Summer 6-21-2023

# Accessibility of Blended Learning for Special Needs Students in Higher Education

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# Accessibility of Blended Learning for Special Needs Students in Higher Education

A Thesis Submitted to

The Department of Educational Studies

School of Humanities and Social Sciences (HUSS)

The American University in Cairo

Submitted by

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Under the supervision of Dr. Teklu Abate Bekele

April 2023

In partial fulfillment of the requirements for

the Degree of Master of Arts in International and Comparative Education

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**Acknowledgement**

Firstly, I would like to express my deepest appreciation to my thesis advisor Dr. Teklu Abate, for his invaluable guidance and constructive feedback. His expertise and encouragement have been essential in shaping my research and bringing it to completion.

I am also thankful to the members of my thesis committee, Dr. Maha Bali, and Dr. Daria Mizza, for their insightful comments and suggestions on my thesis. Their contributions have played a vital role in improving the quality of my work.

I would like to extend my gratitude to Tomorrow's Leaders Graduate Program for providing me with the chance to pursue my graduate studies. Their support and mentorship have been instrumental in my academic and personal growth.

This journey would not have been possible without my mother and my family with their unconditional love, support, and encouragement throughout my academic journey. Their unwavering belief in me has given me the strength and courage to pursue my dreams and overcome many challenges.

Finally, I would like to thank my friends and colleagues for their support and inspiration throughout my academic journey. Their encouragement and positivity have been invaluable in keeping me motivated and focused, and I am grateful for their presence in my life.

Thank you all for believing in me and for making my journey a memorable and enriching experience.

**Abstract**

This thesis investigated the experiences of visually impaired students and their faculty members with blended learning at University X. Qualitative research methods were employed to gather data through interviews with six visually impaired students and six professors. The study analyzed the data using two frameworks, Universal Design of Learning (UDL) and Community of Inquiry (CoI). The findings indicate that the course design, personalization of accessibility, social inclusion and classroom dynamics, university support and resources, and technology accessibility and digital literacy have an impact on the experiences of visually impaired students and their professors. The study provides recommendations for improving the accessibility of blended learning for visually impaired students including addressing the role of the university, students, and educators. This study contributes to the growing body of research on accessibility in higher education and offers insights for educators and disability support providers seeking to create inclusive and equitable learning environments.

*Keywords:* Blended learning, experience, accessibility, visual impairment, special needs, higher education

# Chapter One: Introduction

The aim of this study is to examine the accessibility of blended learning for visually impaired students in higher education. This chapter will provide some background information on the topic of blended learning and accessibility in higher education and present the significance and purpose of this study. Also, this chapter will cover the problem statement, research gap, and research questions.

## Background and Significance

The sudden spread of COVID-19 was a life-changing event worldwide. Due to the pandemic's impact, every country's economic, political, and social systems underwent major changes to adapt to the new urgent circumstances (Ewiss, 2020). The outbreak resulted in a global closure of places of mass gatherings, including schools and universities. During the pandemic, the unexpected deferral of in-person classes and the switch to remote learning contributed to some serious psychological and socio-emotional effects on the education community (UNESCO, 2020). Specifically, in March 2020, Egypt had to transform all face-to-face learning into remote modalities to conform to the government's decision of suspending the educational institutes. The closure of the Egyptian educational institutes was estimated to cause some interruptions in the learning process of around 25.3 million students (UNICEF, 2020). A study conducted in Pakistan by Iqbal and Campbell (2021) found that the transformation to remote learning was difficult and challenging. Some of the issues with remote learning included a lack of proper access to the internet, limited social acceptance of e-learning, difficulties in developing interactive content, and challenges with providing adequate staff training (Iqbal & Campbell, 2021). Pakistan was used as an example of a developing country that has encountered challenges with remote learning due to disruptions in their technological infrastructure; however,

the study also found that this is a common problem faced by many developing countries, which can correlate with the COVID-19 challenges found in Egyptian higher education (Badran, 2021; El Said 2020; El-Sayad et al., 2020; Zalat et al., 2020).

However, technical problems were not the only issue; the unplanned shift to remote learning was challenging in replacing the student-teacher in-person experience. For example, in a study by Selvaraj et al. (2021) that tackled the effect of the pandemic on remote learning in India, school teachers and students, as well as college students and their professors, agreed that regular, face-to-face classes are more efficient in the transfer of knowledge. The participants also agreed that direct student-teacher contact is essential to the learning process (Selvaraj et al., 2021). Moreover, Osguthorpe and Graham (2003) highlighted that "blended learning combines face-to-face with distance delivery systems […] to maximize the benefits of both face-to-face and online methods" (p. 227). In Egypt, Hassan (2021) examined the perspective of Egyptian university students on blended learning education. The results showed that blended learning enriches the social contact between educators and students, resulting in better communication. In addition, blended learning was used to teach undergraduate courses for pre-service teachers in Egypt, and the findings highlighted an increase in the teachers' learning and achievement (Albhnsawy & Aliweh, 2016; EL-Deghaidy & Nouby, 2007).

There are many benefits of using blended learning as an innovative and creative pedagogy (Kintu et al., 2017). It was found that due to the availability of more than one single modality, blended learning provided more flexibility of time which is offered by the integration of some technological tools. This was significantly highlighted in India after the outbreak of the pandemic because "there began a renewed interest in the role and utility of online and digital learning […] by adopting accessible, flexible and affordable technologies in education and by

integrating in person and online activities" (Bordoloi et al., 2021, p. 43). Moreover, when examining the perception of university students in Turkey, it was suggested that courses with blended learning modality provide a student-centered approach to learning, where students are more engaged in self-paced learning (Gülbahar & Madran, 2009). It was further implied that based on a study that divided learners into two groups, experimental and control, where the experimental group was taught a course using blended learning modality and the control group was taught using traditional modality. It was indicated that blended learning has a significantly positive impact on the academic achievement of students in the experimental group (Khader, 2016). In addition, a university in Thailand suggested that the blended learning modality increased the satisfaction of its students as it improved the students' understanding of the subject (Anaraki, 2018).

On the other hand, because blended learning integrates in-person and online modalities, special needs students might face some accessibility challenges while using blended learning modality. A study in Jordan, where the perception of students and faculty was examined on using online platforms, mentioned that there are challenges with the accessibility of online platforms when used by special needs students (Almahasees et al., 2021). In the Convention on the Rights of Persons with Disabilities (CRPD), special needs or persons with disability include people who experience prolonged physical, mental, cognitive, or sensory limitations that might hinder their equitable and active societal engagement (CRPD, 2006). It is suggested that special needs students face many barriers throughout their educational path, which defies the aim of inclusion for all students (Limaye, 2016).

According to a report by the US Agency of International Development (USAID), in Egypt, there is a lack of national data on the exact number of persons with disabilities; however,

suggested data by the WHO indicates an estimated number of 12-15 million persons of disabilities in Egypt, where 3 million are persons with visual impairment (Lord, 2017). Article 81 of the Egyptian Constitution 2014 emphasizes the rights of persons with disabilities to be accommodated by the state in health, social, cultural, and educational aspects (Egyptian SIS website, 2022). In addition, the Egyptian Ministry of Education (MoE) proclaimed the Egyptian Parliament Law No. 10/2018, which addresses the accommodation of students with disabilities in all educational institutes (MOE, 2017). However, a problem that is surfacing in higher education is that the presence of a policy does not guarantee the equitable implementation of it, which might cause a lack of proper care for students with disabilities (Bali & Zamora, 2022). It is claimed that individuals with disabilities in Egypt are marginalized and excluded and that they are not considered a priority for development efforts (El Messiri & Mabrouk, 2005).

**Problem Statement**

In higher education, special needs students face academic barriers, as indicated by data from Fuller et al. (2004) and Kauffman et al. (2022). Further studies have emphasized the need for fairness in providing accessibility and determining the necessary tools and methodologies to inclusively provide blended learning, which may not be usable by some disadvantaged groups (Bordoloi et al., 2021; Rose, 2016). In a Canadian higher education institute, visually impaired students reported facing some academic and social barriers, from the inaccessibility of examination formats, assistive technologies, and web-based activities (Reed & Curtis, 2012). Whereas accessibility is defined as the ease and effective use of simple activities for people with disability in any environment (*Digital Accessibility Guidelines*, 2018; Handy & Niemeier,1997; Iwarsson & Ståhl, 2003). Similarly, in this study, accessibility is defined as the ease and effective use of blended learning in higher education. Digital accessibility in learning refers to the design

of digital content and technologies in a way that ensures that all learners, regardless of their disabilities, can access and use the content and technology effectively (Mullin et al., 2021). According to a report by USAID for disability inclusion in the MENA region, it was reported that the educational institutes in Egypt still lack the necessary infrastructure and resources to accommodate visually impaired students, such as accessibility of resources, social interactions, and curriculum design (Contin et al., 2022). Therefore, it can be suggested that the lack of accessibility in higher education institutions is a persistent problem in Egypt. Accordingly, the researcher believes that addressing the challenges of accessibility in blended learning will help in improving the educational experience of visually impaired students.

In the context of Egyptian higher education, despite the considerable need to examine the accessibility of blended learning for learners with special needs, specifically visually impaired students, limited research has been conducted to investigate the experiences of visually impaired students and their faculty members using blended learning. This was concluded through a literature search that involved viewing the published resources, including articles, books, and handbooks relating to blended learning and accessibility in Egypt. The keywords “blended learning,” “digital,” “web-enhanced,” “accessibility,” “disability,” “special needs,” and “visually impaired” were used to search in wide research engines, such as ERIC, Google Scholar, and Emerald. It is important to note that a limited number of search results does not necessarily indicate an absence of literature on the topic, as there may be several studies that were conducted but could not be accessed by the researcher. Nevertheless, the researcher believes that it is significant to study the current use of blended learning in Egyptian higher education because addressing the current situation will help in understanding how to improve the accessibility of blended learning for visually impaired students.

Therefore, the purpose of this study is to examine the accessibility of blended learning at University X, a private university in Egypt that adheres to the Americans with Disabilities Act (ADA) (elaborated in Chapter 4), which prohibits the marginalization of individuals with disabilities. Specifically, this study will focus on the experience of visually impaired students and their faculty members who utilize blended learning as a modality. The APA Dictionary of Psychology defines experience as the accumulation of past events that an individual lived through. Experiences present the different interactions of people with their surroundings, depending on various factors including their capabilities, attitudes, and expectations (Jantzen, 2013). By exploring the experiences of visually impaired students with accessibility in blended learning, the researcher aims to contribute to the development of strategies that could enhance the accessibility of blended learning for visually impaired students at University X.

**Research Questions**

As previously mentioned, the purpose of this study is to examine the accessibility of blended learning for visually impaired students at University X. Therefore, it is significant to answer the following research questions:

1. How accessible is blended learning for visually impaired students at University X?
2. What are the needed strategies to improve accessibility of blended learning experiences for visually impaired students in higher education?

In this regard, answering the first research question is significant as it identifies the experiences of visually impaired students linked to blended learning accessibility at University X. By identifying the accessibility of blended learning, different stakeholders at University X, including policymakers, university staff, and educators, can address any potential advantages or barriers present. After identifying areas of improvement, it is essential to consider the second

research question to develop strategies to address what is needed to increase accessibility for visually impaired students using blended learning at University X. Those strategies might also be used to improve accessibility in other higher education contexts.

**Organization of the Study**

This section aims to provide a clear and logical structure for the presentation of this thesis. This chapter provided an overview of the research problem and research questions. Then, Chapter two is the literature review which will examine the existing research on the topic, provide a detailed view of the theoretical framework, and identify gaps in the literature that the study aims to address. Next, Chapter three is the methodology section where the research design, data collection methods, and data analysis techniques will be outlined in the study. Followed by Chapter four of the results, in which a presentation of the findings will be organized according to the thematic analysis. Finally, in Chapter five, the discussion and conclusion will summarize the study's main findings, discuss their implications, offer suggestions for future research, and address the study's limitations.

## Chapter Two: Literature Review

The purpose of this chapter is to consider the previous studies that tackled the concept of blended learning and further understand and highlight the research gap. Reviewing the literature began with identifying the relevant peer-reviewed journals, books, and handbooks that included the keyword "blended learning." At first, the search included an international scope, and then it was specified to include "Egypt" and "higher education" to contextualize the search. The search criteria included the definition of blended learning and the advantages and disadvantages of using the blended learning modality. Then, keywords such as "digital," "web-enhanced," and "hybrid" were added to the search to provide an understanding of how blended learning is defined. After viewing the literature on blended learning, "disability," "special needs," and "visually impaired" were added. The search criteria included how disability is defined and how blended learning is perceived by students with disabilities both internationally and then in Egypt. Finally, to further narrow the search after reviewing, the keyword "accessibility" was added. The keywords were used in different forms using Boolean operators such as "AND," "OR," and "NOT" to connect the keywords and phrases and to help narrow or broaden the search results when needed. Therefore, combinations such as blended learning/accessibility; blended learning/Egypt/HE; visually impaired students/blended learning were used.

Moreover, the keywords and phrases combinations were used in the following databases: Google Scholar, Education Resources Information Center (ERIC), and Emerald Insights. Google Scholar was suggested to have sufficient coverage of literature in humanities and social sciences (Harzing & Alakangas, 2016), while ERIC is considered to be one of the largest search engines in educational research (Corby, 2009). In addition, Emerald Insights is considered one of the leading search engines in different fields, including Science, Humanities, and Social Sciences

(Ansari & Raza, 2019). Accordingly, the three databases were mainly used to review the available literature. Although this research review aimed to be comprehensive, it is possible that the results viewed may not include all the available resources on the topic.

In this regard, investigating the literature will help in contextualizing accessibility in higher education and its impact on educators and learners using blended learning in higher education and University X. Therefore, this chapter will focus on the blended learning definition, models, advantages, disadvantages, and accessibility of blended learning. The chapter will then state the theoretical framework guiding this study, followed by the contextual analysis of blended learning and accessibility at University X.

## Blended Learning

There are many discussions on what blended learning is and what this modality represents, which causes confusion when trying to find a possible definition of the term. There are many broad definitions of blended learning in different settings, including corporate, K-12 schools, and higher education (Mizza & Rubio, 2020). As this study focuses on higher education, the definition of blended learning stated by previous research refers to a format that merges between face-to-face classroom sessions with the professor and students physically present and digital learning via the use of the web and digital technologies (Friesen, 2012; Garrison & Kanuka, 2004, as cited in Mizza & Rubio, 2020). Moreover, blended learning highlights the use of multiple learning modalities to enhance the effectiveness of learning using virtual and physical pedagogies and resources (Watson, 2008). In addition, blended learning was specified to have two standards; first is that part of the F2F time is replaced with digital learning, and second is that the integration of both digital activities and F2F time should be “in a planned, pedagogically valuable manner” (Picciano, 2006, p. 97). This emphasizes the debate of the

"value" of this blend between in-person and digital learning. It is elaborated that the simple transformation of materials and content from hardcopy to softcopy (digital) might not add the needed value to improve the learning experience of the students (Dziuban et al., 2004; Garrison et al., 2002). Therefore, it was proposed that the value of blended learning is improved by designing instruction that uses the digital component to enhance pedagogy by adding subject matter, teaching skills, and improving learning approaches (Picciano, 2006).

Another debate when defining blended learning is the use of the terms blended learning and hybrid learning to describe one modality. In previous studies, both terms have been used interchangeably (Allen & Seaman, 2011; Garrison & Kanuka 2004; Kuo et al., 2014; Moskal et al. 2013). However, it is suggested that hybrid learning alters between the traditional setting of synchronous sessions that includes human interactions and the virtual setting of asynchronous sessions where there are human-technology interactions (Graham, 2004). Unlike blended learning, hybrid learning proposes the replacement of F2F class time with online so that the percentage of time spent using digital technologies (where synchronous or asynchronous) is higher than the percentage of time spent in an in-person classroom (*Blended Teaching*, 2008; CETL, 2014; Siegelman, 2019). While blended learning at University X include the replacement of face-to-face time for online classes, this study addressed blended learning in a broader spectrum which correlate with the definition provided by Bekele et al. (2022), as it was stated that blended learning "involves any meaningful use of classroom and online activities in a given course regardless of the extent of the mix" (p.4). This means that blended learning will be defined as a method of delivering instruction in which both online and face-to-face modalities are utilized in a single course.

The rationale of using blended learning is becoming more popular as students have greater access to open resources that are constantly being developed with new data and information. These resources can be utilized to enhance the educational process for students. According to the Committee of Economic Development (2013), digital-age students are students who are competent in using digital devices, software, and applications in their everyday lives, are "less dependent upon traditional education institutions for knowledge acquisition and are much more self-reliant, exercising their internet-based skills to aggregate data and information" (p.1). Therefore, currently, different modalities are being used in learning to enhance the learning process and experiences of the students in acquiring knowledge, including online learning and blended learning. Moreover, there was wide use of laptops, tablets, and smartphones for accessing recorded videos that are available online, as well as using a Learning Management System (LMS) or other communication apps for students to connect with teachers to receive instant feedback (Basilaia et al., 2020). The rationale for using blended learning is further examined by looking at the advantages of blended learning.

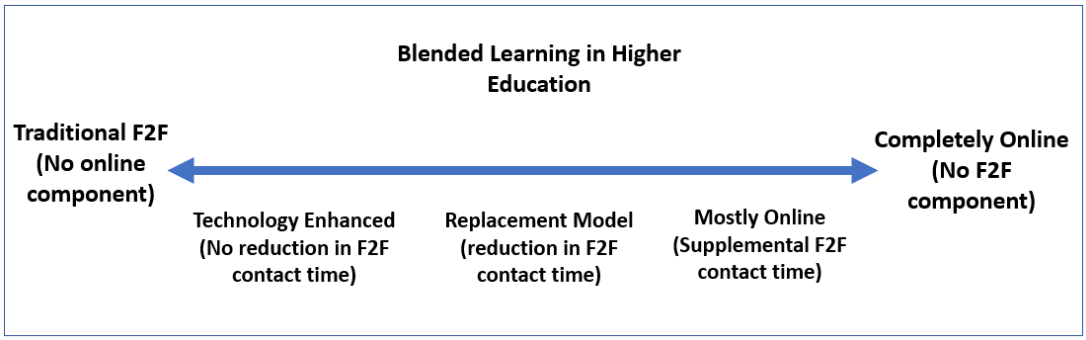
### *Blended Learning Models*

There are many models that are being used in blended learning. The characteristics of each model are different in some cases and similar in others, including the setting and purpose (Abdel-Haq, 2021). Blended learning was described as the mix between brick-and-mortar (in-person) and online learning, which created a spectrum of models in the application of blended learning. The spectrum of blended learning in higher education, introduced by Graham et al. (2017), includes other models such as Technology Enhanced, Replacement, and Mostly Online Model. As shown in Figure (1), the Technology Enhanced model depends on the use of digital tools for learning without eliminating any time from the in-person sessions. Unlike the

Technology Enhanced model, the Replacement Model reduces the in-person time with digital tools to enhance learning. Finally, the Mostly Online model views the in-person sessions as an additional, non-mandatory part; therefore, it lies very close to the completely online modality on the spectrum.

**Figure 1**

*The Blended Learning Models Spectrum*




*Note.* Recreated from *K-12 Blended Teaching Readiness: Phase 1 Instrument Development* (p.7), by C. Graham R., J. Borup, E. Pulham, and R. Larsen, 2017, Lansing, MI: Michigan Virtual University.

### *Advantages of Blended Learning*

#### Flexibility and Autonomy

Blended learning has some advantages, including removing the limitation of time, place (Finn & Bucceri, 2004), path, and pace, as it provides flexibility in learning (Abou Zaid, 2017; Taradi et al., 2005). For example, teachers mentioned that using LMS, prerecorded videos, and discussion forms assisted in maintaining the learning process during the pandemic, especially if students were sick, by giving them the flexibility to learn at their own pace (Aji et al., 2020). Therefore, teachers were found to appreciate the use of blended learning and the flexibility it

offers (Saeed, 2020). The autonomy in blended learning involves a "formal education program in which a student learns at least in part through online delivery of content and instruction with some element of student control over time, place, path, and/or pace" (Horn & Staker, 2015, p. 34). For example, for time; students can complete online coursework and assignments at a time that works best for them, for place; students can choose where they want to complete their online coursework and assignments, for path; students can choose from a variety of learning resources and pathways, and for pace; students can work at their own pace, rather than being required to keep up with the pace of the class (Abou Zaid, 2017; Finn & Bucceri, 2004; Horn & Staker, 2015; Taradi et al., 2005).

The authors further elaborated that the teacher should not be viewed as a mere facilitator or monitor, but rather mentors who provide guidance and support (Horn & Staker, 2015). In a blended learning context, teachers can use scaffolding techniques such as providing guided instruction, modeling problem-solving strategies, and offering targeted feedback and support through online platforms (Graham, 2006). For example, a teacher could create online tutorials or instructional videos that provide step-by-step guidance on how to solve a particular type of problem (Horn & Staker, 2015). The teacher could then provide opportunities for students to practice these skills, either online or in a face-to-face setting, and provide feedback and support as needed (Graham, 2006).

Furthermore, blended learning provides many advantages for educators because this modality uses multiple open web-based resources that are accessible for teachers to incorporate into their pedagogical design (Watson, 2008). This flexibility in learning was highlighted as a positive learning modality by special needs students, as blended learning provides space for personalized education based on each student's needs (Keramidas, 2012).

### Student Satisfaction and Motivation

A meta-analysis study by Rivera (2017) suggested that blended learning offered flexibility for students, which increased their satisfaction with learning the course content. This was found to influence students' motivation to contribute to a positive learning environment. This was also elaborated in another study by Sahin & Shelley (2008) that studied the available literature and indicated that satisfied students would consider taking more classes with blended learning as the mode of instruction, which significantly increased the students' participation inside the classroom. It was implied that the noticeable increase in the students' participation was caused by the ability of some students to communicate better through online platforms than through complete F2F mode (Al Fiky, 2011).

### Performance

Another advantage of blended learning is its positive impact on students' academic achievements. While some studies have found no significant difference in student achievement between blended learning and traditional face-to-face instruction (e.g., Bowen et al., 2014; Garcia-Penalvo et al., 2015), other studies have suggested that blended learning can have a positive impact on student performance. For example, a meta-analysis of research on blended learning found that, on average, students in blended learning environments outperformed those in traditional face-to-face instruction (Means et al., 2013). Other studies have found that certain types of blended learning, such as flipped classrooms can lead to improvements in student's critical thinking, problem solving, and academic achievement (Alten et al., 2019; Zhou, 2022). It was stated that maximizing the use of technological resources inside and outside the classroom in the blended learning modality was essential in enhancing students' academic performance (Al Fiky, 2011). The nature of activities used in both forms of online and F2F increased peer

collaboration as well as teacher-student interactions. Moreover, in a meta-analysis of Iranian studies on blended learning, the modification in the curriculum, learning pedagogies, and instructors' attitudes was found to influence the quality of education and had a positive effect on the academic achievement of the students (Najafi & Heidari, 2019).

### *Challenges of Blended Learning*

#### Technical Problems

One of the challenges of blended learning is poor internet access, which limits the communication between the students and the teachers (Sahin & Shelley, 2008). These types of technical problems, including hardware costs, limited bandwidth, and unstable connectivity, were found to hinder learning, especially in developing countries, as it limits the accessibility to digital-based education (Gamage & Perera, 2021). This claim was also mentioned in a qualitative study that examined blended learning in higher education, where the challenges of blended learning included "lack of policy, lack of faculty support, lack of technological and computer skills, large class sizes, and inadequate technological resources" (Tshabalala et al., 2014, p. 108).

#### Workload

Another challenge suggested in many studies is the excessive workload added to design a blended learning course (Ryan & Lamont-Mills, 2013; Wallace & Young, 2010; Widyanti et al., 2020). In a study that was conducted in a private university in Turkey, it was mentioned that the additional time needed to learn and apply new approaches and skills for teaching in blended modality and the ability to redesign the content to align with the technological competency with high- quality and accessibility can initially provide workload, for considering the technology and curriculum design, which might discourage professors from adopting blended learning (Gülbahar & Madran, 2009). This can be limited through a proposed solution by Saeed (2020) in a study

done in a private school, in which teachers' satisfaction with blended learning was suggested to increase by providing proper internet connectivity, appropriate trainings, and managerial support to adopt blended learning. Moreover, in a study that examined the workload of implementing technology-enhanced learning (TEL) in higher education, it examined many barriers, such as the effect of TEL on workload time management, the need for allocated time to up-skill technological capacity, the need for more time to develop TEL initiatives, the additional time needed to implement TEL strategies, and the lack of incentives to balance additional workload (Gregory & Lodge, 2015).

### Course Design

Moreover, blended learning requires careful course design to ensure that online and in-person components of the blended course complement each other in their integration (Alammary et al., 2014; Alebaikan & Troudi, 2010). This can be a complex process that requires an understanding of both online and traditional teaching methods. Therefore, it was suggested to examine the activities and pedagogies needed to teach in both online and offline environments (Kaur, 2013). For example, the mixing of synchronous and asynchronous learning can be challenging, and educators must ensure that both types of learning are equally effective and engaging. In addition, assessing student learning in a blended learning environment can be difficult, as it might include a combination of online and in-person assessments (Chan, 2021). Educators would need to develop effective assessment strategies that consider the learning objectives and account for the different modes of learning. Furthermore, the design of a blended course requires access to and use of a variety of resources, including technological tools and online content that might not be accessible to all learners, such as special needs students (Draffan & Rainger, 2006).

Overall, the challenges of blended learning included technical problems, such as slow internet connections and unreliable technology, can frustrate both students and faculty members. The workload associated with blended learning can be demanding, as students are often required to complete online coursework in addition to attending traditional classes. In addition, course design can be a major challenge, as it requires careful consideration of how to blend online and offline learning activities in a way that is meaningful and effective.

## Accessibility Challenges of Blended Learning

### *Curriculum and Instructional Design Barriers*

According to a report by Linder et al. (2015) on higher education in the United States, it was found that there is a lack of preparation for a curriculum that provides proper accessibility to digital learning. Also, it was mentioned that problems of accessibility of some websites affect the online interactions needed between student-student and students-instructors, which are essential to facilitate teaching and learning using a blended learning modality (Linder et al., 2015). Therefore, while using blended learning, it is essential to design a curriculum that considers the accessibility of online-based activities and the convenience of retrieving the course materials. For example, with students with hearing impairment, it is essential to provide content with closed caption videos and real-time captioning of live sessions (Crow, 2008). Moreover, for visually impaired students, it is necessary to design course content that considers alternative text for visuals, user-friendly website navigation, and accessible hyperlinks (Burgstahler, 2015). Additionally, there are some examination barriers that visually impaired students face as part of the educational process. The problems faced during testing range from providing unqualified readers for the exams to access to proper computer-based examinations (Lord & Stein, 2018).

### *Lack of Awareness of Accessibility Needs*

In Egypt, a study that was conducted by USAID reported the previously mentioned academic barriers (curriculum design, online accessibility, and examination) as obstacles that are hindering the accessibility of special needs students to proper education. It mentioned that accessibility "was seen as a measure of goodwill and not of rights" (Lord, 2017, p.19). This can be further elaborated by looking at the models of disability. Those models highlight the way that society views and responds to disability and how this is reflected in the policies and practices that are implemented to support individuals with disabilities (Marks, 1997). First, the medical model, also known as the "deficit model," views individuals with disability, including visual impairments, as a problem that needs to be fixed or cured. This model tends to be less inclusive and less flexible, focusing mainly on the student's limitations (Brisenden, 1986; Goering, 2015). Second, the social model emphasizes the importance of removing barriers to access and participation in the learning environment. According to this model, the focus is on changing the environment and adapting the curriculum to be more inclusive and accessible rather than on fixing the individual's deficits. This model tends to be more inclusive and flexible, focusing mainly on the student's strengths (Goering, 2015; Lawson & Beckett, 2021; Oliver, 2013).

Another major conclusion of the USAID study in Egypt mentioned that the accessibility of content in higher education is dependent on the choice of the faculty member (Lord, 2017). Therefore, there is a need for faculty members to understand the importance of accessibility. Bali & Zamora (2022) addressed the notion of Intentionally Equitable Hospitality, which highlights the idea of creating a space that caters to the needs of marginalized learners. The keyword here is "intentionally," which emphasizes the importance of seeing the value of equity and accessibility and then planning to create a hospitable space for minorities, including students with disabilities.

Moreover, this pedagogical approach underlined that being intentionally hospitable is a process that happens by answering questions about equity and inclusion in the predesign and design phases, in the facilitation/teaching moment, and beyond the teaching moment (by creating a sustaining community) (Bali & Zamora, 2022).

Overall, blended learning can present significant accessibility challenges for visually impaired students. Course materials and instructional design must be designed with the needs of visually impaired students in mind to ensure that they can access course content and participate in online learning activities. Lack of awareness of accessibility needs can result in courses that are not designed with accessibility in mind, which can lead to a less than optimal learning experience for visually impaired students. It is suggested that the accessibility of blended learning in higher education is an ongoing process as it is still not fully realized as a right, and there is still a lot of work to be done to ensure that all individuals with disabilities have equal and equitable accessibility to blended learning.

**Theoretical Frameworks**

The identification of a theoretical framework provides a foundation for the research, guiding the researcher in exploring the research question, developing the research design, and analyzing the findings. The theories that shape this study are the Community of Inquiry (CoI) and the Universal Design for Learning (UDL). The CoI framework is a theoretical model that has been used to guide the design and implementation of blended learning modalities (Garrison & Vaughan, 2012; Pool et al., 2017; Zhang, 2020). In addition, UDL can provide a useful framework for designing blended learning environments that are accessible for students with disabilities, including visually impaired students (Black, 2015; Sapp, 2007).

### *Community of Inquiry*

Blended learning is suggested to have the potential to provide visually impaired students with more flexible and accessible educational opportunities. However, designing blended learning environments that effectively support the needs of visually impaired students can be challenging. Developed by Anderson et al. (2001), the CoI framework posits that effective online and blended learning requires the presence of three interrelated elements: cognitive presence, social presence, and teaching presence.

Firstly, social presence refers to the ability of learners to project themselves socially and emotionally in the online environment (Garrison et al., 2000). It is the degree to which learners feel connected to one another and to the instructor, and it is an important element in creating a sense of community in online learning. This can be supported by using synchronous communication tools, such as video conferencing, as well as asynchronous tools, such as discussion forums (Rourke et al., 2001). In the context of this study, the researcher believes that the social presence aspect in the community of inquiry framework is important for visually impaired students using blended learning modality as it provides a sense of connectedness to the class and their classmates, promoting a feeling of belonging and support. Moreover, this sense of community can be enhanced by using tools such as discussion boards, video conferencing, and social media platforms. Using these tools in a meaningful way that is accessible for visually impaired students, for instance, ensuring that discussion boards are accessible with a screen reader, can provide opportunities for visually impaired students to connect with their peers in a way that is not possible in traditional, face-to-face classroom settings.

Secondly, the cognitive presence aspect of the CoI framework refers to the extent to which learners are able to construct meaning through sustained communication and reflection

(Garrison et al., 2000). It is the ability of learners to engage in critical thinking and problem-solving in the online environment. This presence can be supported through the use of interactive and collaborative activities, such as discussion forums, peer review, and case-based learning (Garrison et al., 2010). In this study, cognitive presence is contextualized by focusing on the ability of visually impaired students to engage in critical thinking and problem-solving in the digital environment of blended learning. This can be promoted using interactive online resources, such as online simulations and games, as well as the use of multimedia materials, such as audio.

Finally, teaching presence refers to the ability of the professor to design and facilitate the online learning environment in a way that supports cognitive and social presence (Garrison et al., 2000). It is the ability of the professor to create an environment that supports and enhances the learning process. This can be supported using clear instructional design, effective facilitation of online discussions, and timely feedback on learner performance (Anderson et al., 2001). In this study, this component is essential for visually impaired students as the instructors can utilize resources including accessible technological tools and media, such as alt-text for images. As well as use/design instructional strategies in blended learning that provide opportunities for visually impaired students to actively engage with the material, without relying on visuals only.

Overall, The CoI framework provides a useful lens for understanding the key components necessary for the use of blended learning by visually impaired students. By focusing on the social, cognitive, and teaching presence, educators can design and implement blended learning environments that are supportive of the unique needs and abilities of visually impaired learners. Thus, the CoI framework can help address the research questions of assessing the accessibility of blended learning for visually impaired students and identifying the necessary improvements. In the context of accessibility, social presence includes the use of accessible communication tools to

ensure that all learners engage in social interactions. At the same time, cognitive presence would entail providing learners with accessible and adaptable digital content and technology that meets their individual learning needs. Finally, Teaching presence would incorporate designing online courses and activities in a way that is accessible to all learners.

### *Universal Design for Learning*

Universal Design for Learning (UDL) is another theoretical framework that emphasizes the importance of designing learning environments that are accessible to all students (Dell et al., 2015). The UDL framework is based on the principle that all students have different learning needs and that the most effective learning environments are those that are designed to accommodate these needs (Evans, 2008). The UDL framework is based on the principle that all learners can benefit from flexible and multiple means of representation, engagement, and action/expression (Meyer & Rose, 2005).

One key principle of UDL is providing multiple means of representation to the information which is presented to the learner. UDL principles suggest providing multiple means of representation, such as visual, auditory, and written information, in order to meet the diverse needs of learners (Meyer & Rose, 2005). For visually impaired students, this means that digital materials, such as online readings, videos, and images must be designed to be accessible, such as providing alt-text or captions for images, and audio descriptions for videos, ensuring that the visually impaired students have the same access to the information as the rest of the class (CAST, 2018; Sapp, 2007).

Another key principle of UDL is engagement which refers to different ways learners can be motivated and challenged to participate in the learning process. UDL principles suggest providing multiple means of engagement, such as choice, relevance, and challenge, in order to

provide autonomy and agency for learners (Meyer & Rose, 2005). For visually impaired students, this might include providing opportunities for learners to collaborate with peers and build a social foundation, work on real-world projects, or pursue their own interests (CAST, 2018; Ferreira & Sefotho, 2020; TEDI, 2020).

Lastly, UDL also provides multiple means of action and expression, which refers to providing multiple ways for students to demonstrate what they have learned, such as written essays, oral presentations, or digital projects. UDL principles suggest providing multiple means of action and expression, such as multiple methods of assessment, performance tasks, and self-assessment in order to meet the diverse needs of learners (Meyer & Rose, 2005). For visually impaired students, this can be accomplished through the use of alternative formats for assignments, such as audio recordings or braille, and providing options for the visually impaired students to demonstrate their learning in a way that is accessible to them. This might include providing opportunities for learners to engage in hands-on activities or to use assistive technology to complete written assignments (CAST, 2018; Rose et al., 2005).

In conclusion, the UDL framework provides another useful lens for designing blended learning environments that are inclusive and accessible for visually impaired students. It emphasizes the importance of considering the diverse needs of learners in the design of educational materials and instruction and provides guidelines for creating flexible and multiple means of representation, engagement, and action/expression in order to provide all learners with equal opportunities to access, engage and express their understanding. The UDL framework is a useful tool for inclusive design in education, as it shifts the focus to be on the learner and not on the disability and helps to break down barriers that may prevent visually impaired students from achieving their full potential.

Combining the principles of the Community of Inquiry (CoI) and Universal Design for Learning (UDL) in a blended learning environment for visually impaired students can provide a number of benefits. CoI focuses on creating an interactive and collaborative online/blended learning environment, which can help visually impaired students feel more included and engaged in the blended learning process. By providing opportunities for students to share their perspectives and experiences, CoI can also help to promote understanding and acceptance of diversity among the student population. On the other hand, the UDL provides ideas linked to inclusion and accessibility by designing materials and activities that are accessible to students with a wide range of abilities. Together, the CoI and UDL approaches can help to create an accessible and engaging blended learning environment that is tailored to the unique needs of visually impaired students. This can help them overcome their challenges and participate fully in the learning process.

The review of literature highlighted the importance of considering both blended learning and accessibility in higher education. This identified a gap to fill to the body of literature specifically on the accessibility of blended learning for visually impaired students in Egyptian higher education. Both UDL and CoI frameworks emphasized the need to explore some accessibility principles and aspects, including the course materials, assessments, and online interactions that would help in providing strategies to improve the accessibility of blended learning in Egyptian higher education. Accordingly, the literature validates the stated research questions, which focus on how accessible blended learning is for visually impaired students and what are the needed strategies to improve the accessibility of blended learning in higher education.

# Chapter Three: Methodology

This chapter discusses the research design of the study to answer the following research questions: How accessible is blended learning for visually impaired students at University X? and What are the needed strategies to improve the accessibility of blended learning experiences for visually impaired students? Then, the data analysis strategies will be covered, followed by some of the details of the study's trustworthiness and ethical considerations.

## Research Design

To investigate the accessibility of blended learning for visually impaired students at University X, a qualitative approach was employed in this research to gain insights into the topic. In many research studies, the qualitative approach was used to provide a profound understanding of a specific phenomenon and present the researcher with a descriptive interpretation of the perceptions of the participants (Clark & Creswell, 2014). Likewise, this research further aimed at finding patterns in the experiences of students and faculty members on the accessibility of blended learning at University X, which needed to be deeply contextualized and explained to establish valid results. Moreover, Taylor, Bogdan, and DeVault (2015) mentioned that "the qualitative methodology refers in the broadest sense to research that produces descriptive data - people's own written or spoken words and observable behavior" (p. 19). Similarly, this study focused on the insights obtained from the experiences of students with disabilities, specifically visually impaired students, and their professors to examine the accessibility of blended learning which does not depend on numbers to be expressed, but rather on the interpretation of the participants' answers to open-ended questions. The case study design is described by Merriam & Tisdell (2015) as "an in-depth description and analysis of a bounded system" (p. 37). A bounded system is characterized by the research of a program or an activity in a specific place or time

(Clark & Creswell, 2014). Therefore, in this study the bounded system is examining the accessibility of blended learning at University X, highlighting that the purpose of the study aligns with the case study research design. As a result, a qualitative design case study was conducted to examine the accessibility of blended learning for visually impaired students and their professors at University X. A case study design allowed presenting some contextual factors that influence the accessibility of blended learning at University X, from two different stakeholders (students and faculty). Overall, since this study focuses on both accessibility and blended learning, a qualitative methodology helped in providing a description of the personal experiences of visually impaired students and faculty members of using blended learning at University X.

**Participants and Sampling**

Based on the purpose of the study, the research site had to assist in examining the accessibility of blended learning in a higher education institute. University X was selected because the researcher had informal discussions with a visually impaired student at University X, where the students expressed some accessibility challenges. Because the researcher believes in providing accessibility to all learners, it was essential to start with University X to examine further the accessibility of blended learning for visually impaired students. The researcher had access to University X, which aligned with the study's time constraints and feasibility. In addition, the researcher's ease of access to the university would help in addressing the accessibility and accommodations provided to special needs students through the university's Disability policy and services. Therefore, University X would assist in examining the accessibility of blended learning for visually impaired students as a case study in higher education.

The qualitative design aims at targeting a small sample size. While it was suggested that the qualitative sample size could reach 40 participants (Clark & Creswell, 2014), there was also an emphasis that the power of qualitative research is achieved with more details rather than a larger number of participants (Malterud et al., 2016; Mocănașu, 2020). Therefore, the number of targeted visually impaired students and faculty members for this study addressed 12 participants, as suggested by Boddy (2016) and Payton (2019).

In this study, participants of specific criteria were needed, and the selection covered visually impaired students who experienced using blended learning modality. To be able to generate different experiences and practical implications, faculty members were also selected based on teaching visually impaired students in a blended learning modality. Accordingly, purposive (also called "purposeful") sampling was used in research to target participants who have information that would help answer the research questions and provide information that aligns with the purpose of this study (Ayoub, 2019). Therefore, a snowballing sampling strategy was used to expand the list of participants as it facilitated selecting participants who would fit the same criterion. In snowballing sampling strategy, the interviewee recommends other participants who are unknown to the researcher (Clark & Creswell, 2014).

The study covered one-to-one interviews with six visually impaired students and six professors who have experienced teaching visually impaired students. The researcher started interviewing one visually impaired student who recommended another visually impaired student. Also, at the beginning of the interview, the researcher asked the interviewed student to list the names of their professors from the last year. The researcher intended to interview at least one professor listed by each visually impaired student. The interviewed professors were from different departments, including two professors from the Rhetoric and Compositions department,

two from the English and Comparative Literature department, one professor from the Philosophy department, and one professor from the Center of Learning and Teaching, who teaches core curriculum courses. This included two female professors and four male professors. Moreover, there were different levels of visually impaired students who participated in the study's interviews including one junior, two freshmen, and three sophomores. Also, the students were from different majors, including journalism and mass communication, literature, finance, and philosophy. This included three female students and three male students.

**Data Collection**

Based on the qualitative nature of the study, a suitable tool for data collection for this research was to conduct one-to-one interviews. The participants, including visually impaired students and their faculty members, answered semi-structured open-ended questions in a confidential setting to be able to comfortably provide detailed answers about their experiences of blended learning and its accessibility. The reason for choosing interviews was that this method allowed participants to openly describe and share their experiences of blended learning and how this affected the accessibility of teaching and learning. The interviews were carried out in different settings; most of the interviews were at University X's library and professor's offices, which allowed confidentiality and familiarity to the participants. In addition, as per the request of some participants, some interviews were conducted online using Zoom. In both settings, online and offline, the researcher aimed to build a rapport with the interviewees and note any changes in the body language or voice cues in the participants' responses. The goal behind the flexibility of the interview setting was to provide ease and convenience for participants to express their experiences with the accessibility of blended learning.

At the beginning of each interview, the researcher provided the participants with the consent form (approved by the Institutional Review Board) to advise the participant with general information about the purpose of the study and other ethical concerns (explained further in the ethical concerns section below). The participants had the time to read and sign the consent form before starting the interviews (Appendix A). Moreover, University X has an English language instruction modality; therefore, the participants had the proficiency to conduct the interview in the English language. The researcher then answered any confidentiality questions the participants had and then asked the participants if they agreed for the interview to be recorded. After receiving the participants' approval to record the interview, the researcher explained the purpose of the study and provided an operational definition of blended learning. The researcher started asking the interviewees semi-structured questions for faculty (Appendix B) which included questions about the professors' experiences designing an accessible blended learning course. Moreover, questions for students (Appendix C) included questions about accessibility barriers for the visually impaired students while using blended learning. While other questions were common for both students and faculty, such as, are there any strategies you would recommend in designing/using blended courses to personalize it for visually impaired students? What is your experience dealing with University X's disability services?

Then, the participants had the space to share their experiences, while the researcher would address some follow-up questions when needed. Finally, the researcher would ask the participants if they had any additional comments to add before ending the interview and stopping the recording. In the end, the recorded interviews were saved, labeled, and ready for the following step of data analysis.

**Data Analysis**

The first step of qualitative data analysis is transcription. The process of transcription started by listening to the recordings only to confirm the presence of all sufficient and uncorrupted audio recordings before analysis. Then, the researcher listened to the recordings purposely and transcribed the audio into a computerized written text. The researcher used a verbatim transcription method, which means a word-for-word transcription of the audio files. Finally, the researcher repeated the process of listening to the recording while reading the transcription simultaneously to confirm the accuracy of the transcription.

The next step in qualitative research highlighted the exploration of the data using preliminary exploratory analysis, which indicates reading the data to detect emergent ideas and consider how the data might be organized. The following step in analyzing the qualitative data was the coding process. Based on Clark & Creswell (2014), the researcher coded the data by categorizing them into similar groups that have the same meaning or value. From here, the researcher created and developed themes from the highlighted data analysis. The researcher used an open (also called "initial") coding methodology which means that there are no predetermined themes or codes that were created; therefore, the codes and themes emerged based on the data obtained. The researcher divided the common texts that included the same ideas, values, or perceptions based on the transcribed data and organized the common text segments into codes. Finally, as suggested in other studies, by reducing redundant codes, the codes were grouped to create themes (Clark & Creswell, 2014; Saldaña, 2013).

The researcher connected the grouped themes with literature and the theoretical frameworks to compare the similarities or differences presented. For example, some of the social aspects expressed in the classroom dynamics are linked with the social presence component of

CoI and the engagement principles of UDL. The researcher then examined the data in relation to the research questions to provide a better interpretation of the thematic data. This highlighted the research implications and future suggestions as well as emphasized the study's limitations.

**Trustworthiness**

The quality of the research study is determined by the validity and reliability of the findings. Validity is when the conclusion of the study is directly linked to the results and was not achieved accidentally, whereas reliability is the ability to repeat the same research and receive the same results (Boudah, 2011). While reliability and validity can be measured in quantitative design, it can be challenging to measure reliability and validity in qualitative design due to the nature of the data. Therefore, trustworthiness is used in qualitative research to establish the quality and value of the study (Terrell, 2016).

In this study, trustworthiness will be established using credibility and transferability as two of the commonly used criteria which were introduced by Lincoln and Guba (1985). Credibility is the main focus of trustworthiness as it relies on the true value of the findings. Terrell (2016) suggested that credibility can be achieved using techniques including triangulation. Triangulation is established using various resources to obtain the study's findings (Boudah, 2011). In this study, triangulation was acquired by interviewing two stakeholders (faculty members and students) as different sources of information. Moreover, transferability is another criterion that would be used in the trustworthiness of this study. Transferability is designed as an opportunity for one study to be replicated through a comprehensive description of the study's context, settings, and participants (Stahl & King, 2020). Therefore, a thorough interpretation of the research context is needed to provide an accurate perception of the conditions of the study. In this study, this was included through the description of the study's

location and status, participants' background and areas of study, and the general condition of the study.

**Ethical Consideration**

First, the researcher started the interviewing process after receiving the Institutional Review Board (IRB) approval to interview visually impaired students and their faculty members at University X. As per the IRB regulations, participants were informed about the purpose of the study and how the results will be used. Also, the researcher informed the participants of any risks that aligned with the procedure. The confidentiality of the participants was guaranteed, as the researcher sealed the collected data in a password-protected device as well as pseudonyms were used instead of the real names of the participants to ensure privacy. After explaining the ethical consideration to the participants, the interviewer further requested the participants' consent for the interview to be audio recorded, verbally, and by signing a consent form (as previously mentioned). In this study, the researcher's responsibility was to document and summarize the experiences of the participants regarding the accessibility of blended learning at University X. As a result, the researcher aimed to maintain objectivity on the leading questions, by eliminating or modifying any unbiased questions, as well as neutrality, by not expressing the researcher's views or arguments throughout the interviews.

# Chapter Four: Contextual Analysis

The aim of this section is to examine the factors that may have an impact on the research topic, including relevant policies and practices. Therefore, an overview of blended learning at University X will be provided, addressing how it is defined, offered, and developed. Followed by an overview of accessibility and special needs student accommodation services available at University X.

## Blended Learning at University 'X'

Based on the resources presented on the website of University X, blended learning is defined as the dedication of time to online learning by replacing (20%-50%) of face-to-face time. Unlike traditional learning, the percentage of time assigned for digital activities and online sessions is a vital part of the course design. Starting in 2014, the Center for Learning and Teaching (CLT) at University X started to offer blended learning workshops to its faculty members. Throughout the years, the CLT highlighted the use of blended learning as an important part of the improvement of digital education. In the annual report (2019), CLT conducted six sessions blended learning workshops twice to a total of 20 faculty members and assisted in the development of 17 blended learning courses. While in the annual report (2020), the CLT focus shifted to online courses as a result of the pandemic, the courses of blended learning were still being conducted, as well as 16 workshops on the use of online activity. Even though these were targeting fully online learning at the time, what faculty members learned there could potentially be used in future blended courses once learning returned to F2F.

In addition to the CLT's blended learning six-week course, the CLT has been offering one-on-one consultations to redesign courses as well as providing ideas for formative assessment for the blended learning modality. Also, program-level consultations are organized to cover any

challenges faced by any department on curriculum design, assessment, or professional development training for faculty and Teaching Assistants. However, after the pandemic, the university focused on the implementation of the Dual Delivery modality. Starting Spring of 2021, the CLT supported the implementation of the modality by training faculty members, sharing pedagogical ideas, and conducting surveys with students and interviews with faculty members to gather feedback and recommendations for the implementation.

**Accessibility at University 'X'**

University X, as an institute of higher education, aims to provide proper accommodation for special needs students on campus. The university has Student Disability Services (SDS) unit, which facilitates all needed services to ensure accessibility to the students. According to the university website, the unit's mission is to "promote self-awareness, self-determination, and self-advocacy to encourage independence and enhance opportunities for student success." The university provides academic accommodations to students with disabilities, including classroom, assignment, and testing accommodations, by adjusting curriculum, presentation, equipment, or testing conditions to adapt to the students' needs. Some of the equipment provided includes programs that the student would use in digital learning such as JAWS and Kurzweil 3000 (Windows screen reading software) as well as Dragon Naturally Speaking (speech recognition software). Moreover, other included services might involve providing note-taking services, private testing areas, readers for the exam, and disability assistant peers.

Another highlight of the university's procedures to implement proper accommodation for special needs students is the execution of the Academic Accommodations for Students with Disabilities Policy. The policy indicates its goal of guaranteeing acceptable accommodations for special needs to study alongside other students. In this regard, the policy states some general

principles of the authority and legislations of the SDS unit in accommodating special needs students as well as the different types of disabilities and their corresponding available support. The policy also declares that the SDS unit will abide by the Americans with Disabilities Act (ADA) of confidentiality. The ADA Title II, alongside Section 504 of the Rehabilitation Act of 1973, requires universities and colleges to provide the necessary resources for students with disabilities to have access to equal opportunities in the academic programs (US. Department of Justice, 2020). Finally, according to the Academic Accommodations for Students with Disabilities Policy (n.d), there is a clear declaration of the role of University X, as an institute, and its academic staff in addressing the needs of the students with disability, in addition to providing the needed steps and contact needed to request any specific accommodation.

In conclusion, the literature review highlighted the role of blended learning by addressing its advantages and disadvantages as a learning modality. University X also acknowledged the significance of blended learning, and accordingly, it has been attempting to improve its use to provide a better learning experience for its students. While University X defines blended learning by replacing face-to-face time with online time, this study, as mentioned in Chapter two, will follow a broader definition of blended learning as mentioned by Bekele et al. (2022). Although the advantages and disadvantages sections provided a general overview of the experiences of all students, the accessibility of the blended learning section highlighted the experiences and considerations of special needs students. Although University X is tackling accessibility by providing accommodations to special needs students and blended learning improvements by providing professional development workshops and re/design consultations, the researcher believes that it is necessary to examine the accessibility of blended learning for special needs students, specifically visually impaired students, and their professors to address its accessibility

and any further needed resources as stated in the research questions. This clearly highlights the importance of answering the study's research questions to be able to fill this research gap.

# Chapter Five: Findings

This chapter presents the findings of the study that aimed to examine the accessibility of blended learning for visually impaired students. One-on-one interviews were conducted with semi-structured open-ended questions for both visually impaired students and their professors to gain a comprehensive understanding of their experience of the accessibility of blended learning at University X. The interviews were coded and analyzed using thematic analysis, which involved the identification of patterns and themes within the data. Therefore, the findings are presented in themes as follows the course design phase, personalization of accessibility, social encounters and classroom dynamic, university support and resources, and technical accessibility and digital literacy. Where the first three themes belong to the second research questions, and themes four and five focus on the first research question. Part of the trustworthiness in this study is to provide the experiences of different stakeholders (triangulation); therefore, each theme will be divided into two parts: visually impaired students and professors, to address the different experiences of both stakeholders.

## Theme one: The Course Design Phase

### *Students*

The data obtained from visually impaired students at University X highlighted the importance of the designing phase of a blended course that incorporates accessibility for special needs students, specifically in this study the visually impaired students in advance. All visually impaired students mentioned that a significant issue is the lack of preparation of accessible tools and materials before the start of the semester. All six interviewed visually impaired students agreed that some course materials are presented in an inaccessible format such as printed text, PDFs, infographics, images, and graphs, which can limit their ability to participate fully in the

course and can cause additional stress and frustration for visually impaired students. The students elaborated on how addressing accessibility in the designing phase of a blended course is as essential as addressing it during class time. This was elaborated by one of the interviewees who stated that there are some common guidelines to consider as generic methods to provide accessibility to the course, and this is why visually impaired students ensure that they contact professors beforehand to prepare in advance for at least the basic accommodations ready when they join the classroom. One sophomore participant suggested that:

> *"*If you spend time [designing accessible content], you will spend it one time because when another student comes, you will be prepared with the basic elements, and then you will just have to do the personal catering, and that's it*"* (B).

Accordingly, the findings highlighted the importance of raising awareness of considering accessibility in the preparation phase of designing the blended course, as the alteration between digital and face-to-face provide different challenges to every visually impaired student. This was elaborated by the same student as he mentioned: "Professors should state the tools from the beginning and test the tools with visually impaired students before class; it will give them confidence coming to class prepared" (B).

Another aspect to consider is that the designing of the blended course continues to happen during the course. Half of the students suggested that there is a need to examine the accessibility of the tools before class time. For example, it was suggested by another sophomore visually impaired student (M) to check for the websites and files' accessibility whether of assessments, assignments, or projects in advance. A freshman visually impaired student stated that:

> ″One of my professors in the first semester was sending me everything that would be done digitally before that class to check if I can do them first or not, and if I can't, she will find something else to do″ (T).

Student (T) was very excited and motivated as a result of the professor's consideration of testing the accessibility of the digital tools before class time. This was important to the participant as it allowed a prior preparation that provided confidence in participating in any novel activity. Also, one participant who is a junior (R) elaborated on how by the end of the semester, both students and professors have a better understanding of what is accessible or not. The participant elaborated on how it is a learning process; however, the earlier we examine accessibility, the better it is for class engagement and time management. In the end, the findings indicated the need to address accessibility early on to prepare for students with different abilities and then during the course based on individual needs.

***Professors***

While interviewing the professors who taught the visually impaired students at University X, they also acknowledged the significance of designing a course that considers students with disabilities. It was suggested by a professor in the philosophy department (S) that it is better to design a course that would adapt to any situation and accommodate online and offline. This was elaborated by another professor (O), who was interviewed and suggested that even before the enrollment of a visually impaired student in the course the faculty have to be prepared to be flexible and accommodating.

Moreover, it was stated that one of the problems that hinder accessibility is the lack of awareness of the importance of designing an accommodating course. One of the professors, who had a visually impaired student every semester for the past two years, said:

> ″The first thing would be to research more about visually impaired students and the tools that they find most accessible, while designing our courses. It's not the other way around. I had a course designed for non-visually impaired. And then I had to convert it and adapt it to the visually impaired. But if we want to set a system for the whole university it should be from the beginning*″* (E).

Professor (E) highlighted that there should be a system to ensure that the design phase includes accessibility. This statement focuses on the importance of considering the needs of visually impaired students when designing courses, rather than simply making adaptations after the fact. This involves considering what tools and resources visually impaired students find most accessible when it comes to learning. By understanding these needs and preferences, professors can integrate these tools and resources into the course design from the outset rather than having to accommodate the course later. The initial preparation for a course that considers accessibility was supported by Professor (A) who advised using UDL to design a more accessible blended course. The professor also mentioned:

> ″Your predesign and your design for the possibility that someone might have, what might be different than the norm, so predesigned by initial, even talking to people who are different, talking to previous students and asking what made the course better for them″ (A).

The professor highlighted the importance of considering the diverse needs of students when designing courses. In addition to conducting research, it can be helpful to talk to previous visually impaired students and ask them what made the course better for them. This can provide valuable insights into what worked well in the past, and what changes can be made to improve the course for future students.

Moreover, from the professors' experience, it was emphasized in the interviews that providing accommodations and accessible materials for visually impaired students is not an extra burden or workload but rather a matter of planning and thinking ahead. By considering the needs of students with special needs ahead of time, professors can ensure that visually impaired students have the same accessibility as their sighted peers. Professor (K) elaborated by saying:

> "If I was going to do something that that I knew that I had not done with my blind students, I would contact them ahead of time. Sometimes they needed to view things ahead of time so they could process it. If there was a document that was not available online, it was a printed more of a scanned Pdf. I had to give that to them way ahead of time, so that they could get it translated into braille" (K).

The professor highlighted the importance of communication and preparation when working with visually impaired students. By providing information and materials ahead of time, the students can have the same opportunities to learn and succeed as their sighted peers. In the end, the interviewed professors acknowledged that by designing courses with the possibility that someone may have different needs, it becomes easier to create a more inclusive learning environment. This may involve conducting research to understand the needs of different students, such as visually impaired students.

**Theme Two: Personalization of Accessibility**

***Students***

During the interviews, the personalization of accessibility was a common theme that arose from the variations of preferences of the interviewed visually impaired students. Also, this theme links with the previous theme, which highlighted the necessity of considering the different needs and preferences of visually impaired students in learning. Student (B) communicated that a

generic guideline needs to be used while considering that not each visually impaired student is similar to the others. This was shown when students were asked about their perception of the value of blended learning. As shown in Table 1, participants have different preferences on the value and use of blended learning.

**Table 1**

*Students Response to the Question of "What is Your Perception of the Value of Blended Learning?"*

| ***Participants*** | ***Major*** | ***Responses*** |
|---|---|---|
| **Student (F)** | Finance | "I actually think it is valuable. I would say that I prefer blended learning." |
| **Student (T)** | Journalism | "I don't mind blended learning. I just prefer using the phone not laptops as they might be difficult sometimes." |
| **Student (M)** | Philosophy | "Blended is essential but the accessibility issues need to be solved" |
| **Student (B)** | English Literature | "The digital part of blended learning is valuable especially that now there is a reduction of printed paper." |
| **Student (Y)** | English Literature | "I like fully online more… I think it takes less time and effort." |

Furthermore, the interviewed students suggested that it is recommended to ask the students with disabilities what they need in terms of accessibility and what they are capable of doing using assistive technologies. This allows for a tailored approach and an adaptation of any necessary accommodations to ensure that the visually impaired student can fully participate in the course. For example, as seen above from the responses, Student (Y) and Student (F) would have different needs to accommodate for a blended learning environment. Therefore, it's important to recognize that accessibility needs can vary widely depending on the individual student. In addition, Student (B) commented saying:

> "Professors can familiarize themselves with the digital accessibility requirement by asking the students what they need first and by adapting the syllabi to what they [professors] need from the students to do. So, it's a kind of a pair work between the professor and the student until we reach consensus."

The findings highlighted the idea of pair work between the professor and student refers to the collaborative effort that is required to ensure digital accessibility. The professor cannot make assumptions about the student's needs or rely on a one-size-fits-all approach. Instead, it's important to actively involve the student in the process and work together to find solutions that work for them. This may involve ongoing communication and feedback throughout the course to ensure that any accessibility needs are being met.

***Professors***

The professors also mentioned the importance of personalizing accessibility for visually impaired students. Professors (K), (L), and (O) used the same expression of "the students were the experts." It has been elaborated that visually impaired students need to express what works for them and what does not. Data showed that professors suggested that some visually impaired students may prefer to listen to audio recordings of lectures and readings while others may prefer to use braille materials. Some students may require additional time to complete exams or assignments, while others may require specific software or hardware to access course materials. By asking visually impaired students to personalize accessibility, professors can ensure that they are providing the most effective accommodations for each student. This was elaborated by professor (E) as it was mentioned that in one of the classes,

> *"*A visually impaired student insisted on participating in poster assignment (which is visual) she said I have an idea in mind, and I know what the poster needs to look like, I'm

> probably not going to be doing it myself, but I'll ask somebody to do exactly what I want. She knew exactly what her poster consisted of, through every corner, the picture that was there, the text that was there. Then, the following semester, I had another student who said, no, I don't want to do posters. It doesn't make sense to me, and so I'm going to do a presentation of my work and just record my voice*" (E).*

The professor elaborated on how the visually impaired student in the first example demonstrated the need for personalized accommodations to participate in a visual poster assignment. By allowing the student to share their ideas and collaborate with someone who could help execute their vision, the professor was able to personalize the assignment to meet the student's needs and enable them to showcase their knowledge and creativity. The second student in the example also exemplifies the need for personalization in education. By recognizing that the poster assignment was not accessible, the student was able to personalize their learning experience by choosing to present their work through a recorded presentation. Furthermore, other accommodations were recommended by professors when asked, "Are there any strategies or tips you would recommend for other faculty designing blended courses to personalize it for visually impaired students they are teaching?" which are included in the following Table 2.

**Table 2**

*Professors' Suggestion to Personalize Accessibility of Blended Learning*

| ***Participants*** | ***Suggestions*** |
|---|---|
| **Professor (S)** | "I would suggest having multiple meetings and discussions to contextualize learning for visually impaired students" |
| **Professor (A)** | "Asking questions to visually impaired students to personalize learning (how to make it better for you? how to assist you in this situation?)" |
| **Professor (L)** | "Extra meeting with special needs students is necessary to have conversation on what is accessible and helpful and what is not." |

| | |
|---|---|
| **Professor (O)** | "Allowing modifications of submissions to accommodate accessibility." |
| **Professor (K)** | "I asked that student to come and share with the class how to make their online work more accessible to visually impaired people and then we applied that to their E portfolios." |

Another noted aspect that was mentioned during the interviews is the ability of the professor to accept the modifications resulting from personalization. Professor (K) stated that when they are in the classroom, there are things that the professor might want to do, but they would need major adjustments to make sure that students with visual impairments are included equally. To be able to reach this, as elaborated previously by one of the students, there should be open conversations and discussions between the visually impaired students and their professors. This was mentioned by Professor (A) as follows:

> ″You need to be an open teacher that allows students to come and tell you this isn't working for me, because sometimes you think you've had a blind student before, so you think you figured out how to make something accessible for them. Not all blind people are the same″ (A).

The Professor elaborated by saying:

> ″You shouldn't always put the burden on the person to do that so you should always do your best but also ask and check in, and make sure. That we have done helps, because sometimes you think you're doing something that can help. But it's not what that person wants″ (A).

Overall, the results showed personalization as an important theme to be considered when thinking about the accessibility of blended learning. Though it is recommended to have guidelines and generic rules for dealing with visually impaired students, the data showed that not

all visually impaired students are the same, have the same preferences, or have the same accessibility with the assistive tool.

**Theme Three: Social Encounters and Classroom Dynamic**

***Students***

Social encounters are an important part of the learning experience, and students' participation and classroom dynamic are pillars of the face-to-face and online parts of blended learning. The data showed that visually impaired students sometimes have concerns regarding social interactions with their peers while working on a group project. One of the visually impaired students expressed that even in person, they prefer to work alone. The participant stated, *"*I prefer technology and doing tasks on my own without help*"* (F). While the students did not elaborate on this, Student (M) stated that visually impaired students sometimes struggle with the fact that people are not familiar with how to deal with differences, and this is a cultural problem in Egypt overall, not just at University X.

On the other hand, other visually impaired students had a positive experience dealing with peers. Students (T), (B), (Y), and (R) enjoyed being interactive and social inside the classroom, and they stated that blended learning provided ways to be more engaged in pair and group work. Student (B) mentioned that the issue with class interactions is not dealing with peers; however, it is the accessibility of digital tools used inside the class. The student mentioned that: "Sometimes it is difficult to solve the problems visually impaired students have with screen reader which affects the class dynamic as the professor might not be able to solve the problem during the class. This decreases my participation*"* (B).

Student (T) also mentioned that sometimes in a major group project, the participants will do less or be limited with her task in the project because of accessibility. She also stated that she

faced accessibility problems in a group assignment that included creating a website. Student (T) highlighted how that limited her participation to just collecting the data and not actually learning how to create a website. Both student (B) and (T) agreed that digital accessibility affects the quality of work and participation, which influences the classroom and social inclusion of visually impaired students.

Moreover, the data obtained from Students (R) and (Y) expressed that peer support can be helpful to visually impaired students participating in social interactions and group work. Peers can provide descriptions of visual materials or actions, read out written materials, or simply provide social support and encouragement. However, clear communication is key to ensuring that visually impaired students are able to participate fully in pair and group work. Professors and peers should speak clearly to the visually impaired student and should make sure that they have the necessary tools and roles to increase students' participation and social inclusion.

***Professors***

The findings indicated that professors include pair and group work as a regular interactive pedagogy to enhance teaching and learning. However, in case of the presence of visually impaired students, Professor (A) and (K) use pair work as an essential part of navigating visual activities. Professor (A) elaborated on how there is a need to consider describing visuals and adding alternative text from peers for visually impaired students to be able to participate more and feel that they are included. While the idea of social encounters and their relation to classroom dynamics was mentioned by all the participants, professors had different experiences (Shown in Table 3) with the impact of having a visually impaired students in the classroom and the implications of accessibility on the classroom environment.

**Table 3**

*The Impact of Accessibility in the Social Inclusion and Classroom Dynamic for Visually Impaired Students.*

| ***impact*** | ***participants' examples*** |
|---|---|
| ***Shared Responsibility*** | When working with visually impaired students, students may need to take on different roles and responsibilities to ensure that everyone is able to participate fully (K). |
| ***Peer support*** | It is necessary to build a community inside the class for students to support each other as well as visually impaired students. Sighted students may take turns reading aloud or describing visual materials to their visually impaired peers (A). |
| ***Individual strengths*** | Working with visually impaired students can help students recognize and appreciate the unique strengths and abilities of their peers (E). |
| ***Inclusive Culture*** | When students see their visually impaired peers navigating the world and the classroom environment differently, they may develop a greater understanding of and empathy towards people with disabilities (E). |
| ***Positive role modeling*** | Visually impaired students who succeed academically and socially can serve as positive role models for their peers, demonstrating the importance of determination, resilience, and adaptability (L). |

The participating professors agreed that in any classroom, social interaction and class dynamics play a crucial role in shaping the learning experience. This can be particularly challenging when working with students who have special needs, but as the participants pointed out, these students can actually have a transformative effect on the class dynamic. Specifically, the presence of visually impaired students can inspire and motivate their peers to work harder and learn more, fostering a sense of teamwork and companionship that can benefit the entire class. As Professor (E) explains in the following quote, embracing these differences can ultimately enhance the social interaction and overall dynamic of the classroom.

> "it's a blessing. When you have visually impaired students in class, and I'm not exaggerating because it changes the whole atmosphere of the class. Even the students

> learn a lot because they see how people, despite all challenges, do a good job in the end, and the visually impaired students I've had so far have all been an inspiration. this is my final comments, not to be afraid of having students with special needs in class. No, quite the contrary! embraces the differences, because it's always an addition to the class experience″ (E).

Overall, the presence of visually impaired students in the classroom can promote social inclusion and collaboration by encouraging students to work together, providing peer support, sharing responsibilities, and increasing awareness of individual strengths to improve the classroom dynamic.

**Theme Four: University Support and Resources**

The participants, both visually impaired students and professors, were asked about the services provided by University X to support disabilities, especially visual impairment. A further explanation of the experiences of the participants is presented in Figure 4, which presents below the number of visually impaired students and professors who used the university's Student Disability Services (SDS). Five out of the six visually impaired students mentioned the help they received from the SDS department at University X, while four out of six professors reached out to the department for support.

***Students***

The role of University X in supporting students with visual impairment was one of the main points of discussion during the interviews. The students had a positive attitude toward the SDS assistance options. Students (F) and (M) mentioned that the SDS office helps them and the professors in converting inaccessible file formats, such as PDFs and visuals into an accessible formats, including word files or Braille. Also, some PowerPoints need to be more accessible by

adding Alt text or by recording voice over the presentations. On the other hand, the students acknowledged that while the university is making efforts to convert materials to be more accessible, this process may take time. This means that students may need to wait before all the necessary changes are implemented. Students (B) and (F) mentioned that the process might take extra time, and this sometimes causes a delay in the students' participation in class. Student (F) stated that the office tries to do their best; however, a delay in receiving the content means that the participant did not read the assigned readings on time and was not able to participate in the class discussion.

Moreover, according to the data, the university widens the accessible resources for students in areas that might not be considered in other universities. Student (M) elaborated on how prior to joining University X, the participant faced the challenge of finding accessible Arabic books. A major problem, as was elaborated by Student (M), is that there are very limited Arabic books which are accessible to the screen readers. The participant noted that although not many Arabic contents are accessible to screen readers, the university has provided many accessible Arabic resources to address this issue.

The students addressed the efforts of the university to provide an accessible campus by providing physical and educational resources. However, Student (Y) highlighted that not all professors are aware of the available resources to accommodate special needs students. The participant added that professors working together with SDS might provide better accommodations.

***Professors***

The findings suggested that the experiences of Professor (E), (S), and (K) that their relationship with SDS included the conversion of inaccessible readings and presentations into an

accessible format. Professor (L) mentioned that the visually impaired student is the one who suggested sending the materials to the department, even when the professor had no problem doing the conversion personally. On the other hand, Professor (S) mentioned when the student registers for the course late or any mid-term modifications might cause a delay as the department needs a week or more to create an accessible format of the readings. The professor elaborated on how this does not mean that there is an issue with the department; however, there are some areas of improvement from the professors' end, including early preparation of the materials as well as a better communication between the professor and the department as it was expressed:

> "I feel like, and this is probably a much my fault as anyone's, but I think our communication about certain things could have been better or meet the standards of communication, because it felt very much like... almost like I was just sending things to a work desk or something like that. Like I said… okay, here's the load of work to have it back whenever. I'm like… I'm not talking. But it would have [been] really beneficial if I could have more close consultation with someone in particular like a contact person″ (S).

Moreover, Professor (A) also mentioned that there is an increase in the enrollment of special needs students however, "SDS is very understaffed, and they support the whole university, and they don't have enough time for faculty. But of course, if someone needs help, they can go one to one″ (A).

Furthermore, Professor (A) acknowledged that sometimes accessibility is not a priority. The professor believed that on many occasions, people don't have time or don't realize how essential it is to consider accessibility, as they believe that special needs students are very few people, so they don't design for the minority. A simple step to avoid this was mentioned by Professor (K) as it was stated that every course has articles that are read, every semester, they're

those core pieces that are read in the courses, and those articles could be submitted to the SDS early and become available in an accessible format at all times for visually impaired students to avoid any delays. In addition, Professor (L) also elaborated that before and during the semester, it would have been helpful to deal with an expert provided by the university in designing a better learning experience for visually impaired students.

Another service that is provided by University X is the workshops provided by the CLT. The findings showed that three out of the six interviewed professors did not reach out to the department to consult on designing an accessible blended course. Professor (E) mentioned that the only service he dealt with was the SDS to convert documents, but he did not attend the CLT workshops. Meanwhile, Professor (S), who was hired in 2021, mentioned that as a new hire, he had to attend some of the workshops offered by CLT. However, Professor (S) mentioned that he attended blending learning workshops and other workshops about accessibility, but not on the accessibility of blended learning. He stated,

> "First, I guess I don't think I've had specifically a CLT workshop about special needs students in the context of blended learning, I think I've had each of those separately, but not together. And I do think is probably worth, you know, discussing. I'm sure they'd [CLT] be happy to discuss it if that was specifically brought up to them" (S).

Overall, University X provides multiple resources to assist visually impaired students and professors. However, the data from students showed that while the university is making efforts to improve accessibility, there is still work to be done to better accommodate visually impaired students. In addition, professors need more guidance on the available resources provided by each department and how those resources can be used to support visually impaired students.

**Theme Five: Technology Accessibility and Digital Literacy**

***Students***

As previously highlighted in Theme three, the data showed that the proficiency of the technological tools that are being used affects the accessibility, engagement, and participation of visually impaired students in blended courses. It was also added that if the technology is not accessible this might affect the digital literacy of the visually impaired students. Student (B) mentioned that, *"*using technological tools can be a double weapon when visually impaired student gets overwhelmed with the barriers of technology, and it's good as it makes visually impaired students feel included as their peers" (B).

Student (F) mentioned that in blended courses, there is wide use of digital materials, and that technology can be accessible to blind people by dealing with accessibility problems of pdfs, graphs, and photos. Therefore, Student (F) elaborated that there is a need to sort out what is accessible and what is not. Another participant, Student (T)'s main concern was with QR codes as they are being used in classrooms; however, visually impaired students would have to ask for a peer's assistance to scan the code. Student (T) suggested sending the link in advance or using an alternative accessible tool. In addition, Student (B) pointed out his excitement that some polling tools are accessible to use, including Mentimeter and Slido. However, he also mentioned that sometimes while the App is accessible and easy to use, there are some features which are not accessible including the whiteboard feature in Zoom.

Nevertheless, there were some contradictions in the responses of Student (B) and Student (T). While Student (T) highlighted that she would prefer using Google docs, slides, and sheets rather than Microsoft Word, PowerPoint, and Excel, Student (B) stated that the Microsoft package is more accessible. Such contradiction was elaborated on in Theme two of

personalization which can also be explained by the response of Student (M) who mentioned that there is a need to improve different tools to accommodate the different accessibility needs of students with disabilities.

The technology accessibility issues also affect the student testing and examination. The findings indicated that the students have a fear of the failure or inaccessibility of the websites during exams. Students (R), (Y), and (T) mentioned that if the exam or quiz is on Blackboard then it is accessible; however, websites such as Quizzlet were not accessible during class evaluations. Moreover, Student (M) and (B) stated that to ensure accessibility of the exam there is a need to ensure that questions do not include photos or graphs. The students faced problems with questions that included visuals as it did not include Alt Text and had to be converted into Braille.

Student (T) mentioned that trying new technological tools is always a challenge for her, especially since there is a need to examine the compatibility of the tools with the assistive technology. This was apparent when the student needed to be aware of any guidelines or modifications that needed to be done using JAWS to assist her in creating websites. Moreover, Student (M) mentioned that there are syncing problems between the digital tools and the screen reader; this was shown in many obstacles of the screen reader with the accessibility of programming and mathematics. Finally, most professors do not know the basic troubleshooting for screen readers. Student (B) mentioned that sometimes it is difficult for the professors to solve problems of screen readers, which affects the class dynamic as they have to wait for an expert to solve the problem; this decreases the visually impaired students' participation and engagement.

***Professors***

The data showed that the professors highlighted the importance of using blended learning. Professor (K), when asked why she believes that blended learning is useful, said, *"*Sometimes we need to be alone to absorb information and create our own meaning"(K). This was also elaborated by Professor (A) as she mentioned that some technologies are available at home which can be used to enhance learning better than meeting in-person, "so that students have opportunities to express themselves in different ways. Not everybody is good at presenting themselves orally or in discussions in class… they just need more time to reflect*"* (A). Furthermore, Professor (L) stated that, especially after the pandemic, it is better to design a blended course that does not depend on one modality. Professor (E) mentioned how he believes that the use of technology in the classroom is merely a logical implementation of the students' use of technology in their daily life. This is why the professor teaches all classes in a computer lab to provide digital elements into the classroom.

Therefore, professors try to use accessible technological tools to implement a blended learning modality. An essential accessibility consideration mentioned by Professor (A) is that the LMS used at University X has an accessibility tool. Professor (E) stated that using University X's LMS, which is the Blackboard for quizzes did not cause major problems with accessibility. Moreover, Professor (E) and (K) agreed that he uses Google Suite as a technological tool which is accessible for visually impaired students, used commonly by all students, and does not require any special skills. Whereas Professor (A) uses accessible technologies such as discussions on Slack, blogs, or Hypothesis for annotation on readings.

Four out of six professors mentioned that there are some extra modifications that need to be done during exams for visually impaired students. These problems are with visuals, graphs, and PDFs. Professor (E) in an exam that included Mathematics and Venn diagrams help was

needed, so the professor had to reach out to the SDS to use alternative strategies. In addition, Professor (E) elaborated that he also had to find alternatives for visuals and PDFs by converting them to Braille or Word files. The accessibility challenges of technological tools are not known to all professors and peers. Professor (K) elaborated that if the University X uses a certain hashtag on their social media unless the university capitalizes the two words in the hashtags, it would not be accessible to visually impaired students screen readers . Such small accessibility detail might not be considered by all stakeholders. Professor (A) mentioned that ″not every person has the digital literacy or the patience to learn″ *(A).*

Therefore, Professor (K) advised that,

> ″I think there needs to be a constant awareness building in our classes, and I think a lot of us don't realize when we use visuals if we don't have alt texts and things like that…that, it won't make sense″ (K).

## Chapter Six: Discussion

The aim of this chapter is to discuss the study's findings presented in the previous chapter. This chapter outlines the relationship between the findings and the following research question: How accessible is blended learning for visually impaired students at University X? and What are the needed strategies to improve accessibility of blended learning experiences for visually impaired students? Moreover, the chapter will discuss the implications of the presented findings, followed by the research's implications and future recommendations.

The literature highlights that the advantages of blended learning included providing the students with flexibility, and motivation (Rivera, 2017; Saeed, 2020; Taradi et al., 2005). These benefits were highlighted in the findings section of this study, specifically in Theme five, where Professor (K) and (A) were quoted saying that blended learning allows students to express themselves and reflect on course content in a self-paced manner. This also links with the UDL's framework to provide multiple means of representation that encourage the use of different methods of expression based on students' different needs. In addition, in the findings, Professor (E) highlighted that mixing face-to-face with online learning is beneficial since using technology is a daily practice for students. Therefore, the researcher agrees with the Committee of Economic Development (2013) that the students' use of technology is part of their day-to-day activities. This is shown in the students' responses to their perception of the value of blended learning, where five out of six students agreed on the value of blended courses. However, as shown in chapter two, Linder et al. (2015) stated that the issues of accessibility affect the interactions between the students and their professors as well as the students with their peers. In Theme four of the findings, Student (T) and (B) agreed with the literature on how the accessibility of the technological tools influences their participation and motivation in the blended learning

environment. From the researcher’s perspective, if a visually impaired student has an accessibility issue with a tool or platform, it may take them more time and effort to do what other students would do with ease. This additional workload can be a significant barrier to the participation and motivation of visually impaired students with the technological aspects of the blended course.

In this research at University X, one of the themes that helped answer the first research question about the accessibility of blended learning was the accessibility of technological tools. The findings indicated that, overall, the university's Learning Management System (LMS), Blackboard, is accessible to students with only minor technical issues. Specifically, students (R), (Y), and (T) highlighted that Blackboard was accessible during exams despite occasional technical problems. Moreover, in Theme five, it was observed that visually impaired students and professors relied on commonly accessible tools such as Google Suite (or Microsoft), Zoom, Slack, blogs, Hypothesis, Mentimeter, and Slido, with fewer instances of using inaccessible tools such as Zoom's whiteboard and Quizzlet. These findings align with Bali & Zamora's (2022) notion of intentionally equitable hospitality in higher education, where educators must consider the proper accommodations necessary to meet learners' needs. Accordingly, to create a hospitable classroom environment, it's necessary to consider the accessible technological tools that are preferred by students, as well as any inaccessible features that may be less apparent to educators.

Nevertheless, as Lord & Stein (2018) stated in chapter two, visually impaired students have accessibility problems with computer-based exams. Similarly, the visually impaired students at University X mentioned some issues with testing and examination. In Theme five, Student (M) and (B) highlighted that photos or graphs are not accessible in the exams. For

example, some exam questions which depended on visuals did not include an Alt Text or description of the pictures. Furthermore, Butler et al. (2016) examined the graphical challenges faced by vision-impaired students in Australian universities, and in this study, it was stated that charts and graphs are commonly used in higher education (78% of course materials). On the other hand, the accommodation for the visuals included either written descriptions or Braille graphics, which require extra time to be generated for students. Therefore, professors need to consider the suitable accommodations of visuals and prepare for them ahead of examination time.

In this regard, the support and resources of University X were another theme that helped in answering the first research questions of how accessible blended learning is at University X. The visually impaired students, in Theme Four, mentioned that the Students Disability Services (SDS) assisted them and their professors to convert the course materials to an accessible format. The students recognized the efforts executed by the service unit; however, Students (B) and (F) highlighted the issues mentioned by Butler et al. (2016) regarding the timeline of the conversion services. The students mentioned that the delay in the materials affects their participation in the blended learning environment. However, Professor (A) stated that the SDS is understaffed, and this increases the probability of needing extra time to assist the students with the needed accommodations. Professor (L) also mentioned the need to have better communication with the SDS during the semester. This highlights the significance of providing the SDS with the needed staff to reduce the workload on staff, decrease the timeframe for material conversion, and provide consultations to students and professors. Furthermore, while the professors acknowledged that the CLT provides consultations and workshops, the findings indicated that half the professors did not reach out to the department. Therefore, the researcher believes that

this is another aspect that can aid the professors' workload issues in designing blended learning courses (Ryan & Lamont-Mills, 2013; Wallace & Young, 2010; Widyanti et al., 2020). The utilization of the university's resources and services would support faculty members to adhere to the CoI's teaching presence aim of supporting the blended learning environment.

In addition, to answer the second research question, there is a need to consider how the accessibility of blended learning modality impacts visually impaired students' social interactions with peers. As elaborated by Garrison et al., (2000), the social presence, which is an aspect of the CoI framework, highlights the importance of the connectedness of students with their peers and professors. The data showed a variety of social inclusion by visually impaired students at University X as some were disengaged from peers, limited by the inaccessibility of technology, and preferred to work alone, while others were actively social and connected with professors and peers. The finding indicated the necessity of having a social space that addresses the social inclusion of visually impaired students with their peers and its influence in fostering an inclusive classroom dynamic. This is linked to the literature, which also emphasized the importance of exploring the social inclusion of visually impaired students (Claiborne et al., 2010; Ngubane-Mokiwa & Khoza, 2021; Parvin, 2015). The researcher agrees that by addressing the social inclusion of visually impaired students, the classroom can become a more welcoming and supportive community.

Furthermore, another strategy to improve accessibility of blended learning was the design of an accessible blended course. The literature highlighted an issue with the design of an accessible blended learning course, especially a design that considers the needs of visually impaired students (Burgstahler, 2015; Crow, 2008). The findings in theme one by Student (B) and Professors (E) and (A) emphasized the need to consider the accessibility of the blended

course in the design phase of the course. However, the findings indicated that accessibility modifications are considered when a visually impaired student enrolls in the course shortly prior to the start of the semester or during the semester. Therefore, the faculty might be resistant to considering accessibility in the design phase, which is supported by the findings of a study by Gülbahar & Madran (2009), stating that the professors might be discouraged from the workload needed to provide a blended learning course that considers accessibility in its design. On the other hand, the findings by Student (B) in Theme one suggested that the prior consideration of accessibility lays the groundwork for an accessible blended course and eases the path to the next step of the personalization of accessibility. Personalization provides different accessible options that motivate the contribution of visually impaired students inside the classroom. In this regard, the researcher believes that the consideration of accessibility in the design phase is an essential strategy to apply, whereas the last-minute modifications do not provide sufficient time for the university services to support the accommodation process, which would increase the workload on faculty and staff, as previously mentioned.

**Implications and Future Suggestions**

This study suggests that the design of courses is particularly crucial for visually impaired students' accessibility to blended learning environments. Professors should ensure that course content is accessible through assistive technologies, such as screen readers, to guarantee that visually impaired students can access the materials. The course structure also needs to be well-organized and clearly labeled to facilitate navigation for visually impaired students. Inadequate course design can result in confusion, frustration, poor time management, and a lack of engagement, leading to poor learning outcomes. Moreover, social encounters and classroom dynamics are essential factors that influence visually impaired students' engagement and overall

satisfaction with blended learning courses. It is proposed that professors should ensure that visually impaired students have the same opportunities for social interactions as their peers in virtual group projects and discussion forums. In addition, professors should also promote the presence of a learning community that values and respects diversity for students with different abilities, including students with visual impairments.

Furthermore, personalization is particularly crucial for visually impaired students' ability to access the blended learning environments. It is recommended that professors try to accommodate diverse learning preferences and provide alternatives for how students can engage with course materials. Professors are also advised to provide personalized support, such as one-on-one meetings, to ensure that visually impaired students have equal access to academic resources and support. Moreover, there should be a focus on the facilitation of the university's support and resources for visually impaired students. It is recommended that the university provide training for professors and academic staff on the interconnectedness of accessibility and blended learning for visually impaired students. This will help staff to follow up on the design of accessible course content and to conduct some informational sessions for professors and students on the resources available to accommodate the visually impaired students. Additionally, it is proposed that the university needs to provide proper resources, including up-to-date assistive technologies, and to increase the disability services staff to support visually impaired students' academic needs.

Moreover, technical proficiency and digital literacy are particularly important for the accessibility of blended learning for visually impaired students. Professors should ensure that visually impaired students have the necessary skills to navigate online platforms and the limits and potentials of the available assistive technologies. Nevertheless, the university might also

recommend trainings and support to visually impaired students to help them develop digital literacy skills, such as coding and website development that are necessary for academic and professional success in the digital age.

In conclusion, the design and implementation of blended learning courses must consider visually impaired students' accessibility needs. By ensuring that course materials, assessments, and resources are accessible through assistive technologies, providing personalized support, and promoting an inclusive learning environment, professors and universities can create an environment that fosters engagement, inclusivity, and academic success for visually impaired students.

## Chapter Seven: Conclusion

This study aimed to examine the accessibility of blended learning at University X. This research followed a case study qualitative design which assisted in examining the experiences of visually impaired students and their professors at the university. The study has acknowledged several key themes that should be considered to improve accessibility for visually impaired students in blended learning. The themes identified the meaning of success for visually impaired students in a blended learning environment. This definition includes various factors and indicators that determine success. The success indicators for visually impaired students include students' satisfaction, motivation, achievement, and agency in the blended learning modality. These indicators can be achieved through various success factors such as technological accessibility, digital literacy, personalization, accessible course design, and social inclusion. Therefore, to improve accessibility for visually impaired students in blended learning environments, a combination of technical solutions, social support, and a commitment to creating an inclusive learning culture is needed. By keeping accessibility in mind and providing appropriate accommodations, blended learning can help to promote inclusive education and improve learning outcomes for all students. In addition, the study recommends ongoing evaluation and feedback from visually impaired students to continuously improve accessibility and ensure that their needs are being met. This feedback can inform the development of new technologies and strategies to support visually impaired learners in a blended learning environment. Overall, by recognizing and addressing these factors, educators and universities can establish an inclusive learning environment that promotes effective learning and supports the success of all students, including visually impaired learners.

## Limitations of the Study

One limitation is that this study encompasses most of the professors and visually impaired students who were taking courses that were primarily discussion or writing-based, which may not provide a full spectrum of further challenges in other available courses at University X. This limitation can be tackled in the future by examining other courses that might include more visuals such as mathematics, programming, or science courses. It can be further suggested to investigate if visually impaired students are empowered and encouraged to attend these courses. Moreover, another limitation is that due to restrictions on time, the study only focused on the students and professors' experience. Except for one professor from the CLT, the study did not include input from other important stakeholders such as CLT and SDS staff. CLT and SDS staff may have valuable insights into how to cater to accessibility for students with disabilities. Therefore, future studies could benefit from including input from these stakeholders to ensure a more comprehensive understanding of the issue. Overall, these limitations suggest that while the study's findings are valuable, they should be interpreted with caution.

## Suggestions for Future Research

Based on the study limitations, the research would suggest further examination of the experiences of visually impaired students and professors in courses that require more visual content. This would provide a more comprehensive understanding of the challenges that visually impaired students and professors face in a wider range of courses. In addition, future studies can include input from other stakeholders, such as the CLT and SDS staff (University's resources and services). This would provide a better understanding of how universities can better the accessibility of blended learning for visually impaired students. Finally, it would be significant to conduct a comparative study between University X and other public and private Egyptian

universities, to identify best practices in catering to the needs of visually impaired students and professors. This would help identify areas for improvement and provide insight into how other universities are addressing this issue.

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# Appendices

## Appendix A

## Participants' Consent Form

Project Title: Examining the Accessibility of Blended Learning for Special Needs Students in Higher Education

- You are being asked to participate in a research study. The purpose of the research is to examine the accessibility of blended learning for special needs students in higher education. and the findings may be published, presented, or both. The expected duration of your participation is 60 minutes.
- The procedures of the research will be as follows the interviewer will ask you a few questions about your experience of the accessibility of blended learning.
- There are no risks or discomforts associated with this research.
- There will not be benefits to you from this research, still the researcher hopes that exploring the faculty and visually impaired students' experiences will help to better understand the accessibility of blended learning in an Egyptian higher education institute.
- The information you provide for purposes of this research is confidential.
- If you want to ask about anything, please call the researcher PI: Reem Yaseen on her phone or contact her at this email (reem.yaseen@aucegypt.edu).
- Participation in this study is voluntary. Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may discontinue participation at any time without penalty or the loss of benefits to which you are otherwise entitled.

Printed Name :_____Signature :_____Date:_____

## Appendix B

## Faculty' Interview Guide

Location:

Date/time:

"My name is Reem Yaseen, and I will be conducting this one-on-one interview. The purpose of this study will be to examine the experience of special needs students and their faculty members at University X using blended learning as a modality of instruction. Blended Learning is defined as the modality of learning in which both online and face-to-face modalities are utilized in a single course. By exploring the experiences of visually impaired students with accessibility in blended learning, the researcher aims to contribute to the development of strategies that could enhance the accessibility of blended learning for visually impaired students at University X. Moreover, the researcher will use this interview as a part of a research study that will be submitted to the American University in Cairo in partial fulfillment of the requirements of master's degree program in International and Comparative Education. The expected duration of your participation is 60 minutes. You have received a consent form that you carefully read and signed prior to the interview; do you have any questions about it? If there are no further questions, do you consent to start recording and begin the interview?"

The interview included the following semi-structured questions:

1. Could you please introduce yourself?
2. How often do you design/use a blended learning course?
3. Why would you generally design or not design/use blended learning in your classroom?

4. What is your experience with designing accessible blended learning courses?
5. Do you encounter any barriers when designing blended learning for visually impaired students? If yes, what are they? how you have overcome them?
6. Can you discuss any specific accommodations or modifications you have made in your blended learning course to support visually impaired students?
7. Have you found any tools or technologies to be particularly helpful in making the blended learning environment accessible to visually impaired students?
8. What is your approach to testing and assessments in a blended learning course for visually impaired students?
9. How do you include visually impaired students in group and peer work in the course?
10. What is your experience dealing with University X's disability services?
11. In your opinion, what can improve the accessibility of blended learning for visually impaired students? How can they make it personalized?
12. Are there any additional strategies or tips you would recommend for educators teaching blended course to visually impaired students?

## Appendix C

## Students' Interview Guide

Location:

Date/time:

"My name is Reem Yaseen, and I will be conducting this one-on-one interview. The purpose of this study will be to examine the experience of special needs students and their faculty members at University X using blended learning as a modality of instruction. Blended Learning is defined as the modality of learning in which both online and face-to-face modalities are utilized in a single course. By exploring the experiences of visually impaired students with accessibility in blended learning, the researcher aims to contribute to the development of strategies that could enhance the accessibility of blended learning for visually impaired students at University X. Moreover, the researcher will use this interview as a part of a research study that will be submitted to the American University in Cairo in partial fulfillment of the requirements of master's degree program in International and Comparative Education. The expected duration of your participation is 60 minutes. You have received a consent form that you carefully read and signed prior to the interview; do you have any questions about it? If there are no further questions, do you consent to start recording and begin the interview?"

The interview included the following semi-structured questions:

1. Could you please introduce yourself?
2. Can you describe how blended learning is integrated in your education.
3. What is your perception of the value of blended learning?
4. What is your perception of digital accessibility?

5. Do you encounter any accessibility barriers when learning using blended learning? If yes, what are they?
6. Can you describe any modifications or accommodations that have been made for you in the blended learning environment?
7. Have you found any tools or technologies to be particularly helpful in a blended learning environment?
8. How would you describe your social connections and engagements in the blended learning environment ?
9. What is your experience on the accessibility of testing and assessments in a blended learning course?
10. What is your experience dealing with University X's disability services?
11. In your opinion, what can improve the accessibility of blended learning for visually impaired students? How can they make it personalized?
12. Are there any additional strategies or tips you would recommend for educators teaching blended course to visually impaired students?