



The Role of Assistive Technology in the English Language Learning Experience of Blind and Visually Impaired Students in Pakistan: A Qualitative Study

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Abstract: This qualitative study addresses the role of assistive technology in the English language learning experiences of blind and visually impaired students. Underpinned by the interpretivist theory, in-depth, semi-structured interviews were conducted with ten blind and visually impaired students studying at IIU and NUML universities in Islamabad. All the students were given a chance to give a detailed account regarding the role of assistive technology in their English language learning experiences. The study revealed that the BVI students who made effective use of assistive technology proved more successful English language learners as compared with those who made less use of it. They had better access to study material, and were more successful in completing and submitting their tasks and assignments to their sighted teachers for their perusal with little assistance from sighted individuals. Assistive technology made the BVI learners independent, self-reliant and self-assured. Although very effective, yet assistive technology could not resolve all the problems confronted by blind and visually impaired students.

Introduction

The number of visually impaired people is increasing and, in order to bring them on a par with the sighted people, they would need modern assistive technology. It is estimated that the number of visually challenged individuals will double to almost four hundred million by 2030 unless measures are taken to deal with the menace (WHO, 2022). Every visually impaired individual has the right to have equal access to quality education like sighted people, and it is the duty of every member country to take measures in this regard (United Nations, 2006). Assistive technology has the potential to help the blind and visually impaired (henceforth BVI) people in getting equal access to quality education.

Assistive technology is defined as “technology adapted or specially designed to improve the

functioning of people with disabilities” (Borg, Lindstrom, & Larsson, 2009). It is a broad concept and covers many things ranging from high-tech devices such as computers with specialized softwares, to more advanced gadgets like digital hearing aids and glasses, to low-tech devices like handheld magnifiers and canes (Cook & Hussey, 2002; Petty, 2012). All assistive technology is aimed at helping the BVI individuals to be more autonomous, have better social inclusion and improved quality of life.

BVI individuals in Pakistan generally have little access to modern assistive technology mainly because of poverty and lack of awareness. Johnson (2011) enumerates several reasons for the underuse of assistive technology: hesitation among BVI individuals to test and use the devices,

lack of awareness among them, poor device performance, and feelings of stigmatization. The problem of underuse of assistive technology is not limited to BVI individuals in Pakistan, Kelly (2008) found that the vast majority of BVI students were not using enough assistive technology in the U.S.A.

Assistive technology can be helpful in assisting a BVI individual how to complete a particular task and/or how to circumvent an area of difficulty. For instance, when a BVI student, who obviously cannot read normal print, uses a screen reader to listen to a book, she/he bypasses an area of difficulty. But if he focuses on the computer screen as highlighted words are read aloud, they can learn unfamiliar words.

Modern assistive technology is used for a variety of academic purposes by BVI individuals, including, Braille access, speech access, tactile communication systems, large print access, or any combination of these modes. But teachers are generally unaware of different assistive technology available for BVI students which often result in the underuse of assistive technology to benefit these students.

BVI students' success in English language learning in integrated settings depends on a variety of factors including access to study material used in class. They need to have books and other secondary study material in an appropriate format (e.g. Braille, e-text, large print, and audio etc.) (Kelley et al, 2001). It means that assistive technology can be "great equalizer" for BVI students (Michaels & McDermott, 2003).

Apart from academic benefits, assistive technology has opened new job opportunities for BVI individuals as well, and jobs which require access to visual information are now accessible to them through modern assistive technology. Visually impaired people are now able to achieve academic success and obtain competitive employment through the use of assistive technology which enable them to have

independent access to information and have effective communication (Kelly & Smith, 2011).

Research about BVI individuals is rarely carried out from these students' point of view (AFB, 2021). Modern researchers mainly focus on the teachers' views about services for BVI students in integrated classroom settings (Wungu & Han, 2008); imparting education to them in regular classroom settings (Murray, & McKenzie, 2010); and teachers' capacity for teaching BVI individuals in regular classes (Smith, Kelley, Maushak, Griffin-Shirley, & Lan, 2009). However, no study has been conducted so far into the use of assistive technology by BVI students in learning the English language in Pakistan. I agree with Tobin's (2011) who, along with Topor and Rosenblum et al (2013) argued that there is a need for an extensive research into the field of second language learning by BVI individuals from various aspects and perspectives.

This study is aimed at unravelling the role of assistive technology in the English language learning experiences of blind and visually impaired university students in Pakistan. It is concerned mainly with the role of high tech assistive technology (e.g. the screen reader JAWS (Job access with speech), scanners and printers, etc.) used by the BVI study participants for success in their English language learning efforts.

Research Questions

1. What blindness-specific support services and assistive technology, according to the study participants, are available for the BVI learners and their teachers in Pakistan?
2. How do they assist them in teaching and learning the target language?

Research Objectives

1. To unravel the role played by assistive technology in English language learning by

blind and visually impaired students in different universities in Pakistan.

2. To find out how assistive technology is of use to BVI learners of English in accessing the written word and does various assignments and in-class tasks and activities.

Significance of the Study

This study would help all the stakeholders to take appropriate measures in terms of ensuring the availability of modern assistive technology for the BVI students in order to help them successfully achieve their goals in integrated classes. The study could also be useful in informing government policies especially related to education of visually impaired learners in Pakistan. Moreover, The study would also add to the already existing body of knowledge on the role of assistive technology in second language learning by visually impaired students.

Delimitations of the Study

Delimitations determine the boundaries drawn by the researcher prior to embarking upon a study and are essential for narrowing the focus of study (Creswell, 2009). This study was delimited to the role played by assistive technology in English language learning by BVI students in Pakistan.

Research Methodology

This qualitative study tries to study participants in their natural environment using different means to interpret meanings shared by the study participants. Qualitative research generally aims to understand the way people comprehend the world from different aspects, and accepts the varied interpretations of human experience; both the researchers as well as the study participants thus have a discovering experience (Guba & Lincoln, 1994). This study used a qualitative approach because of various reasons, given by Creswell (2014): (a) when research questions begin with how, what and why, (b) there are multiple aspects to the issue under study which

needs investigation, and (c) the study has to be carried out in a natural environment. I believe that the blind and visually impaired students' views about the world around them and the realities they draw and construct can best be understood through a qualitative approach. Moreover, the role of assistive technology in the English language learning experience of BVI students in Pakistan is being studied for the first time, and, as Strauss and Corbin (1990) argue, a largely unexplored phenomena can best be investigated qualitatively.

The research population for this study consisted of blind and visually challenged students, whose ages ranged from eighteen to twenty-two years. A comprehensive list of BVI students enrolled in Islamic International University and National University of Modern Languages was obtained from these universities. Ten BVI students were selected through the process of purposive sampling. The BVI students were contacted and their willingness to participate in this study obtained through consent forms.

For this study, semi-structured interview was considered appropriate because through this type of interview the researcher could glean from the participants maximum relevant information. Moreover, this type of interview enabled the participants to freely express their views. A set of questions was developed (which was in line with the main research question and the research objectives) and put before the participants during the interviews which lasted on average for around one hour. In line with the views of Smith & Osborn (2008), a relaxed atmosphere was created so as to allow the study participants to share their views regarding the role of assistive technology in their English language studies, and whenever needed, cues were provided to them when they appeared to get stuck.

Before finalising the interview guide, however, a pilot study was conducted with two BVI students, and certain changes (e.g.

minimising technical terms, reordering certain questions for the sake of smooth flow in conversation) were made in accordance with the outcomes of the study. Data was then collected from ten blind and visually impaired students through semi-structured interviews. All the interviews were audio-taped through a smartphone and a laptop.

The student participants used a mixture of both Urdu and English to express their views. The researcher then translated and transcribed all the interviews into English. My knowledge of both Urdu and English and my position as an insider (I am myself a blind individual having the experience of using assistive technology, especially computer-based, to study English language) proved very effective with regard to understanding their views and perceiving the contextual as well as cultural nuances associated with their responses.

Major themes were established through a thematic analysis of the data. Moreover validity and reliability of the study established through interpretative and descriptive validity, using such strategies like member check sessions and low-inference descriptors.

The interpretivist theory guided this study. Interpretivism assumes that empiricism cannot be termed as the only method which can be used for knowing about the world; rationalism can also serve the same purpose in a better way. It also assumes that different people perceive reality differently on the basis of an individual's experience and his cultural background. This study attempted to know the BVI students' views about the role of assistive technology in their English language study from their own perspectives. Being an interpretivist, I believe that the world should be viewed from the individual's perspective so as to have a better understanding of the world. It is for this reason that I tried to explore the role played by assistive technology in the English language learning

experience of blind and visually challenged students from their own perspective.

Data Presentation and Discussion

Learning strategies used by BVI learners of English greatly vary from sighted students because they cannot use their sense of sight and are forced to rely on their auditory and tactile senses. For this purpose they are compelled to rely on specialised assistive technology and gadgets to successfully tackle their blindness-related problems (Bardin & Lewis, 2008).

This study revealed that all the study participants found computer-based assistive technology to play an important role in their English language studies.

Hassan believed assistive technology made him independent as he had to rely least on the assistance of his sighted peers. With computer-based assistive technology, he could surf the net and find study material related to different aspects of English language (e.g. grammar, vocabulary and phonology). Moreover, he could read novels and magazines online. Apart from accessing study material, assistive technology also helps him to do in-class tasks and activities and prepare and submit his assignments on his own without least reliance on sighted people. Although Hassan did not know much about various latest assistive tools and gadgets, yet the screen reader he used on his smartphone and laptop enabled him to function quite independently in integrated class. (Screen reader is a text-to-Speech- software that converts digital text into audio)

Highlighting the important role played by assistive technology in his English language studies, Sami stated that it would have been almost impossible for him to pursue his studies of English language without the screen reader on his laptop and smartphone. Like Hassan, Sami also termed assistive technology indispensable for him in his studies of English language. Without computers equipped with screen readers, he

would be unable to look up a word in a dictionary, prepare study-notes and read books.

He complained that his teachers and administrators were unaware of the centrality of assistive technology for BVI learners which sometimes resulted in problems for the BVI students in integrated classes. It took the BVI learners quite a while to convince the administration to allow them to take their credited exams on laptops equipped with screen readers.

Ahmad was of the view that assistive technology made him independent in his studies of English language. He said that it gave him a sense of autonomy, self-confidence and motivated him. Ahmad, like other BVI study participants, converted the printed material into soft form by scanning it on to his laptop through an OCR application called "Open Book". (Optical character recognition (OCR) system allows users to scan printed documents, convert them into digital text and also serve as tools for correcting translation errors). He could then read it through a screen reader either on his laptop or smartphone. Moreover, Arshad said he could read, with the help of a smartphone application called "Seeing AI", a printed page on the fly. He pointed out, however, the exorbitant prices of most of the high-tech tools and gadgets which rendered them beyond the reach of average Pakistanis.

Ibraheem said he felt he was visually impaired only when he was away from his assistive tools, as without his laptop and smartphone equipped with screen reader, he was able to do no assignments, no in-class tasks and activities, and could not access the study material. Ibraheem had dual disability, he lost the fingers of both his hands in some accident, due to which he relied more on assistive technology: he required a computer to be equipped with not only a screen reader but also speech recognition program.

Arshad was of the view that assistive technology gave him access to the vast world of

internet where everything related to any aspect of English language. He termed assistive technology a "great leveller" because it put him on a par with his sighted classmates in terms of studying the English language. With the help of assistive technology, he said he could access the written word, store and retrieve documents, create his own E-library, consult dictionary, search and find relevant study material, store audio-tracks on his laptop in the voices of native speakers and listen to them as and when he likes; and all these things could be done without any assistance from a sighted individual.

Farooq used such assistive tools as CCTV, magnifying glass and computer equipped with screenreader, etc. Like the other BVI learners of English language, he said he used assistive technology to work on all the four skills as well as pronunciation, vocabulary and grammar. He complained, however, that he was barred from using his laptop in class on the plea that it distracted and disturbed his sighted peers.

Rafiq could not use braille as he did not study in any special school for blind. Therefore, he relied only on his laptop and smartphone equipped with a screen reader. He kept himself abreast with the latest developments in the field of assistive technology and used a variety of tools and gadgets. He seemed to prefer the screen readers available on IOS devices as compared with those which were available for Microsoft Windows, as they were, according to him, much more user-friendly and less prone to crashes. Rafiq said that assistive technology could enable the BVI learners to function in integrated classes as successfully as their sighted peers, as long as they had accessed to and could use the latest assistive tools and gadgets.

The above discussion shows that the BVI students who used assistive technology, especially computer-based assistive technology, were able to function quite independently in terms of preparing assignments, accomplishing in-class tasks and activities, working on all the

four skills, grammar, vocabulary and pronunciation. There were students, however, who could not utilise modern computer-based assistive technology, on account of which they could not function that much independently in integrated class. They could not prepare their assignments, for example, for the perusal of their sighted teachers who were braille illiterate.

Both Saima and Sadia used braille only for studying the English language. Although Saima was considered to be a brilliant student because she had all the study material available to her in braille at present, yet she was worried about pursuing her English language studies at the advanced level because she was not sure whether she would be able to obtain her study material in braille. She did try using audio-tapes and computer with screen reader, but could not continue with them because she found them beyond her. She appeared to be a visual learner as she comprehended better when her study material was available to her in a tactile format.

Sadia found using computer with screen reader very hard; she simply could not memorise so many keyboard commands. Likewise, following the native speakers on audio-tapes/CDs were beyond her; the different speaking tempos and accents of the readers made it very difficult for her to comprehend the speakers.

Findings of the Study

Various studies have confirmed that assistive technology has positively impacted the lives of BVI individuals (Beacham & Alty, 2006; Cooper & Nichols, 2007; Kapperman, Sticken, & Heinze, 2002; Strobel, Fossa, Arthanat, & Brace, 2006). Apart from creating an atmosphere for learning where the BVI learners can be on a par with their sighted peers, Assistive technology has also positive effect on their learning, especially, increasing their comprehension rates and reading speeds (Bera, 2011; Corn et al., 2002; Howell, 1996; Kennedy, 2002; Merbler, Azar, & Ulman, 1999). Moreover, assistive technology is essential

for BVI students in terms of enhancing learning, cognition, and social development (Berfield, 2003; Sze, Murphy, Smith, & Yu, 2004; Wong & Cohen, 2011). In line with previous research, this study arrived at the following findings:

Communication with Sighted Teachers in integrated class

Assistive technology made it quite easy for BVI students to communicate with their sighted teachers in written format. The sighted teachers at the university level are generally braille illiterate and could check the BVI students' assignments and other written tasks only when they are made available to them in ordinary print. The BVI students like Hassan, Rafiq, Farooq and Ahmad who were acquainted with and utilise modern computer-based assistive technology (e.g. computer and smartphones equipped with screenreaders, printers, scanners and so on), could communicate successfully with their sighted braille-illiterate teachers, as they could prepare their assignments and print them out for their sighted teachers' perusal. They did not rely on amanuensis for writing exam papers or assignments.

Farooq, for example, confronted no problems in doing his homework and his in-class assignments on his laptop equipped with a screen reader, printing them with the help of his laser printer and submitting them on time to his teacher for grading and perusal whereas Sanan relied for his writing on the services of an amanuensis because he could not use modern assistive technology. Thus Sanan was compelled to rely on the services of a sighted volunteer. There is a major problem, however, with dictating something to an amanuensis: the sighted teacher could not be sure whether the errors in the document were committed by the student or his amanuensis. Moreover, the BVI student who rely on a sighted person for his studies has to adjust his schedule in accordance with that sighted individual. Thus she/he has to sacrifice part of their liberty and independence.

Making Study Material Accessible

One of the major problems faced by BVI individuals is to access the printed word. Assistive technology facilitated them to make the study material accessible for themselves. All the study participants, who used computer-based assistive technology, converted the printed material (which was obviously not accessible to them) into soft form by scanning it on to their computers through scanners. They would listen to the study material through a screen reader installed on their computers. In other words, they read by listening. However, the scanning process can be time-consuming since this is typically done one page at a time (Lagaet al. , 2006; Davis et al., 2010), and OCR is highly sensitive to the resolution and background colour of the text being recognized (Bigham, et al , 2006; Day & Edwards, 1996).

All the study participants said that they used the screen reader called JAWS (job access with speech) for this purpose. But it was essential for the printed material to be of excellent quality, as poor quality printed material often contained typographical errors because of misrecognition of characters through the optical recognition character (OCR) technology. (All the students complained that the study material provided to them by the university was of very poor quality which resulted in poor conversion, and hence they faced considerable challenges in reading such low quality material. (Low/poor quality, not in terms of content but in terms of having too many typographical errors).

Reading by listening through a speech synthesiser means the BVI learners could read only in a linear order. They could not skim a document; rather, they have to scan it, even if they intend to read for gist. That is why BVI students take more time, almost double the time taken by a sighted student, to read a document. But this issue was confronted by those BVI students as well who used braille instead of

speech synthesisers. Saima and Sanan were compelled to read word-for-word and line-by-line. Moreover, the OCR technology does not have the capacity to recognise handwriting as yet. Thus modern assistive technology has been unable to help the BVI learners in this regard.

Assistive technology has also enabled the BVI students to find study material related to almost every aspect of English language on the internet. Vast amount of study material can be found online about English vocabulary, phonology and grammar. Moreover, BVI students can also listen to native speakers and download English novels, poetry and plays in audio. Although the existing screen readers can not read the majority of sound-symbols for different phonemes of English language, but it is hoped that this issue will be resolved soon.

Assistive technology is also of help to those BVI students who feel comfortable reading the study material in braille. They can create their own braille documents through braille-writer, braille-printers and braille-embossers. All they need to do is to first scan a printed document on to a computer, proofread it for any typographical errors, and then print it out through a braille embosser.

Another issue with OCR technology is that it can not recognise pictures and diagrams. BVI students have to rely on the services of a sighted individual to provide verbal description of pictures and diagrams. Moreover, they have problems deciphering maps and reading charts and tables as well. Although tactile images i.e. graphical information created and tactile format that is accessible for blind people, and manipulatives i.e. toys, shapes, models, and other objects which may be used as a replacement for images, can be utilised, but they are very expensive and are hard to find in a developing nation like Pakistan. So assistive technology needs to find solution to these issues.

Conclusion

Assistive technology enables BVI students to access study material and to complete assignments and tasks efficiently, thereby providing to them the highest level of independence possible. It has the potential for being a great equaliser in terms of enabling the BVI students to learn the English language as efficiently and as successfully as their sighted peers in integrated classes. However, there are still certain issues which need to be resolved, and in order to do so, assistive technology has to progress even more.

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