

## “I Like to be Independent”: Experience of Visually disabled Students with Online Learning in Saudi Arabia

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### ABSTRACT

Online learning has long been essential in universities, and during the COVID-19 pandemic, it became obligatory for all students. This new circumstance entailed advantages and disadvantages for online learners. As disabled students have their own needs, and as each disability is related to specific kinds of needs, in this paper, we focus on online learning experiences for visually impaired students. We conducted online interviews with eight university and college students from several regions in Saudi Arabia to explore their perspectives on the advantages and disadvantages of online learning. We also asked them for suggestions on how to improve their online learning experiences. Based on a thematic analysis of the results conducted using NVivo, we found that students' attitudes towards online learning are positive, as they are related to increased autonomy. However, their experiences with teaching forums and methods of online teaching and assessment involved many obstacles. They attributed most of these obstacles to a lack of technical support and some lecturers' lack of awareness regarding their needs. The students suggested the continuous development of platforms for compatibility with screen readers, as well as continuous training and technical support.

**KEYWORDS:** Accessibility, Learning experience, Online learning, University students, Visual disability

### 1. Introduction

#### 1.1 Visual Disability in Saudi Arabia

A recent national survey in Saudi Arabia found that 2.9% of Saudi citizens are disabled. Visual disability comprises 46% of all disabilities (GaStat. 2022). The government website of the rights of people with disabilities indicates that there are over 811,000 visually disabled individuals in Saudi Arabia (Saudi national portal for government services, 2022). Although statistics on the number of visually impaired students who attend colleges and universities are unavailable, most universities in Saudi Arabia announce the availability of special services for visually impaired students and state that they have several students with visual impairment on their websites (Deanship of Students' Affairs, 2022), (Special Needs Center, 2022).

#### 1.2 Visual Disability and Technology

Visually disabled individuals use two types of technologies: mainstream technologies such as smartphones and assistive technologies such as screen readers, magnifiers and braille devices (Mingzhe, et al., 2021). Assistive technologies for visually impaired students are manufactured all around the world and imported by many companies in the Middle East (Boundlessat, 2022). Blind societies and universities in Saudi Arabia work to update visually impaired individuals with new assistive technologies. Exhibitions of assistive technologies for visually impaired individuals periodically invite companies that produce assistive technology (Ibsar Society. 2022; Association for Blind, 2022).

Recent studies in Saudi Arabia found that university students with disabilities are informed about the existence of assistive technologies and are aware of the importance of these tools. Students emphasised the importance of using assistive technologies to access learning materials (Ali, 2017; Dodi and Ibrahim, 2017; Almalki, 2021). For example, a qualitative study in one of the Saudi universities interviewed 14 visually impaired students and indicated that, aside from academic difficulties, students prefer to use assistive devices when studying and writing their exams, rather than exploiting a scribe (Almalki, 2021).

With regard to visually impaired university students' experiences with assistive technologies, a small body of research in Saudi Arabia and surrounding Arabic countries has raised concerns about the quality of Arabic screen readers and magnifiers (Alani, 2021; Almalki, 2021; Ali, 2017; Dodi and Ibrahim, 2017; El-Din, 2018; Hife, 2019). Studies have also raised issues about the accessibility of websites and learning materials (El-Din, 2018, Hife, 2019). For example, a study conducted in an Arabic university found that guidelines for accessibility were missed in half of the required features (El-Din, 2018). Studies have also indicated that visually impaired students consider inaccessible textbooks in universities to be their most difficult obstacle towards their academic success. Visually disabled students complain that lecturers suggest key reading materials and textbooks at the beginning of each term without considering whether the materials are available in electronic format. Students cannot bear the cost of transferring paper books to electronic copies and need electronic materials to either read them via screen readers or magnifiers or transfer them to Braille via Braille devices (Almalki, 2021).

It was found that disabled people's perceptions of assistive technology are related to their situations (Bajcar, 2020; Mingzhe, et al., 2021). Persons with disabilities indicated higher levels of satisfaction with assistive technology compared to persons without disabilities, although both groups showed similar perspectives on the efficiency of assistive technology (Bajcar et al., 2020). Despite quality issues, students' acceptance of assistive technology is moderate (Ali, 2017; Almalki, 2021; Hife, 2019; Alani, 2021). Students even seem to use assistive technology for entertainment and communication via social media (Hife, 2019).

### 1.3 Online Learning

When the need for online learning emerged following the outbreak of COVID-19, a body of research explored students' experiences with online learning around the world (Zhu,2020; Mukhtar et. Al, 2020; Chung, 2020). As the experiences of visually impaired university students differ from those of others (Liakou and Manousou, 2015; Vision impairment and blindness, 2020; WAI, 2021) we aimed to explore the advantages and disadvantages visually impaired university students faced with online learning and to obtain their suggestions for improving the online learning experience. Answering these questions will have implications for the development of assistive technologies, improve their use in practice and yield guidelines for teaching and administration faculties in colleges and universities to establish an environment that supports the autonomy of students with visual impairment.

The theoretical framework we adopted for this study is based on Vygotsky's (1978) sociocultural theory. This theory emphasizes the significance of collaborative learning and social interaction in online environments. It also highlights the role of cultural and societal influences in shaping learners' experiences and the use of tools, such as digital platforms, to mediate learning.

## 2. Method

### 2.1 Participants

We aimed to recruit university and college students with visual disabilities who studied online from all main geographic regions in Saudi Arabia and conduct semi-structured interviews until we reached saturation (i.e., until recruiting additional participants did not add new, essential information) (Cresswell, 2013). We detected consistent themes among six participants and added two more participants to ensure saturation.

Recruitment was conducted through announcements on social media (i.e., we contacted blind individuals who are active on Twitter or Snapchat and they distributed the link of the study). We also contacted university students with visual disabilities to post the study in WhatsApp groups for students with visual disabilities. All procedures were carried out with the approval of the institutional review board at King Saud University.

Although we announced the study to males and females and targeted both groups, all eight participants were female. No male students responded to the announcement, apart from two male students who registered in the study and then withdrew before booking an interview slot. Another 13 participants signed up for the study, but they either had not experienced online learning (two participants), failed to provide valid contact information (five participants) or withdrew from the study before the interview (six participants).

The ages of the eight participants who were interviewed for the study ranged between 18 and 45 years (mean = 27.35; SD = 8.05 years). Their courses were all in Art and humanity sciences, including social sciences, education policy, religious studies and general management. Table 1 shows information about each participant, including their age, level and onset of visual disability and course type.

**Table 1. Information about participants' level, age of disability and the course**

N	Age	Level of disability	Age of disability	Period of online study (Academic terms)	Degree	GBA (course Average)
1	18	Blind	Birth	1	BA	A
2	25	Partially sighted	Birth	8	BA	C
3	26	Blind	Adolescence	2	MA	A
4	45	Blind	Adulthood	6	BA	B
5	30	Blind	Birth	3	Diploma	-
6	27	Partially sighted	Birth	3	BA	B
7	21	Blind	Birth	3	BA	B
8	27	Blind	Birth	4	Diploma	-

## 2.2 Interview Procedures

All interviews were conducted online via Zoom, except for one interview, which was conducted via phone call. The interviewer was one of the researchers, and the interviews lasted between 25 and 40 minutes. The researcher sent the consent form to the participants in a text document via WhatsApp prior to the interviews. The researcher commenced the interview with an introduction to the research team and the study aims, asked the participant for permission to record the interview and read the consent form, and the participants gave their approval verbally.

To answer the study questions, the researcher asked students about their experiences with learning platforms and applications used in online learning and how they accessed them. The researcher asked them about their practices when attending lectures, working on and submitting assignments, writing closed exams and communicating with staff and students. The researcher then asked them what challenges they faced in online learning. The researcher asked them about the support they received from the university centres for special needs (if it existed) and from staff. The researcher asked them to reflect on which personal and technical skills they perceived to be valuable tools for success in online learning. The researcher then asked them to compare online learning with on-site learning. The researcher asked them for their suggestions to improve the online learning experience for visually disabled students. Finally, the researcher asked the participants for their demographic information. We left the demographic information to the end to decrease the participants' reluctance to share information at the beginning.

## 2.3 Method of Analysis

This section presents the important qualitative findings and procedures used to analyse the data. Transcripts of the recordings of the interviews were written manually by one of the researchers. A sample of three recordings was double-checked to ensure the reliability of the transcripts (Cresswell,2013). Data sets were uploaded to NVivo (Version 12) and prepared for coding, which entailed labelling similar ideas with codes (Cohen,2011) . We followed the inductive coding (bottom-up) approach and the qualitative data were analysed using thematic analysis. We coded the data under suitable themes, creating sub-categories of the main themes when needed. We relied on a combination of both across-case analysis and within-case analysis, as 'neither across-case nor within-case approaches alone enable the researcher to interpret an experience both through its parts and as a whole, such that readers can recognize individual experience in a generalizable way' (Ayres et al. , 2003). Thus, we commenced with analytical immersion within each case to get a sense of the students' online learning experiences. We then moved to across-case analysis, identifying overall themes from all seven cases. The coding process was iterative and was mostly conducted at the sentence level. The researchers added multiple codes to sentences that contained several ideas. We noted overlaps in our reflection notes. We kept reflection notes on a shared Goggle drive throughout the coding process, which eventually assisted us in understanding the students' online learning experiences. After completing the coding process, we finalised the name of each theme and made sure that each theme was not complex. When needed, categories were fitted under overarching themes. We also reduced redundant themes.

The codes and themes and all analysis procedures were checked using a member check method by another researcher on the team to validate the authenticity of the analysis (Cresswell,2013). In the case of a contradiction, the two researchers discussed the codes' definitions and how the codes relate to each other's. There were initially seven overarching themes, which the coders reduced to five.

## 3. Results

Table 2 presents the final themes along with categories, codes and frequency of magnitude coding. The aim of counting frequency was not to quantify the data but to follow a systematic approach in choosing and organising extracts and determining students' overall attitudes towards online learning. The results in this section are not reported according to the frequencies of the themes, but rather are organised according to the research questions.

Additionally, magnitude coding, which consists of ‘adding supplemental alphanumeric or symbolic codes or sub-codes to an existing coded datum or category to indicate its intensity, frequency, direction, presence, or evaluative content’ (Saldaña,2013), was added to some of the main themes to get a general sense of participants’ overall learning experiences. Some examples in the context of online learning experiences are ‘positive’, ‘neutral’ and ‘negative’.

Overall, there were five main overarching themes: general online learning experiences, social interaction in the learning environment, learners’ attitudes towards online learning, use of technologies (advantages and disadvantages) and students’ suggestions for improving online learning.

With regard to the technologies used and their magnitudes, online platforms included Zoom, Blackboard (7), distance learning via the university website (1), Google Meet (2), and Microsoft Teams (1). Students used two main methods to access forums and applications: accessibility tools and personal assistance. Accessibility tools included magnifiers for partially sighted students, screen readers such as NonVisual Desktop Access (NVDA) (2), and voiceover (7). Personal assistance included guidance from family members or volunteers on how to access forums, notetakers and volunteers for typing and recording lectures.

**Table 2. Themes identified in the qualitative analysis**

Overarching themes	Categories	Magnitude coding		
		+	-/+	-
General Online experiences	Online lectures	(4)		(3)
		Ease of communication and discussion with teachers and classmates		Not able to participate online Lack of support on how to access the materials Struggled in the beginning Lack of training
Course assignments	work/ (3) Using word processor Send via email Very easy and convenient, with the help of the support group Assistance from personal assistants	(2)	Depends on students	(2)
				Not able to do PowerPoint Struggled with statistics Struggled in using calculators
Online Exams	(2) Easy via phone	(1) Need assistance from family members		(2) Prefer on campus exams Lack of support Lack of clear guidelines Extremely difficult Requires assistance from note taker
Social interaction in learning environment	Communication with lecturer	(7) via email via WhatsApp Very easy and convenient Very supportive lecturers	(1) No need	(1) Prefer physical attendance .

Communication with classmates	(4) Very easy Convenient WhatsApp Via Telegram	(1) Never needed via
Support from instructors during the online learning	(1) very supportive	(1) No special support
Used technologies	(7) Zoom is very accessible (4) Microsoft is accessible (1) Blackboard is accessible with NVDA (1). Feeling of independency and relying on help from technology rather than from people.	(13) Accessibility issues with blackboard Lack of support from the university Technical issues. Lack of training for the students Dependency on others to access the platform.
Learners Attitudes towards Online learning	(3) Easy and convenient Extremely positive, specially with screen readers and voice overs	(4) Hard Frustrating Lack of support Prefer face to face

### 3.1 General Online Learning Experience

It was obvious that the general online experience varied depending on the learning activities. When attending lectures, students found online lectures to be a struggle at the beginning, as they did not know how to access the platform and lacked training or support. This is reflected in a quote from one student: “The nice thing about Blackboard is that the slides are available in readable text format while the teacher is explaining.... I guess there is a feature which I should activate and the slides become available as texts. Honestly, I did not know about this... This feature is available in some subjects, but not in others.” The student is probably pointing to the share file vs share screen features. When a lecturer shares their screen, the slides appear to students as images and the screen reader does not read the text; however, when the file share feature is used, the text becomes accessible. It seems that the student was unable to enjoy this important feature of Blackboard because neither the students nor the lecturers were trained on the accessibility of presentations online. Nevertheless, some students prefer online lectures because they facilitate participation in discussions during lectures.

The students encountered different submission requirements for assignments. Their situations also affected the chosen method. One student said, “I wish I knew how to read braille and use braille sense when giving presentations. One of my blind friends does not struggle with presentations, as during her presentations, she can use braille sense.... When I give presentations, I use my smartphone to join the room and attach another phone to my headphones to read the points that I am explaining via voiceover.” In fact, making presentation slides to be presented was one of the most difficult tasks for the students. Completing assignments for statistics was also difficult, as the students were not aware of complex calculators using voiceover. Moreover, statistics software is incompatible with screen readers.

By contrast, assignments in the form of an essay or report are accessible. Students can type their assignments into Word files using screen readers or magnifiers and email them to their professors using assistive tools. However, some tasks require help from family members, personal assistants or volunteers. As one student stated: “When I wanted to format the text, I would send it to my sister via WhatsApp, and she would do the formatting.” Another student commented on the discussion board on Blackboard: “I used to not open Blackboard. I used to depend on my personal assistant, whom I asked to open the assignments and write the answers on Blackboard.”

Online exams entail many obstacles for students with visual disabilities. The students lacked training, could not find support and found that the online exams were extremely difficult to access. “My family opened the test via my smartphone. I did not like to proceed with answering the questions by myself. I feared I might skip a page or question, as I had not received training,” one student said. Even in an online learning context, some tests require physical attendance on campus, and hence, students require help from personal assistants or scribes.

Some students expressed satisfaction with the alternatives provided by lecturers. For example, one student said, “I told my lecturer that I cannot perform the online test on my own. She said that one member of my family could read and write for me during the test. She said this to all blind students because they otherwise would not have had enough time to complete the tests.” Some students also preferred verbal exams over written exams. This opportunity is available through online learning and the types of homework exams that lecturers feel are not applicable to students with visual disabilities.

### 3.2 Social Interaction in the Learning Environment

The theme of social interaction in the learning environment included interactions with lecturers, about which the students showed an overall positive magnitude. Although visually impaired students participate in lectures alongside their classmates, some face problems with enabling their microphones when they are needed. One student mentioned that she had issues accessing her microphone when using Blackboard; this sometimes prevented her from reporting her attendance during online sessions, which she found frustrating. Outside of lectures, communication was easy and convenient via WhatsApp and emails. Lecturers seemed to vary in their willingness to communicate with students outside of lectures. Some students found that lecturers were quite willing to communicate and supportive: “Sometimes, lecturers called me to ask what support I needed.” Another student said, “I did not know how to write in the online forum, so I asked the teacher if I could reply verbally, as it was very difficult for me to access the forum, and the lecturer said that was okay.” By contrast, another student found that on-campus learning was a better environment for communication with lecturers. She said that some lecturers refused to be directly contacted by students and appointed student leaders as liaisons between themselves and their students.

WhatsApp appears to be the most convenient means of communication with classmates. Telegram channels and groups were also used. Most students had positive attitudes about communicating with their classmates. If needed, communication between students was easy and convenient.

Regarding the special support the students required from lecturers because of their visual disabilities, they tended to have more negative attitudes towards the available support. They noted that some lecturers did not understand their special needs. One student said, “Some lecturers say that there is no difference between sighted and blind students.” She also noted that this entailed that the lecturer would not give them any special support.

By contrast, another student said the following:

Communication is not difficult. I contacted a member who is responsible for quality and accreditation and asked her to give me a number to contact the professor.... The professor writes questions without reading them, and this is one of the difficulties that I always face in lectures. The students write the answers to the questions in the chat. The professor says, “Yes ... good job,” and I do not know what was written.... I told the member to ask the professor to read the answers out loud, as there are blind students who cannot read them.

The student had a positive attitude towards the reply of the member, who was willing to help, welcomed any comments and said that all would be delivered to the staff and that the student could contact the staff by any means. One communication problem encountered by students with visual disabilities is their reliance on listening, as they cannot see the visual materials, which are not available in accessible form prior to lectures. One student also indicated that some lecturers’ speaking was unclear because of the devices they used. Another student said, “I have some vision. When the material is magnified, I can see it. Sometimes, the whole presentation looks black. Nothing appears. I ask for help. Nothing happens. I ask my friends but find no solution.”

### 3.3 Used Technologies

As previously mentioned, the students had to use various platforms. Zoom was the most accessible platform for students with visual disabilities. One student said that Microsoft Teams is excellent. Another explained that NVDA was compatible with both Zoom and Blackboard and that she wrote her tests and submitted assignments using these platforms without accessibility issues.

Although some platforms and features were accessible via accessibility tools, the students still faced many problems. For example, some features were inaccessible to them, and they were not sure why. For example, some

students mentioned that they were unable to enable their microphones during online lectures on Blackboard. One student said, “I have no problem logging in, but when I want to enable the microphone or raise my hand, I cannot click the buttons. I do not know whether the problem is caused by my phone or the application. I asked my friend with a visual disability, but she is partially sighted, and she said that she would close the voiceover to open the microphone.” This quote reflects accessibility issues on these platforms and the lack of training and technical support these students receive from the university, as they depend significantly on their family members, personal assistants or volunteers.

Indeed, the students mentioned that what contributed most to the success of their online learning experiences was the support provided by volunteers, who helped make course materials more accessible. One student explained that she used to pay someone to read and record course materials. She later found a group of volunteers with whom she continues to work. They record the materials in whatever format suits the student’s needs. This student said, “Honestly, I would not have been able to pass without the support of the volunteer groups.”

One student expressed her frustration with the lack of technical support, which reflects the experiences of many participants: “It takes them ages to fix any technical issue that we face, and sometimes they provide impractical solutions that never fix the issue.”

### 3.4 Attitudes Towards Online Learning

Overall, the participants found online learning convenient and accessible. “Personally, I prefer online learning because I do not have to worry about commuting, as I need support to move on campus, so online learning is very convenient for me,” one student said. Another student expressed a similar sentiment: “The thing that I like most about online learning is the feeling of independence, as I do not need help from anyone; technology can really assist me, read and write for me, and I can refer back to recording of the lectures.”

However, there are still several obstacles to ensuring that visually impaired students have positive experiences with online learning. The participants found it difficult and frustrating due to a lack of support and training. Indeed, the students expressed frustration with the lack of training. One of the participants explained that on many occasions, she felt so frustrated during the online experience and that her blood pressure dropped, and she had to be hospitalised.

However, some students expressed their preference for face-to-face learning over online learning. One student said, “I do not really like online learning, as I cannot easily participate in online classes. I prefer face-to-face learning, which allows me to participate more easily in classes.”

### 3.5 Suggestions for Improving Online Learning

Regarding the students’ suggestions for improving online learning, they believed that training students at the beginning of the online experience is a necessity. One student said, “We need training courses on computer use. In the past, we were not obligated to use computers or be trained to use computers, so our experience with computers is minimal.”

Students also emphasised the need for designated technical support services. One student suggested that prompt replies to technical support requests are essential to improving online learning experiences. That is, technicians must solve problems as soon as they occur.

Students also mentioned the importance of raising staff awareness. One of the participants reported her frustration with the teaching staff and how they neglected her disability:

“We do not want their pity, and we do not expect them to make things extremely easy for us. All we need is some understanding and support, and instructors should try to understand what it is like to live in our shoes.... Can they survive and live their lives with their eyes closed? Can they manage to comprehend a challenging school subject like this without sight? Of course not.... So they just need to be compassionate”.

Another student suggested assigning individuals specialised in social sciences as coordinators for disabled students:

“It is very important that the university assign someone who has a background in disabilities and special needs so that our needs can be raised with stakeholders. Right now, many stakeholders do not understand our needs and tend to neglect our requirements due to a lack of understanding. We need the university to give special attention to disabled people because, as you know, universities restrict us to certain majors.”

The students' suggestions included optimising the technical aspects of the platforms. They suggested improving accessibility in the utilised platforms, especially Blackboard. One student said, "If possible, they need to improve the accessibility of Blackboard because it will be the main platform in the coming years. As far as I know, it will be the main platform for exams and assignments." Other students suggested the use of online platforms that are compatible with screen readers, such as Zoom.

Another suggestion is to provide course materials in advance of the online class so that students can make them accessible. For instance, a student can print the materials in braille and read them before the lecture. One student said, "I prefer printed materials to electronic copies." Some students also noted the importance of financial support, that some assistive devices are too expensive for students and that the universities and visual disability centres must provide students with these devices.

#### 4. Discussion

Overall, although students have a positive attitude towards online learning, a lack of technical support and training seems to be the main obstacle. Although various assistive technologies are available for individuals with visual disabilities (Chung et al., 2020). Students seem to prefer mainstream technology (i.e. they use their smartphones' built-in voiceover and magnifier applications instead of screen readers on laptops or personal computers). As students lack training and technical support from the university, they rely on their families and friends who are better at training them on mainstream technologies. Li et al. (2021) offered a similar interpretation of why visually disabled individuals might use mainstream technology rather than assistive technology: Individuals with visual disabilities depend on family members in choosing their assistive technologies, and hence they prefer mainstream technologies (Mingzhe et al., 2021). Individuals with visual disabilities also use smartphones for entertainment and social media (Hife, 2019) and therefore have positive experiences with these devices compared to the frustrating experiences they face with new assistive technologies. Some students expressed not being into technology. Therefore, students with visual disabilities primarily use mainstream technologies that are widely used by the public and were created to be simple and user friendly.

When mainstream technologies fail to help students access platforms, course materials or resources, they can seek help from lecturers and request alternatives or seek help from family members, personal assistants or volunteering groups. There seems to be a conflict between students' desire to be independent and their need to remain in their comfort zones (i.e. not using new applications). For example, one student said, "I do not know how to create a PowerPoint presentation, so whenever I get an assignment that requires me to do so, I ask for an alternative, such as a research project using Word." This statement indicates a lack of willingness to learn how to use accessible programmes, such as PowerPoint, and the student is directly seeking an option that falls within her comfort zone. Learners need to be encouraged to try to learn new programmes, especially if these programmes are easily accessible.

Some of the students had a strong sense of autonomy. When one participant was asked about the training she had received, she instantly replied that she had not received any training, as she preferred to rely on self-learning.

Therefore, positive and negative attitudes were related to the students' preference for mainstream technologies versus assistive technologies, their level of expertise with assistive technology and how they solve the conflict between seeking autonomy and accessibility. These personal options and skills were found in other cultures to be the main factors for the success of disabled students, especially in the context of new experiences (Wegner, 2017; Lee, 2021).

The surrounding environment also affected the students' practices and attitudes towards online learning. Lecturers' expectations of the students were either high (e.g. they did not acknowledge any differences between sighted and blind students) or low (e.g. they gave students easy alternative options that were by no means similar to the original tasks).

Students want their voices to reach lecturers, and they want lecturers to be understanding and have realistic expectations of them. Students believe that raising awareness of university staff, lecturers and administrators would be a step towards advocating for their rights to access all materials and platforms and to be trained on learning platforms and assistive technologies. Indeed, advocacy for disabled students' rights is among the main factors that affects their academic success (Wegner, 2017), and their social environment and the amount of technical support influence their ability to adopt and use assistive technologies (Mingzhe, et al., 2021; Lee, 2021; Kourea, 2021; Roberts, 2011).



Participants in this study reported wanting to be trained on screen readers and computer programmes, but they have not yet started to do so. Despite their awareness of the necessity of such training, a possible reason for this delay is that they found easy alternatives, such as substituting one type of task with an easier task in their comfort zone.

Finally, the participants seemed to have low expectations from the educational system and expected the volunteers or notetakers to compensate for this lack of support. Therefore, as previously stated, students must be educated about their rights and advocate for them.

### 5. Limitations of the Study

As all the participants were female students, we could not verify whether male students with visual disabilities had similar online learning experiences. Additionally, we recruited students whose ages of onset of visual disability differed; however, we did not compare the experiences of those who were born with visual disabilities with those of students who became visually disabled later in life. We also did not systematically differentiate blind from partially sighted students. Further studies could focus on each type of visual disability.

Another limitation is that students reported minimal use of assistive technologies and greater use of mainstream technologies. Therefore, we could not gain insight into what kinds of accessibility issues are problematic with assistive technologies in online learning. Finally, we wanted to determine whether university students in Saudi Arabia have negative online learning experiences related to language compatibility issues. However, the students were only studying in Arabic; therefore, we could not compare the accessibility of materials and platforms in Arabic with the accessibility of those provided in other languages. Even students who had English courses could not comment on the differences between Arabic and English materials and platforms due to their minimal use of accessibility tools.

### 6. Conclusion

We aimed to explore the positive and negative aspects of online learning from the perspective of university students with visual disabilities in Saudi Arabia and their suggestions for improving online learning. We derived several conclusions from the thematic analysis. The students found online learning to reinforce their autonomy. However, a lack of training and technical support represented obstacles to their independence. The students always had to choose between struggling with accessibility and technical issues or sacrificing their independence for the sake of ease of use by asking other people to read, type or complete their tasks. Aspects that deprived the students of independence or raised their feelings of incompetence with technology were considered negative aspects of online learning. The students believed that training on assistive technologies is a necessity and that the whole learning environment must be adapted for them, including increasing the accessibility of learning materials and platforms, raising awareness of university staff and providing efficient technical support and training.

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