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Virtual Classrooms for Hearing-impaired Students during the COVID-19 Pandemic

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Abstract: Distance learning has become an essential educational option during the COVID-19 pandemic. However, students with varied needs require diverse learning experiences. For example, deaf and hard-of-hearing students need specific accommodations to aid their learning. This study aimed to identify the obstacles that instructors face when conducting virtual classroom sessions for these students. Data were collected from 11 lecturers who taught deaf or hard-of-hearing students using distance learning tools during the COVID-19 pandemic. Time, technical problems, and lack of simultaneous translation are among the barriers that must be overcome to address the learning needs of this group of students. Recommended improvements to the virtual classroom experience for deaf or hard-of-hearing students were provided.

Keywords: *Deaf and hard-of-hearing; Virtual Classrooms; COVID-19.*

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Introduction

People around the world have had to adapt to distance learning due to COVID-19. The pandemic has closed conventional classrooms for more than 300 million students who are now distance learning from their homes. Students differ in terms of their cultures, age, gender, and cognitive and technology skills and needs. Moreover, deaf and hard-of-hearing students use a special language for their interactions, which can be challenging in a distance learning environment. A variety of technological systems, services, and applications, such as virtual classrooms (VCs), can be used to facilitate learning at a distance. Teachers can conduct synchronous lectures whereby they meet students located at different sites at a specified time. Many learning management systems integrate this type of tool.

This paper reports on an investigation of the barriers instructors who teach deaf students at King Saud University (KSU), Saudi Arabia face when using VCs. Recently, the need for alternative ways to present lectures via distance learning emerged suddenly and without planning in response to the COVID-19 pandemic. To improve distance learning activities, including VCs, instructors must identify these barriers and manage them effectively. It is hoped that this study will help educators all over the world address and overcome the challenges of education during the COVID-19 pandemic.

Literature Review

The wide array of high-speed internet technology enables institutions to provide students with synchronous learning experiences in VCs. Synchronous communication enhances students' sense of social presence; moreover, it is convenient and it supports a variety of communication modes, such as audio, video, text, presentations, and shared whiteboards, which facilitate real-time online learning and teaching activities (Kear, Chetwynd, Williams, & Donelan, 2012). However, changes in education technology have created further challenges, particularly in distance learning (Tandy & Meacham, 2009). The challenges of synchronous courses identified in the literature include technological anxiety and literacy, the need for professional development, the time-consuming demands of designing and managing online courses, the need to troubleshoot technical problems, and the lack of institutional support (Bower, Dalgarno, Kennedy, Lee, & Kenney, 2015; Rasheed, Kamsin, & Abdullah, 2020). Coordinating students in synchronous courses, adapting to differences in their technical skill levels, and enhancing their familiarity with the learning system platform can cause

problems (Bower et al., 2015; Rasheed et al., 2020). Using different media at the same time places a high cognitive load on students and teachers alike, especially when they are new to a synchronous communication system (Kear et al., 2012).

These challenges are magnified when teaching students with disabilities. Instructors often inadvertently erect barriers for these students, including the need for technical skills and knowledge; moreover, hard-to-navigate educational web sites can also create problems. Intrapersonal barriers related to students' specific disabilities can arise and while assistive technology devices help disabled students, not all access barriers have been removed (Tandy & Meacham, 2009). Deaf students cannot benefit from video conference classes without translators. It is difficult for instructors to provide live captions when lecturing during distance learning classes. While deaf people develop good attention skills, they can also be easily distracted (Pappas et al., 2018). Thus, instructors should take care not to confuse or overload learners when planning for VCs (Kear et al., 2012). Because sign language requires more memory capacity than spoken language, deaf people have shown indications of having a weaker memory than hearing people. Easy-to-follow, short learning modules can help alleviate this problem (Pappas et al., 2018). Finally, synchronous e-learning is unpredictable because teachers need to adjust their approaches to address the learners' responses and meet their needs (Kear et al., 2012).

Deaf or hearing-impaired students need special accommodations for their online learning activities. They communicate using sign language, which "makes use of manual communication, body language and lip patterns […] combining hand shapes, course and movement of the hands, arms or body, and facial lexis to express speaker's thoughts" (Chowdhuri, Parel, & Maity, 2012, p. 1). Thus, instructors need to conduct their VC sessions using a webservice that has a visible sign translator. Technology skills have become increasingly necessary for everyone, regardless of age, gender, culture, health, or individual disabilities, and they are especially crucial for deaf and hard-of-hearing students (Debevc, Kosec, & Holzinger, 2011). These skills help them communicate with their instructors and their peers. Students with disabilities spend less time interacting with their teachers than their able-bodied peers, and they have different learning experiences; thus, it is not surprising that they make less academic progress than their peers (Webster & Blatchford, 2019). This also affects the way in which they interact with their instructors via VCs. This paper sheds light on the barriers that instructors face that might hinder their interactions with learners when using VCs to teach deaf and hard-of-hearing students.

Educational Settings

The Kingdom of Saudi Arabia (KSA) has made higher education accessible to deaf students since 1994, allowing them to complete their education according to their individual capabilities in the same classrooms as hearing students. During the 2019–2020 academic year, 71 male and 109 female deaf or hard-of-hearing students were registered at King Saud University (KSU). The university provides the accommodations they need to support their success (KSU, 2020). While Blackboard, the learning management system used by KSU to conduct VCs, has the Blackboard Collaborate tool, it does not allow for video communication. When the Saudi Ministry of Education directed KSA educational institutions to offer distance learning options, the KSU administrators realized they needed to provide equal learning opportunities to all students, including those with disabilities. Studies have indicated that it is more effective to show deaf and hearing-impaired students content and information using images and videos with subtitles paired with sign language than word-based information (Pappas et al., 2018). Because deaf and hard-of-hearing students must see a sign translator to comprehend live lectures, the university incorporated Zoom, a communication software system that allows video conferencing, in its distance-learning set-up.

Zoom allows an instructor to conduct synchronous lectures in a VC and share PDF files, presentations, or videos with students. It also allows instructors to share an interactive whiteboard they can use to add typed or hand-written text, and it provides them with a pointer. These tools help instructors conduct lectures in a VC as effectively as they can in a conventional classroom. Zoom shows the students' names and allows them to ask questions using chat or voice functions, or a web cam. The KSU instructors who teach deaf or hard-of-hearing students have shifted to Zoom, but they had little training in using it so they faced some difficulties.

Method

This study was conducted during the second academic semester of 2019–2020 during the COVID-19 pandemic when all educational institutions in KSA had to adapt to distance learning. The data used in this study were collected via 10–15-minute, unstructured phone interviews with 11 instructors at KSU who taught deaf or hearing-impaired students. During the interviews, the authors asked the participants open-ended questions to identify the difficulties they face when teaching in VCs.

Finding and Discussion

Deaf and hard-of-hearing students accessed the technology by signing in to their VC sessions through their cellphones. During the VC session, only the translator and the deaf students used their cameras to communicate with each other. Almost all the study participants stated that they sent the learning materials to their students as well as the sign translators prior to the VC session, so the information could be read in advance. This approach helped the deaf students understand the content of the lecture. The barriers that emerged from the collected data were grouped into categories (Table 1).

Table 1 *Categories of the Barriers: Frequency and Rank*

Category	Frequency	Rank
Time	3	1
Technology	2	2
Lack of simultaneous translation	2	3
Communication through writing	1	4
Social presence	1	5

One participant indicated that she had problems during the first week of holding distance learning sessions when there was no translator. She had to communicate with her two deaf students in writing, which was time-consuming. She said the students' poor writing skills added to this difficulty. Adams and Brown (2006) indicated that poor writing skills can hinder the ability of deaf students to complete their university studies.

Three participants stated that interacting with deaf students or asking questions took a long time in the VC. Deaf students use sign language to ask questions, which the translator then interprets to the instructor. One participant added that even though she was concerned about the amount of time she had to reserve for such questions, she believed deaf students have the same right to participate and ask questions as their hearing peers. These three participants said that they were worried that the long translation time might cause hearing students to stop paying attention. When asked why the deaf students did not use the chat function to post their questions since doing so might save time, the instructors explained that the deaf students' poor writing skills made them uncomfortable with posting written questions. Other instructors indicated that their deaf students write questions and comments through the chat window during the VC session, and the translator only relayed the spoken portion. This variation in the writing skills

of deaf and hard-of-hearing students could be due to their academic level as well as their majors.

One participant noted that a few deaf female students had no background with the Blackboard system that she used to deliver the lessons and to communicate with her students. She recommended that faculty members and students undergo mandatory training in the Blackboard system. Participants in a study conducted by Kear et al. (2012) said they would like to experience being students within a VC to see, first-hand, how the interface looked to students. Some instructors communicated using other tools, such as WhatsApp. This allowed them to receive their students' questions at any time, and it enabled them to answer the questions directly. One participant noted that this helped relieve her deaf students' stress during the VC session. Thus, instructors should be prepared to support their students in their VC by developing their technology-related skills, knowledge, and confidence (Kear et al., 2012)

One participant said that she always looked at her deaf students during face-to-face lectures to pick up clues to determine whether they were understanding her. She added that during the VC, those clues were lacking because her deaf students did not appear on camera. Kear et al. (2012) noted that this challenge is related to the differences in social presence between VCs and conventional face-to-face learning environments. They explained that visual clues, such as looking confused or bored, help instructors adjust their teaching approaches.

Other difficulties arose when heavy traffic on the internet bandwidth shut the system down and instructors and students had to reschedule the VC meeting time. This was not easy, particularly when the sign translator had a full schedule. All the participants complained about the unreliability of the internet. Two instructors stated that technical problems had prevented their deaf students from seeing the sign translator who was unable to simultaneously translate the information being presented by the teacher. The translator recorded the VC session, and then translated it for viewing at a time that was convenient for both the students and the teachers.

One instructor noted that her deaf students, and some of her hearing students, did not like to use the voice function. The students avoided verbal participation when invited to contribute. This could be due to the lack of eye contact; perhaps the students thought that the questions had not been directed to anyone in particular (Kear et al., 2012).

Conclusion

This study identified several barriers that might limit the use of a VC for deaf and hard-of-hearing students, although it is an important tool for providing synchronous learning during the COVID-19 pandemic. This study had some limitations. Only 11 female instructors participated, and the barriers were only considered from their point of view. However, the results do support the barriers identified by previous studies of online learning, in general (Rasheed et al., 2020), and synchronous learning, in particular (Chowdhuri et al., 2012; Kear et al., 2012). The use of distance learning as a teaching tool was on the rise before the COVID-19 crisis, and it will continue to expand. It is important to conduct research to understand the barriers that might limit VC use. Further research should consider related factors to better understand the conditions under which VC and distance learning are apparent and from which the barriers impeding it emerge. Research should also consider the barriers facing hard-of-hearing students attending a VC from their perspective.

This study's findings suggest that instructors using a VC with deaf and hard-of-hearing students should:

• Learn which visual techniques and tools on VC platforms, such as a whiteboard, drawing pens, or pointers, can help deaf students keep track of lectures;

• Send deaf students and translators the learning materials that will be presented during the VC, such as PowerPoint presentations. This will allow them to read the material and familiarize themselves with the topics that will be discussed;

• Prepare written activities for non-deaf students to use while deaf students ask their questions;

• Provide different ways of communicating with students, such as e-mail or WhatsApp.

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