once you pause the session, a new session has to be recorded, and this is just a waste of time. If this option was available, it would be perfect, and I am pretty sure that this is an issue for all of us.

Software and Interface Design

The participants discussed aspects related to software design. One participant felt that the Blackboard design was not appealing. They found it hard to navigate, and finding assignments and other features was time-consuming. Other participants were disappointed with the limited functionality of the mobile application. They felt that the mobile application was useless and needed further improvement. Experiencing a complex software design might discourage participants from using the system. Participant 3, a restorative dentist, claimed:

> When I used Blackboard for the first time, the layout was difficult, and it was not easy to figure out what you need to do next because sometimes the function you want is under something else, and it is not very clear where to find it, so you need to spend some time looking for it.

Security

Several respondents were concerned about their students sharing their recordings with the public. Blackboard, by default, disables public access to the newly recorded session. However, students cannot view the playback link to the recording unless it is made public so that anyone can view the recorded session. Participant 8, an oral biologist, noted:

> The students can only listen to the recorded lectures and have them available to them if I change the setting to public access, and I am afraid they would share it with the public.

Individual Barriers

Lack of Experience

The level of experience using Blackboard for online education varied among the participants. Based on the discussion, some participants disclosed that they had no experience with Blackboard before the pandemic and that they were not ready to shift to online education exclusively. All the participants agreed that even though the university provided extensive workshops, they still had to look for guides and videos to become more familiar with the Blackboard system. Participant 4, a periodontist, said:

> During the pandemic, I took training courses, but when I started giving lectures through Blackboard, I had to search for more YouTube videos whenever I faced problems.

Less Face-to-Face Interaction

The majority of the participants commented on the limited interactive features of Blackboard. Despite the fact that the discussion forums were channels for communication, the participants perceived that these channels lacked human interaction, and they missed seeing their students' faces during lectures. Several participants felt that they were talking to themselves because the students were not interacting during the course. They claimed that lack of face-to-face interaction and "students" engagement might leave them to develop a sense of isolation and lose their motivation to teach, thus affecting "students" learning outcomes. They said they wanted to see "students" facial expressions to know if they understood the subject. The following quote by Participant 12, a prosthodontist, expressed their views:

> I am missing the interaction with my students, reading the faces of the students, and how they can understand and catch the information; this for me is very important, so I am missing this part.

Advantages of Using Blackboard

Ease of Use

The participants were pleased with how user-friendly and easy Blackboard is to use. They had no difficulties performing activities like uploading materials, delivering courses, and copying course content. Several participants mentioned that the continuous training courses provided by the university were the main reason for perceiving Blackboard as an easy-to-use platform. They said that working with an easy-to-use platform helped the participants implement e-learning effectively. Participant 1, a public health dentist, said:

> I just asked my colleague once how to use the platform, then figured out everything by myself, and it was easy to use. It's not a complicated system.

Usefulness

Some participants said that Blackboard is efficient and has valuable features like virtual classrooms, a whiteboard, and access to course materials anytime. Such features facilitated the teaching process and improved their experiences. Many participants explained that the more they used Blackboard, the more tools they discovered and were able to learn and apply. Being familiar with many Blackboard features made it a valuable tool and enabled them to give lectures effectively. The following quote by Participant 8, an oral biologist, supports this:

During the second year, I found that Blackboard had a lot of features that made it a lot easier during the pandemic.

Ongoing Support

During the pandemic, all faculty members were required to attend Blackboard training courses before starting online classes. All participants agreed that they had ongoing technical support readily available to assist them. The participants expressed that continuous technical and faculty support were critical elements in successfully implementing Blackboard and enhancing their experience. This opinion is evident from the following comment by Participant 8, an oral biologist:

> I didn't know how to transfer an exam from one course to another. I contacted technical support, and they responded quickly, provided the help I needed, and made things easier.

Discussion

Most of the study participants reported their satisfaction with Blackboard for teaching during the COVID-19 pandemic; they believed it was a very useful tool to continue teaching dental subjects during the pandemic. These findings agree with the staff experience at Taif University, another Saudi university that uses Blackboard to teach medical students.[13] However, our educators and those at Taif believed that Blackboard is more appropriate for teaching theoretical material than practical topics. According to those concerned about teaching appropriate hand skills, this was a significant disadvantage, which required face-to-face interaction.[13] Another barrier the participants experienced was maintaining students' attention throughout the lectures for a long time via video screens, not being able to see students' facial expressions, and missing genuine interaction during online classes. This barrier was also considered a disadvantage by other educators.[14,15] AlKarani and Al Thobaity reported effective communication and interaction between students and lecturers while using Blackboard. However, being unable to see students' faces made it difficult for educators to confirm that the participant was a real student.[13]

Lack of technical support is a significant problem and a downside reported by educators using online technology in teaching worldwide.[7,16,17] In addition, a lack of proper technical skills was one of the main barriers reported by some participants in this study. It was found to be an issue for educators and academics globally. The faculty were not confident in dealing with online teaching at a high level of competence if they were expected to shift from a conventional to an online teaching class.[18–21]

At first, the dental staff found the software design was not appealing and not easy to navigate because many educators in other fields had no experience with the system.[18,20] Our participants agreed that the lecture recording process was a considerable drawback because they could not pause and continue later when needed. This limitation has not been focused on before in the literature, and the staff members were not alerted about the issue during training until the teaching process had begun. Therefore, it has been recommended that all students and lecturers have mandatory training by experts in the system to ensure a proper educational process and effective delivery of course subjects.[13]

Internet connectivity and infrastructure could play a major role in the success or failure of the educational process using an online system, such as Blackboard, which was a challenging issue for several universities in developed and developing countries.[5,22,23]

All the study participants agreed that exam assessment via Blackboard was not reliable or controllable. It is essential to conduct exams in a traditional way to guarantee proper evaluation in a controlled and fair environment. This opinion was also reported by others who found it very difficult to maintain monitoring for actual attendance in class or during exams in virtual courses.[13,23]

Blackboard was a user-friendly system once training and active use were performed.[20–22] Our sample reported many advantages that satisfied users with the educational process using Blackboard, such as uploading lectures, creating a library for students, and tracking teaching progress. This process was also encouraging to others.[20,21] Another advantage was the usefulness of the system with a variety of features, such as the ability to switch from recording to virtual classrooms, saving lecture material, streaming videos, using a whiteboard for additional explanatory phrases or

equations, examining students and following up with their submissions. These and other features allow the successful promotion of metacognition and self-regulated learning.[14,20]

Our staff thought that the presence of IT support staff helped and facilitated the educational process during the pandemic, especially when many could not attend the training sessions or recall every step using the new system (Blackboard). They expressed gratitude for their peers' support and the professional IT team. Such support is crucial to facilitate the maximum utilization of any e-learning system to enhance knowledge and skills.[7,16–18]

Our study could not compare Blackboard with other e-learning tools because it is the only tool used by the institutions included in the study. However, only scarce literature was found to compare Blackboard with other tools like Moodle, Zoom, and Microsoft Teams. While there are debates on the usefulness and efficiency of these tools.[24] A recent study showed that Moodle was more popular and preferred by students and lecturers than other tools.[25] Another study found that Microsoft Teams facilitated a rapid dissemination of information and provided a platform for discussion, feedback, and sharing of information openly.[26] More studies are needed in Saudi Arabia to further determine the efficacy of different e-learning tools.

Limitations

The findings of this study may not be generalizable because it was conducted in one dental school in one region of Saudi Arabia. Therefore, other potential barriers and advantages to using Blackboard might emerge. Another limitation is that we did not include dental students. Further determination of students' experience using this platform during the pandemic is needed. Finally, to ensure the success of this teaching modality, it is necessary to evaluate the students' learning outcomes regularly.

Recommendations

This study recommends the ongoing use of the Blackboard system in dental education after the COVID-19 pandemic in theoretical subjects to make use of resources that can be very useful for both students and educators. Stakeholders must provide proper training for both students and staff and be updated about Blackboard to facilitate a successful learning experience. It is also essential to provide and increase computer labs and reliable internet connections in the university to encourage blended learning and overcome the infrastructure issues some may face in their areas. Future research should focus on correcting current problems in the Blackboard system. In addition, other regional or international dental faculty members and students must be included, and their outcomes compared.

Conclusions

This study provides insight into the use of the Blackboard system as an educational tool in dentistry during the COVID-19 pandemic. The majority of the participants were satisfied with Blackboard and believed it to be a valuable and complementary educational tool in dentistry. Educators reported some advantages and disadvantages that are helpful for university leaders, policymakers, and program designers in improving the quality of e-learning in the future.

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Disclosure

The authors report no conflicts of interest in this work.

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