

Challenges Faced by the Visual Impairment Students While Inducing Assistive Technology

K Srinivas Reddy¹, Dr. Chandrakala²

¹Research Scholar, Career Point University

²Research Supervisor, Career Point University

Abstract - The study aimed at exploring barriers to the use of computer assistive technology among students with visual impairment at special schools for the visually challenged in the state of Telangana. A case study design was adopted, and the purposive sampling technique used to select 55 participants for the study. The gathered qualitative data using an in-depth interview guide to investigate challenges to the use of keyboarding skills and Job Access with Speech (JAWS). Data were transcribed and analysed thematically. That is the key themes were identified in the conversations and these were drawn and discussed. This was done using both the narrative methods and opened quotes from interviews. The findings indicated that challenges limiting effective use of assistive technology in the schools were more personal than external influences. This was because most of the challenges were due to the individual response to the training and familiarity in developing their competencies in using assistive technology.

Based on this, it was recommended that efforts should be made to stock the laboratory with additional computers. Directly in line with the first recommendation, it was further suggested that more practice time should be created or the students with visual impairment to maximize computer use. And adapted computer keyboard (with Braille signages) should be made available to children with visual impairment. Also, Licensed JAWS must be acquired by the schools to advance students' competence in using assistive technology. A number of the challenges were expressed by the students on their non- familiarity with the JAWS. As a result, it was recommended that instructors and trainers at the schools should engage the students in revised lessons on introduction to computer. This will help to refresh the minds of students with visual impairment.

Index Terms – Visual Impairment, Assistive Technology, Keyboard, Job Access with Speech, adapted computer keyboard.

I.INTRODUCTION

The use of assistive technology has captured the attention of students with visual impairment. Specifically, assistive technology has given visually impaired people ever-expanding opportunities for personal and professional growth (Sah, 2013). Obviously, the success in getting information in our society today, demands computer literacy. Besides the braille, it appears that, no invention has enabled visually impaired people to communicate as effectively assistive technologies that have made computers and the Internet accessible. Assistive technology is involving both assistive technology devices and assistive technology services (Presley &D' Andrea, 2008). In fact, an assistive technology device, whether acquired commercially off the shelf, modified, or customized, which is used to increase, maintain, or improve the potential capabilities of children with Special Needs (Kotani& Sharma, 2010). The visually impaired learns about their environment mostly through the sense of touch and hearing unlike other disability groups (Smith, 2008). Without the skills in the use of assistive technology, these students may find it difficult to access the computer and explore maximally. As computer users with visual impairment, the ability to use the computer keyboard to both get around and issue commands is critical. Particularly, if they use a screen reader, they will rely on keyboard commands instead of a mouse in order to get their computer work done. The ability to utilize information technology is important in most other aspects of life, such as, email for correspondence, online-banking, access to public libraries, access to read E-Books, like Sugamya Pusthakalaya and Daisy books. As such, information technology, computer literacy and information access are important to every-one in modern society, the visually impaired not excluded.

To make such a highly visual environment accessible to those unable to see a computer monitor, assistive technology enables users to read all on screen content, whether emails, spreadsheet columns and application tool bars. Assistive technology also provides a means to navigate one's keyboard and desktop, open and use programs, and browse the web. The technology that makes this navigation possible is the Job Access with Speech and Screen magnification software programs (Gerber & Kirchner 2007). These Screen readers give voice to computers through applications that synthesize written words and keyboard commands into human-sounding speech for the visually impaired to hear and visualize what is written on the computer screen. Thus, the use of assistive technology has become a part of the core curriculum in junior high schools in Telangana State. In Telangana State quest to equip students with the needed competencies in computer usage, many professionals have been trained to help the visually impaired students gain adequate knowledge in information technology programs. Among the reasons for this is that most students with visual impairment at one point in time find themselves in environments where the use of computer will be needed to make a living and gain independence. In spite of these benefits, students with visual impairment are likely to encounter some problems in usage of assistive technology. Some of these problems are that student with visual impairments appear to exhibit errors in keyboarding skills. This appears to be due to student's inability to remember keyboard shortcuts, as well as difficulties in having access to license speech software and inability to discrimination voice of Job Access with Speech (JAWS). Challenges to the use of assistive technology do not only pertain to developing state like Telangana. In fact, a study conducted in other states and countries suggests that individuals with visual impairment are not fully benefiting from the use of assistive technology at house, school, and community (Gamble & Hirsch, 2003). Again, it appears that there are also inadequate qualified personnel with regard to teaching assistive technology. Furthermore, it seems the difficulties faced by persons with visual impairment in the usage of assistive technology in school is due to lack of adequate computers to meet the needs of students

with visual impairment. Besides, it appears that the huge impact of technology has not impacted on teaching and learning of those with visual impairment. Many professionals appear to understand, at least anecdotally, that computer use could make a tremendous difference in the lives of students with visual impairments by improving their educational, vocational and employment opportunities, enhancing their social networks and facilitating their independence, yet little research has been conducted to document the challenges to computer usage among students with visual impairment. Such information or data is important for planning appropriate intervention for the optimum utilization of assistive technology thereby improving the quality of life in students with visual impairment.

METHOD

Participants and data collection: 55 students with visual impairment at special schools for the visually challenged in the state of Telangana, made up of 33 males and 22 females were purposively sampled for the study. The students were chosen because they have attained some degree of mastery in computer use. A self-designed in-depth interview guide was used to collect data from participants.

RESULT

Challenges on keyboarding skills:

About 75% of students indicated their unique challenges in keyboarding. In relation to the first challenge namely, the arrangement of keys on the keyboard, the students explained that they found it difficult (without braille signages) to identify some of the keys on time particularly, the alphabetic keys. Specifically, they were un-impressed with the arrangement of these keys on the keyboard which deviates from their conventional knowledge in the flow of alphabetic count. This is typified in the following expression by one student; "I have difficulty in identifying the letters on the keyboard because the alphabets do not follow the normal arrangement of A, B, C... X, Y, Z"

Directly linked with the arrangement of keys, another challenge was the spacing of keys on the keyboard. Accordingly, the students opined that the location of the keys on the keyboard is so close that this affects

their competence in the speed and accuracy of constructing sentences. Whereas it is true that consistent practice and use of the keyboard helps a user to develop familiarity with the spacing between keys, this familiarity has not been fully developed among the respondents. Again, even though the class had computer lessons thrice a week, the students perceived the amount of time spent as being limited. In expressing a viewpoint on this, one student states. “There is inadequate time for practice, and this has affected my typing skills. Therefore, I could not type fast and accurately” Consequently, most of the respondents therefore complained that it takes extended practice time for them to develop familiarity with the various keys.

Another challenge that was raised on keyboarding skills was the difficulty in remembering shortcuts. It is well known that computer usage comes with an added benefit of employing shortcuts to navigate a document or carry out other processes. However, most of the students with visual impairment indicated that they found it difficult to remember most of these shortcuts. While it is undeniable that remembrance of these shortcuts does not come handy, our study found out that the students with visual impairment’ inability to remember shortcuts is directly linked with their difficulty with arrangement and spacing of keys on keyboards. Lastly, some respondents also had difficulty of developing motor skills. This is because, they have deformity on their wrists (fine motor skills) and this may have affected their finger positioning and ability to navigate swiftly across different parts of the keyboard.

CHALLENGES ON THE USE OF JOB ACCESS WITH SPEECH

Our study also found that about 75% of the students at special schools for the visually challenged in the state of Telangana, have challenges in using the JAWS software as assistive technology. It was as found that, there is always malfunctioning and sometimes sudden failure of the JAWS application as it is being used and the students believed this regards progress in their studies. In expressing this frustration, one of the students indicated: “At times, the JAWS could stop working while being used hence reducing efficiency “Upon further interaction,

they explained that the type of JAWS that is being used in the schools is unlicensed and is thus limited in some of its applications or functions. The students are therefore limited to access other uses of JAWS because they use the “cracked version” coupled with it inefficient functioning. Some of the visual impaired students had the challenge of adjusting from the use of mouse to the use of shortcuts. This challenge was faced by a number of the students who initially had their sight and were thus, familiar with the use of the mouse. But when they later lost their sight and were brought to the school for the blind, they had difficulties adjusting from their knowledge of the use of mouse to memorizing and using shortcut as required by the JAWS application.

STRATEGIES TO ADDRESS CHALLENGES ASSOCIATED WITH ASSISTIVE TECHNOLOGY USE KEYBOARDING SKILLS

Respondents in this study outlined a number of strategies that they thought could help address the challenges hindering their competence in keyboarding skills. In the first place, it was found that mental drill as a strategy could be adopted by the Information and Communication Technology teacher to address the challenge of remembering numerous shortcuts. One respondent explained that “There is fifteen (15) minutes mental drill conducted by the Information and communication Technology teacher on keyboard shortcuts and this has helped us to memorize more shortcuts in order to improve our competence”. Secondly, to address difficulty of visual impaired students with the arrangement and spacing of keys on the keyboard the way forward has been in developing their familiarity. In this regard, one visual impaired student indicated that: “The teacher has been encouraging them to have additional computer classes during vacations. He emphasized that when they are able to do that then they can practice more to help themselves develop familiarity with location of the keys on the keyboard “Directly linked with the above, another visual impaired student pointed out that, “During computer lessons each of us is given the opportunity to show the positioning of various parts of keyboard. And this has helped us to develop familiarity (adopted braille signages computer keyboard) with the positioning of

the keys, especially the arrangement of the alphabetic keys.”

JAWS APPLICATION USE

To address the challenge of voice recognition, the visual impaired students indicated that, their teacher always encourages them to listen carefully to the speech of the JAWS in order to become familiar with the voice. A student said that “We are often given ten (10) minutes to listen to the speech and explain our understanding to the teacher and this has helped us to understand the accent”. Other respondents also expressed that; the teacher has been helping them with some of the pronunciations to have a better understanding of voice recognition in the JAWS application. There is also a mental drill on the JAWS usage and the visual impairment students stated that in order to get good marks, they have to listen keenly, and this has also contributed to enhancing their familiarity with JAWS software use. As it was noted earlier, special schools for the visually challenged in the state of Telangana has an unlicensed version of JAWS which malfunctions and fails at times. When asked what was being done to address this challenge, one respondent said: “The Parent-Teacher Association and benevolent individuals and philanthropists have been encouraged to help the schools obtain licensed JAWS for the computer laboratory”.

DISCUSSION

Challenges associated with assistive technology use among students at special schools for the visually challenged in the state of Telangana. There are numerous benefits of assistive technology among students with visual impairment. It is particularly noted that through the use of these devices and software's, students with visual impairment gain independence and autonomy concerning information management and access to communication, just like their peers with normal vision (Caparos, 1994). That notwithstanding, a number of challenges exist to the successful and effective use of assistive technology devices among people with various disabilities in schools. This is evident in the fact that 75% of the students at special schools for the visually challenged in the state of Telangana highlighted various

challenges which hamper their competencies in keyboarding and JAWS application use.

However, the results of the study show that, the challenges mentioned by the visual impaired students are related to personal response to assistive technology use rather than external influence. These challenges arise due to the individual response to the training and familiarity by the students with visual impairment in developing their competencies in using assistive technology. This however excludes the malfunctioning and failure of JAWS application. This challenge has an external influence, and its manifestation is linked with limited financial resources, high costs of equipment and eligibility issues for possessing devices (Fifield & Fifield, 2002), as well as a lack of knowledge and support from teachers (Alper & Rahrinna, 2011) the case of the students at special schools for the visually challenged in the state of Telangana is however different. This is because the various strategies that the visual impaired students highlighted as being used to address their challenges demonstrate knowledge and support from their Information and communication technology teacher.

In another study, Johnson (2011) indicated that a lack of knowledge and awareness among people with visual impairment, reluctance to use the devices, poor device performance, changes in needs or priorities, and feelings of stigmatization are major reasons for underused assistive technology devices. Our study results seem however, to suggest that there are effective strategies that are being adopted by the Information and communication Technology teacher at special schools for the visually challenged in the state of Telangana to address their challenges. The students' competence in using assistive technology has been affected by the malfunctioning and sometimes failure of JAWS.

IMPLICATIONS AND RECOMMENDATIONS

The study showed that, the challenges mentioned by the visual impaired students are related to personal response to assistive technology use rather than external influence. In other words, these challenges raised are likely, due to the individual response to the training and familiarity by the students in developing their competencies in using computer assistive

technology. Because the Information and communication Technology laboratory is stocked with desktop computers demanding direct power supply this study recommends that efforts should be made by management of the schools and other benevolent individuals and philanthropic organizations to help procure power stabilizers for power management in the case of interrupted power supply. A number of the challenges expressed by the visual impairment students on their non-familiarity with the JAWS. As a result, we recommend that instructors and trainers at the schools should engage the visual impaired students in revised lessons on introduction to computer. This will help remedy their difficulties in the use of Jaws and Keyboard. We further suggest that additional time should be allocated to ICT lessons on the timetable to maximize student's potential in the use of assistive technology and also obtaining license Job Access with Speech (JAWS).

REFERENCE

- [1] Ayers, E. (2000). Cyberspace, U.S.A. [Electronic version]. In W. E. Leuchtenberg (Ed.), *American places: Encounters with history* (pp. 1-39). New York: Oxford University Press.
- [2] Barnes, C., & Mercer, G. (1997). *Doing disability research*. Leeds, England: Disability Press.
- [3] Barnicle, K. (2000). Usability testing with screen reading technology in a Windows environment.
- [4] Proceedings of the Conference of the California State University at Northridge Centre on Disabilities. Available: <http://www.csun.edu/co d/conf/2000/proceedings/0073Barnicle.htm>
- [5] Brunken, P. (1984, April 23-27). Independence for the visually handicapped through technology. Paper presented at the 62nd annual convention of the Council for Exceptional Children,
- [6] Craver, J. M., & Burton-Radzely, L. (1998). *Technology links to literacy: A Case book of special educators' use of technology to promote literacy*. Calverton, MD: Macro International.
- [7] Crudden, A., & Fireison, C. (1997). *Employment retention after vision loss: Intensive case studies*. Washington, DC: National Institute on Disability and Rehabilitation Research.
- [8] Denzin, K., & Lincoln, Y. S. (1998). *Collecting and interpreting qualitative materials*. Thousand Oaks, CA: Sage.
- [9] Foulke, E. (1981). Impact of science and technology on the early years. *Journal of Visual Impairment & Blindness*, 75, 101-08.
- [10] Gerber, E. (2002). Surfing by ear: Usability concerns of computer users who are blind or visually impaired. *Access World*, 3, 38-43.
- [11] Gerber, E., & Kirchner, C. (2001a). Social Research on use of and preferences for <www.medicare.gov> by people who are blind or visually impaired. Unpublished report, Department of Policy Research and Program Evaluation, American Foundation for the Blind, New York.
- [12] Gerber, E., & Kirchner, C. (2001b). Who is surfing? Internet access and computer use by visually impaired youth and adults. *Journal of Visual Impairment & Blindness*, 95, 176-181.
- [13] Kirchner, C., Schmeidler, E., & Todorov, A. (1999). *Looking at employment through a lifespan telescope: Age, health, and employment status of people with serious visual impairment*. New York: American Foundation for the Blind.
- [14] Longmore, P., & Goldberger, D. (2000). The league of the physically handicapped and the great depression: A case study in the new disability history. *Journal of American History*, 87(3).
- [15] Mather, J. (1994). Computers, automation, and the employment of persons who are blind or visually impaired. *Journal of Visual Impairment & Blindness*, 88, 544-549.
- [16] National Telecommunications and Information Administration. (2000). *Falling through the net: Towards digital inclusion. A report on Americans' access to technology tools* [Online].
- [17] National Telecommunications and Information Administration. (2002). Chapter 7: Computer and Internet use among people with disabilities. In *A nation online: How Americans are expanding their use of the Internet* [Online].
- [18] Obringer, S., & Kemp, S. (1992). The effect of computer technology by braille students on instruction time. Paper presented at the annual meeting of the Mid-South Educational Research Association, Knoxville, TN.

- [19] Patton, M. Q. (1990). *Qualitative evaluation and research methods*. Newbury Park, CA: Sage.
- [20] Rossi, P., & Freeman, H. (1989). *Evaluation: A systemic approach*. Newbury Park, CA: Sage.
- [21] Scrimshaw, S. (1990). Combining quantitative and qualitative methods in the study of intrahousehold resource allocation. In B. L. Rogers & N. P. Schloss man (Eds.), *Intrahousehold resource allocation: Issues and methods for development policy and planning* (pp. 86-98).
- [22] Slatin, J. M., & Rush, S. (2003). *Maximum accessibility: Making your website more usable for everyone*. Boston: Addison-Wesley.
- [23] Spradley, J. P. (1980). *Participant observation*. New York: New York: Holt, Rinehart & Winston.
- [23] Strauss, A. L., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (2nd ed.). Newbury Park, CA: Sage.
- [24] Taylor, H. (2000a). How the Internet is improving the lives of Americans with disabilities. *The Harris Poll*, 30. Los Angeles: Creators Syndicate.
- [24] Taylor, H. (2000b). Many people with disabilities feel isolated, left out of their communities and would like to participate more. *The Harris Poll*, 34. Los Angeles: Creators Syndicate.
- [25] Alper, S., & Rahrinna, S. (2011). Assistive Technology for Individuals with Disabilities: A Review and Synthesis of the Literature. *Journal of Special Education Technology*, 21 (2), 47-64.
- [26] Caparros, J. (1994). Tiflotechnologia. In M. B. Martir, *Deficiencia visual: aspectopsico evolutirosyeducatiros* (pp. 200-220). Malaga EdicionesAljibe: SL.
- [27] Fifield, M. G., & Fifield, M. B. (2002). Education and training of individuals involved in delivery of assistive technology devices. *Technology and Disability*, 77-88.
- [28] Gamble, M., & Hirsch, (2003). Informed decision making on assistive technology workplace accommodations for people with visual impairments. *Blindness*, 123-130.
- [29] Johnson. (2011). Internet access, computer use, and disability status: Survey of Income and Program Participation (SIPP). pp. 225-230.
- [30] Kotain & Sharma (2010). Ensuring equal access to technology: providing assistive technology for students with disabilities. *Theory into practice, Journal of Visual Impairment and Blindness*, 212-219.
- [31] Kapperman, G. & Sticken, J. (2002). Survey on the use of assistive technology by Illinois students who are visually impaired. *Journal of Visually Impaired & Blindness*, 106-108.
- [32] Presley, I., D. & Andrea, F. M. (2008). *Assistive technology for students who are blind or visually impaired: A guide to assessment*. New York: AFB Press.
- [33] Smith, D. (2008). *Assistive Technology Competencies for Teachers of Students with Visual Impairment*. Texas: Tech University.
- [34] Sah, P. K. (2013). *Assistive Technology Competencies: Need, Outlook, and Prospects (With Reference to Special Educators for Children with Visual Impairment)*. *American Journal of Disability*, 200(15), 22-35.