

Factors affecting the Use of Information by Visually Impaired Students: With Special reference to the Library, University of Colombo

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Abstract

Visually-impaired (VI) students still face unusual difficulties in accessing library resources although there are several assistive technologies and devices being available to help them to get access to information resources. Equality in services mandates libraries to strive for their best to assist these special-need users by examining and mitigating the challenges faced by them. In this regard, a case study was carried out at the Main Library of the University of Colombo, where 42 visually-impaired students were interviewed using a set of semi-structured interview questions. The study population constituted totally blind and partially impaired students. Issues facing by the respondents were

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Received: 03 March 2022, Accepted revised version: 05 June 2022
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identified over institutional, personal and technological factors. Out of different challenges they mentioned, lack of appropriate resources was drawing primary concern. Problems relevant to use of the Internet were identified based on 5 aspects: social, institutional, financial, personal, and technical issues. Those challenges significantly affected VI users having access to their learning resources. It was found that VI users were largely left out in the mainstream student community since they make up a very miniscule faction of the entire student population. Hence, it is recommended to establish a special assistance mechanism for VI users of the library, meanwhile training both VI students and library staff on finding information resources specifically intended for VI users, and using the assistive technologies and equipment.

Keywords: Braille books, Audio books, Visually-impaired users, Screen readers, Text magnifiers

Introduction

Education does not exclude anyone in society thus all students regardless of their disabilities should deserve a decent access to adequate information resources and services. In this regard, the authors embarked on a survey to find out the perception of VI students as opposed to their challenges so that the library services designed for such users can be improved.

Library users need to have equal access to resources whether or not they are visually healthy or impaired, however, visually challenged students indeed face numerous challenges if they want to enjoy an ordinary information resource ([Javier & Calvo, 2014](#)). These issues are further intensified when VI users have access only to less than 5% of the published materials and 3 – 5% of trade books, yet they strive to perform equally well in all aspects of education as opposed to visually abled students ([Pal et al, 2011](#)). Considering the cognitive and learning capabilities, VI students can be sound in their studies. However, only the lack of resources makes them unequal to visually able students.

Recent technological development brought about new hopes to VI users who usually depend on conventional resources like Braille and books with large prints ([Cahil & Cornish, 2003](#)). These assistive technologies give VI students more opportunities to have access to equal information resources and services through their libraries.

Assistive technologies available for visually impaired users encompass both hardware and software that help them to read texts in books ([Schiff, 2009](#)). In this regard, a combination of services would be appropriate to cater to students with special needs, which would make sure the library services reach all tiers of society.

The Resource Center for the Visually Impaired at the Main Library and the Support Center for the Disability Students (CDS) in the Faculty of Arts are two places where the VI undergraduates could get help in finding information or borrow assistive devices to be used within the University of Colombo.

Literature Background of the Study

Status of VI Students in Academic Arena

Access to information is a must to achieve success in all endeavors of life in modern society ([Ayiah, 2007](#)). [Williamson, Schauder, and Bow \(2000\)](#) revealed that the needs of visually impaired users did not significantly deviate from visually abled students. Meanwhile, [Sehic and Tanackovic \(2014\)](#) found that VI students believed that they were not equal in academic work compared to visually able students. They ought to invest more time and effort even to finish a simple assignment and to sit for exams although those tasks had to be performed simultaneously with their visually-able counterparts.

Information Resources

The invention of assistive technologies in the past two decades allow them to communicate, access information sources, and even travel with more independence ([D'Andrea, 2012](#)). These would compensate the lack of equal access to resources encountered by VI library users.

Audio Books, CD-ROMS, Braille, and large-print books are classified as traditional methods used by the VI students ([Bernardi, 2004](#)). According to the report of International Federation of Library

Association and Institutions (IFLA) Braille books are identified as a material that should be available in the libraries for VI users ([Irvall & Nielsen, 2005](#)). However, [Ayiah \(2007\)](#) states that the existing Braille materials on the library shelves are outdated and mostly not relevant to their educational needs. When Braille materials are not available, VI students have to depend on their visually able companions to refer the usual books ([Sehic & Tanachovic, 2014](#)). Therefore, learning is quite challenging for VI users of libraries.

Assistive Tools and Technologies

Audio books, screen readers, Braille display, digital video magnifier and Braille note takers are some of the assistive devices mostly used by the VI people as stated in the literature. Audio recordings (or “talking books”) are the most preferred resources amongst VI students ([Rayini, 2017](#)). According to [Bernardi \(2004\)](#) “talking books” or DAISY (Digital Audio Based Information System) books are proved to be beneficial tools for the visually impaired library users. Therefore, these resources need to be an essential part of the library collection. Similarly, screen readers allow VI users to interact with information on a computer screen using a speech synthesizer or Braille translator ([Pal et al. 2011](#)).

[Schiff \(2009\)](#) advocates tools like JAWS and ZoomText that enable a visually challenged individual to interact with computers just like visually able individuals. These facilitate the VI users to retrieve bibliographic data from any library catalogue and various other databases. Therefore, the library system is made accessible to VI users when they need to browse the library catalogues.

[Kiambati \(2015\)](#) emphasizes on the importance of awareness about software and assistive technologies among VI students. However, some studies in developing countries show that VI students mostly prefer Braille resources to screen-readers to comprehend better ([Jaleel & Anis, 2018](#)), hence the libraries had better keep a balanced collection for VI users.

Factors Affecting VI Library Users when Using Information Resources

Scarcity of necessary textbooks in electronic format is a major issue for VI students. In such cases, special software that converts the scan copy of the books to screen-read is helpful to VI users, thus availability of textbooks in the library is a prerequisite for a successful scanning process ([Sehic & Tanachovic, 2014](#)). Besides, VI users do not have full independence to use electronic resources as they face issues in retrieving desired information ([Kiambati, 2015](#)). VI users face different challenges when accessing websites and retrieving information as many sources rarely support such users ([Sehic & Tanachovic, 2014](#)). This means that mere access and resources would not meet VI user needs and aspirations.

On the other hand, [Lazar et al. \(2007\)](#) show that VI users displayed different frustrations when they use the Internet, such as non-labelled forms, inaccessible pdf files, and missing or confusing alt text to describe the images. [Dermody and Majekodunmi \(2010\)](#) endorse the fact that access to the Internet and using screen readers did not expand the accessibility to many journal databases with complex interfaces, yet they prefer Google scholar due to its simple interface.

Most importantly, assistive technology and related gadgets are not affordable to many of the VI students ([Sehic & Tanachovic, 2014](#)) and screen rendering applications in these countries are not user friendly either ([Pal et al, 2011](#)). In this regard, the libraries are in need of developing strategies to connect their user needs, resources and budgetary allocation.

All literature findings reveal the gap between available resources and services and meeting VI user needs. It was also substantiated by these studies that tools and resources alone would not help meet the needs of VI students. Hence, a set of appropriate strategies is needed to enhance the effectiveness of those equipment and information materials. Therefore, a thorough survey was needed to address the real-time challenges and relevant strategies.

Research Problem

The Library of University of Colombo provides special resources, devices and services to the visually-impaired students; however, the inequality gap between visually abled users and visually impaired students is wider. With all the available reading materials, computer software and devices, visually impaired students are unable to meet their genuine information needs. This questions the effectiveness of library resources and services, which affects the level of satisfaction of visually impaired users. Besides, the research in relevant area dealing with VI students in Sri Lanka is relatively less or poor. Therefore, this survey was aimed at finding out the issues and challenges faced by VI students, gaps

in library resources and services designated for VI students, and strategies to be drawn by the library.

Research Objectives

1. To discover the different types of information resources and assistive devices preferred by the VI users and their experience of using assistive devices;
2. To identify the challenges that students with visual impediment face in accessing the information sources; and
3. To examine the perceptions of the VI students to improve the library services provided for them.

Research Design Methods

The study was carried out at the University of Colombo in 2018 as a qualitative study. Total population of 43 students was approached with a semi-structured interview schedule. Among them, 40 students were from the Faculty of Arts, whereas other three students were from Faculty of Law, Faculty of Education, and Faculty of Science, each.

A pilot interview was conducted with five (05) VI students and the questions were also discussed with two instructors at the Center for the Disability Students (CDS) at the Faculty of Arts for validating the interview questions. Before collecting data from the respondents, ethical clearance was obtained from the Ethics Review Committee (ERC), University of Colombo. Collected data were descriptively presented and conclusions were drawn based on thematic content analytical techniques. Basic demographic information was collected from 1st to 4th questions in the interview schedule. From 5th to 10th, questions were designed to

gather information on usage of information sources and assistive technologies. Challenges and issues faced by respondents were collected through questions 18 to 25, and finally the user's perceptions on improving the services were collected from 25th question.

Interview responses were analyzed using thematic approach and content analysis ([Clarke et al, 2019](#)). Analysis of responses on the issues mentioned were done by categorizing the issues under different themes identified through the literature. Qualitative analysis was executed based on the discussions about challenges faced by the respondents when tapping the information. The confidentiality of the participants was maintained by not disclosing their names and personal details hence a reference number was used to identify participants for connecting their responses (for example, BA-34 where BA denotes Faculty of Arts, and the number indicates the respondent and L-16 where L denotes the Faculty of Law).

Findings of the Study and Discussions

Sample Interviewed

Out of 43 students, 42 were interviewed where 22 were male VI undergraduates and 20 were females. Study found two broader types of visual impairment that made students who could only read Braille materials (55%) and students who could read print resources using magnifiers (45%).

Different Types of Information Sources and Assistive Devices

It was positively identified that majority of the respondents (40) conferred onto recommended readings. This finding displays the commitment of these users with special-needs towards their studies regardless of the obstacles, and therefore it is mandatory for the library to maintain its collection as per their curricula.

A majority of respondents use resources at the Main Library and through the Internet for tapping the information. Apart from those two sources, VI students reach the Center for Disabled Students, or buy the required books, and use other libraries such as public libraries. It has been proven that using multiple sources of information guarantees the accessibility to the required resources ([Ayiah, 2007](#)).

Meanwhile, the interview findings revealed that majority of the respondents (81%) sought to visit the library in person to borrow books. Almost equal numbers of students from both groups (VI students who are able to read printed text and VI students who are unable to read printed text) stated that they purchase printed books. In addition, those students borrow audiobooks from other sources mentioned in the findings. Responses have been themed corresponding to the objectives of the study. Following sections elaborate the thematic analyses.

Audio recordings of printed books were preferred by 55% of the respondents, which comprise students who can only read the Braille text as well as the ones who can read printed text with assistive tools. It is highlighted that a considerable number of respondents prefer Braille texts (19%). Those who prefer to read printed resources (19%) struggle to enjoy their preference due to insufficient illumination in the library or health reasons that hinder them to read for long hours or inability to read

on the computer screen. These issues drive them to select audiobooks as their primary sources. A small fraction of the respondents (7%) who can read with difficulty preferred large fonts.

Use of Assistive Technologies

Respondents were asked questions on the selected mostly used assistive technologies and few latest developments to obtain information on the level of awareness on such technologies, the expertise of using these, and the challenges encountered.

Most of the users mentioned that they use DAISY Digital Talking Book device. One of the respondents stated that *I used to study with audio recordings as it helps me to memorize facts easily. Therefore, I always use DAISY player (BA-10)*. Another one said, *Usually what I'm doing is scan the printed text and convert that into audio recording using special software. Then, I can listen to it using DAISY player (L-16)*. One more respondent appreciates *I prefer DAISY player as it is small and even, we can listen to audio recordings while we are traveling (BA-36)*. These statements endorse the importance of assistive technologies in libraries to cater to the VI users.

Experience in Using Assistive Devices

The highest number of respondents stated that they were well experienced with using DAISY players since it is user-friendly, less costly and audio recordings are the most preferred format of reading books. On the other hand, only one respondent stated that she knows about Braille Reader which is the least popular equipment even though it is available at the university, which was expressed in the following

statement: *I have heard about it and once used the Braille reader (BA-22).*

However, lack of proper training on using Braille readers and high cost of the equipment make them hard to own it personally. Importance of awareness was sensed in the following theme: *We aren't aware how to use it and as its cost is high it is difficult to afford (BA-18).* Besides, students are not much interested in Braille materials and they prefer other alternatives which makes this instrument less popular according to one response: *As listening to an audio recording is more convenient and I cannot read braille fast. Therefore, I do not prefer Braille reading (BA-27).*

A digital video magnifier is a device that is useful only to those who can read enlarged text. 19 students of the population could read printed text with the assistance of the digital magnifier. Only 9 respondents claimed that they can use digital video magnifiers too, although this device is less user-friendly they stated that *With the help of digital magnifier, I can read printed text but it is not user friendly as always we have to see though a small grid to read (BA-9).*

None of the respondents stated that they do not know how to use a computer with screen reading software as they stated that *With the help of my family members and friends I scan the printed text and get it read by screen readers in my laptop (BA-41).* This convinces that they need some level of training on IT and computer usage. However, none of them were aware of the latest technological developments such as Braille note takers or Braille tabs. This was a crucial finding for the library to invest in technologies and resources that are suitable and preferred by the VI users.

The Challenges that Students with Visual Impediment Face in Accessing the Information Sources

Barriers Faced in Searching for Information

[Kiambati \(2015\)](#) categorized the issues faced by visually impaired faced when searching for information in to 3 themes as Institutional, Personal and Technical. Accordingly, the issues mentioned by the respondents in this study also categorized under main 3 themes as Institutional, Personal and Technical.

Institutional Issues

Majority of respondents (71%) stated that lack of audio books is a main issue they face in searching for information. Following responses further elaborate the institutional issues faced by the VI students: *There are only a few audio books available. [And]...[a] very few or no audio recordings of academic books (BA-2) and Little or no Braille books in the library (BA-10)* reveal that there was a dramatic scarcity of required materials in the library. Incidentally, *Absence of a hotline number which VI users could contact the library when need help in search of information without physically visiting the library all the time (BA-38)* suggest that the libraries need to customize an empathetic service to VI users.

In addition, Borrowing period of books is not enough for VI students (BA-19), Less support for students who can only speak Tamil (BA-36), Special lighting facility such as table lamps for partially VI undergraduates to read printed text is not available at the library (BA-

11) and *Lack of separate collection with easy access especially on the ground floor and/or 1st floor of the library* (BA-42) were other institutional factors that impede the usability.

VI students mainly resort to Main Library and the Internet for getting their information in addition to a few other places where they could obtain special services. Hence, the library is required to alleviate these institutional shortcomings.

Personal Issues

Under this content, some respondents mentioned their personal issues that hindered the use of information sources. Since VI students depend mostly on others (*We have to depend on others to get help in searching and selecting books in the library* (BA-7)), their library use is hugely restricted when those ‘helpers’ are also busy (*Less help to get a printed book and read or record book chapters, when our friends are busy during exam times it is hard to find someone to record book chapters* (BA-16)). Personal challenges include lack of skills, too (*We do not have much IT skills and training to find/search information on the Internet and databases* (BA-30) and *I have less skill to search in OPAC with a screen reading facility* (BA-2)).

Technological Issues

On a fringe line, technological obstacles present considerable challenges to the VI users (*Some LMS materials (PDF format) cannot be read by software/cannot use LMS without the help of others* (BA-25) and *Face difficulties when software updates take place* (BA-35)).

However, majority of the respondents state they face institutional issues than other two. Lack of audiobooks available at the library is the major issue stated by the respondents and they prefer audio recordings of important reference materials although half of them could read the print text with assistive technology. [Sehic and Tanackovic \(2014\)](#) point out that it is highly disadvantageous when alternative resources like audio books are not readily available to visually impaired students.

Second biggest challenge for VI users is their inevitable dependency on others to use the library and information resources. As [Kiambati \(2013\)](#) records, the need to depend on others to use the library is one of the major impediments facing VI users. Apart from those two challenges, the respondents revealed their grief about lack of Braille materials, absence of resources in their mother tongue, and incompatibility of LMS with certain resources.

Barriers to Using the Internet

Surprisingly, majority of the respondents (88%) received proper ICT trainings which may have an influence on the Internet usage. Nevertheless, VI students still face significant challenges due to the factors which are out of their control such as physical dependency or non-availability of format that is compatible with screen readers.

Issues faced by visually impaired when using the Internet classified under 5 themes as: Social factors, Technical factors, Financial factors and Legal and policy factors as mentioned in the World Wide Web Consortium (W3C) (Brophy and Craven, 2007). Similarly, [Kiambati \(2015\)](#) categorized the issues faced by visually impaired when searching for information in to 3 themes as Institutional, Personal and

Technical. Based on these two literatures, in this study issues mentioned by the respondents were discussed under 5 sub-themes; social factors, technical factors, financial factors, institutional factors and personal factors.

Social Factors

Under the social factor majority of respondents (55%) stated that lack of proper knowledge to use the Internet was the main problem. Respondents displayed these issues by their inability to extract the information off the Internet (*I'm unable to filter exact information (BA-2)* and *Do not know internet searching techniques other than Google search (BA-42)*)

Financial Factors

Majority of the respondents (52%) stated that the cost of smartphone, laptop or needed equipment is unaffordable and, cost of the Internet services such as mobile data is high (*Do not have even a smartphone to access internet, cost of smartphone which support needed software is high (BA-35)*, *Wi-Fi connectivity in the University and inside the library is very low, therefore, have to use personal data packages (BA-17)* and *Do not have any personal Internet package and we use mobile data to download needed information, but cost of mobile internet data is also high (BA-13)*).

More than a half of the respondents (55%) stated that they do not have proper knowledge. Majority of the respondents who stated that they do not have a proper knowledge in using internet are totally blind

students (57%). It was observed that the financial barrier is faced by both groups irrespective of their level of visual impairment.

Personal Factors

For many respondents (43%) lack of suitable personal devices to access internet was the major barrier. Responses like *Mobile phone is the only device I have with me to access [the] Internet* (BA-9) reveal that they rely on one device for everything, especially when other family members, too, use the same device.

Institutional Factor

Majority of the respondents (57%) commented that they do not have a spacious room for e-resources specifically allocated for VI students. *Space available to use internet at the Center for the disability students is not enough as well as it has less computers* (BA-9) and *Access to other e-resources rooms is difficult for visually impaired [VI] and we need a[n] e-resource room where screen reader facility is there as well as with less disturbance for listening to screen reader* (BA-24) state there is a serious space challenges for VI users.

Technical Factors

Majority of respondents (71%) stated that VI students face challenges as certain amount of information is not read by screen readers most of the time. Higher number of respondents (67%) stated that they find website designs which are not user friendly to them. Apart from this following issues also were mentioned by the respondents:

Responses like *Have to go through several links to find information on some websites and sometimes it is difficult to find an exact place to click* (BA-23), and *sometimes only the headlines get read by the screen reader software. Therefore, we do not get a certain amount of information* (BA-11) explains that websites cause hindrances.

Moreover, statements such as *Text of information presented in images could not be read by the screen readers* (BA-16), *We are unable to obtain information presented in a graph* (BA-18), *Some PDF documents cannot be read by screen readers* (BA-25), *When there are more links sometimes screen readers do not support* (BA-30), *Mobile phone screen readers have problems in Tamil and Sinhala Languages* (BA-40) and *Some non-Unicode fonts are not read by screen reading software* (BA-41) convey their challenges pertaining to technology.

Among technical issues, some information not being read by screen readers was the main obstacle faced by the respondents (71%) followed by less user-friendly application or equipment (67%). The respondents who can read only Braille were more disadvantaged than the others in terms of depending on screen readers when using the Internet. Respondents who cannot read printed text faced technical issues more often than the respondents who could read printed text.

Lack of a suitable resource center with access to the Internet was the next highest among institutional issues (57%). Respondents who depended only on Braille faced this issue more frequently than the other groups. Availability of more audio books and a wider Wi-Fi coverage from the library may help tackle these challenges.

Prominent comments included poor Wi-Fi connectivity on the university premises, congested e-resources room of the library, inability to afford personal Internet connections, high dependence on visually-abled and less user-friendly environment for learning. These issues need to be curbed and an equitable learning environment is a must for VI students at the University.

Limitations to Using Assistive Devices

No matter how many assistive devices/technologies are available for the VI users to exploit, there always were barriers to make those technologies familiar and effective.

Nearly half of the respondents personally owned DAISY Digital Talking Book Players (52%). Affordable price, certain donation programs, and user-friendliness were the reasons that enabled those students to personally-own the device. 38% of the respondents owned a computer or a laptop with screen reading software. Whereas 48% of the respondents requested for access to a computer with a screen reading facility. Findings showed that VI students managed with the devices in spite of other challenges associated with using the library resources.

Only one respondent personally owned a digital video magnifier, and 7 respondents stated that they were unable to afford the device. Only 3 respondents were aware about the availability of the digital video magnifier to borrow when they need to use it within the University and still another 7 respondents stated that they were not aware of such a service. Compared with other devices, least responses were gathered for the Braille note takers/ Braille tabs. Most of the respondents were not aware of such devices.

Perceptions of VI Students on Improving the Library Services

Respondents were requested to state their suggestions and views which they thought that could be implemented by the library and the university to provide better services for them. A statement, *It is better if library could have more audio books, not only the academic books but also leisure reading books such as award-winning novels, etc.* (BA-41), suggested for further improving the collection.

Training Needs

VI students felt that they needed more training as revealed by the following statement: *I would like to suggest an IT training course for VI students where individual attention is given to each student* (BA-3), especially in their mother tongue, since they stated *It would be an advantage for Tamil students if that IT training is given in Tamil medium also* (BA-36).

More Space and Search Facilities

Respondents proposed to increase the service space through this statement: *It is better if there [is] a separate e-resources room for VI students with easy access for example closer to the entrance of a building and it should have computers with screen reading facility. As VI students are listening to the screen readers it is better if the room is free from other disturbances* (BA-24). Additionally, statement *It would be much helpful if there is a computer with a screen reading facility to search OPAC in the library* (BA-27) revealed that they required more search terminals in the library.

According to the suggestions of the respondents library could improve its audio book collection and also could conduct special training for them on information searching and how to use OPAC with screen readers. Apart from these, other institutional issues should be considered such as providing e-resources room facility with easy access and peaceful working environment. It is better to have training on IT in Sinhala as well as in Tamil.

Conclusions and Recommendations

In this study, majority of the respondents (81%) heavily depended on resources made available at the Main Library of the University, regardless of their nature of visual impairment. Amidst all these services and technologies, VI students still faced with lot of issues, such as inadequate number of audio books. One of the major challenges for VI students was their inability to move independently around the library. Despite majority of VI users (90%) depend on the Internet for information their exploitation is limited as many sites do not provide screen-reading facilities. This study, therefore, identified special training needs to increase the efficacy of using the electronic resources and the Internet. DIASY Digital Talking Book Player is the device used by most of the respondents. On the other hand, Braille reader is the least popular device among students due to its high price and complexity. Finally, the VI students have expressed their opinions to enhance the library services designated for users with special-needs.

Recommendations

Identifying these barriers would help the Library of University of Colombo to develop relevant strategies to improvise its services rendered to the VI students. Based on the inferences drawn from the survey, the library has to improve its collection. For example, an investment on audiobook collection both academic as well as leisure reading has to be materialized. Since some students still preferred Braille books there could be a collection of such resources, too. Collection ought to comprise materials in all three languages, namely Sinhala, Tamil, and English.

It is strongly recommended that special services be established for the VI students and the library would coordinate the volunteers/ staff members to make them available during working hours to help VI students with their searching for information, reading textbooks, and note taking. In addition to that, lending period for VI users could be extended as they require more time to read.

A hotline phone number can be recommended through which VI students can contact the library and obtain relevant information. Information such as new arrivals, information regarding training/ workshops could be passed on to visually impaired students through SMS, social media such as WhatsApp, Viber, and Facebook as most of the responders stated that they use the Internet and smartphones as well as social media.

Training programmes on information searching techniques, use of e-resources and less popular assistive devices, and training on searching for books through an online catalog with the help of a screen reader are other important suggestions. It is equally important to provide training sessions for library staff on assistive devices, technologies, and other

special services for needy students. The study also recommended a spacious, separate e-resources room in the library with computers where the users with visual impairments can work with screen reader facilities.

Finally, authors recommend embarking on further research to measure the level of satisfaction through improved services for VI users. Continuous investigations should be carried out to find out the issues and their requirements which usually tend to change with time.

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