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INCREASING STUDENTS' ABILITY TO DISCOVER AND ACCESS ACADEMIC INFORMATION: INFORMATION LITERACY FOR BLIND AND VISUALLY IMPAIRED STUDENTS AT THE FEDERAL UNIVERSITY OF SANTA CATARINA LIBRARY

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Abstract

The Federal University of Santa Catarina Library has an effective information literacy program. However, until recently, there were no classes specifically designed for students with disabilities. In December 2014, a pilot instruction session on electronic scholarly sources was taught to a group of blind and visually impaired students. Despite considerable preparation and support in the form of assistive technology, during the class several difficulties arose. In this paper those difficulties are described along with the goals that must be reached in order to develop an appropriate information literacy module for blind and visually impaired students at UFSC Library.

Keywords: Information literacy. Blind and visually impaired students. Assistive technology.

1 Introduction

The inclusion of disabled individuals is a challenge in many areas of Brazilian society. At the university it is no different. Besides overcoming physical and attitude barriers, equal conditions of access and attendance should be offered for all academic activities. The academic library is a fundamental component in the academic achievement of the undergraduate student, including, of course, disabled students (Paula & Carvalho, 2009).

It is the library's duty to provide information access to all users no matter what their condition is. Libraries should be available to the community as a whole, regardless of ethnic origin, gender, religion, language, physical disabilities, economic condition and scholarship level (Koontz & Gubbin, 2013).

In order to provide equal opportunities to users, libraries should adapt their products and services to the specific needs of patrons. Presently, Santa Catarina Federal University (UFSC) Library is considered a model for other Brazilian university libraries due to the high-quality services it provides for students with disabilities. Loan of assistive technologies, providing special library collections and adapting printed materials for various accessible formats are some of these services.

Nevertheless, several changes are needed to adapt other services to students with disabilities. One of them is the Information Literacy Program. To date the materials integrated in this program are not entirely adapted to the needs of students with disabilities and there are no regular classes for them.

To address this situation, a pilot session for blind and visually impaired students was initiated in December 2014. This aimed to present the online information resources provided by the library and guide participants on how to conduct research using these resources. The choice of this particular group was based on the fact that the largest number of students with disabilities who use the university library are blind or visually impaired. In addition, these students rely on assistive technology or specially adapted printed material which enable them to access information and conduct their studies.

Providing a course like this for such students is a way to make them more independent when finding and selecting the information they need. Unlike sighted students,

blind or visually impaired students rely on document adaptation services or on the help of classmates, teachers, librarians or other intermediaries to ensure access to printed information.

This article reports what that first experience was like, detailing the preparations, the problems faced during class, and the volunteer students' perceptions. Furthermore, the measures needed to create an information literacy course designed for blind or impaired individuals will be discussed.

2 Accessibility and Brazilian Academic Education

Over the past 20 years Brazilian educational policies have allowed disabled people greater access to education. The Guidelines and Bases of National Education (Brasil, 1996), the law that regulates education in Brazil, consolidated special education and instituted measures to ensure the permanent access of citizens with disabilities to school. In addition, in 2008, Brazil incorporated the United Nations Convention on the Rights of Persons with Disabilities, ratifying it as a constitutional amendment (Brasil. Secretaria de Direitos Humanos, 2012).

As a result, the Brazilian higher education system has been enrolling an increasing number of students with disabilities. According to the Ministry of Education (MEC), in the early 2000s, there were 2,173 disabled students enrolled. By 2010, the total number was 20,287 (Brasil. Ministério da Educação, 2012).

Concurrently, in 2005 the Brazilian government launched the "Inclusion Program" which, by means of public announcements, supports efforts to ensure full access of disabled people to federal institutions of higher education. This program aims to create and consolidate accessibility centers at the institutions, which must integrate and articulate activities for the educational and social inclusion of people with disabilities (Brasil. Ministério da Educação, 2005).

The actions carried out by the accessibility center include a selection process with equality of conditions; providing specialized services; hiring qualified personnel; and equipment purchase. All these initiatives aim to guarantee that the students stay at the university and gain their degree.

2.1 Accessibility at UFSC

UFSC is a federal university in southern Brazil, located in Santa Catarina state. Currently there are over 34,500 students enrolled at its five campuses. The working staff is composed of 1,610 professors and 2,874 other faculty members. According to the latest mapping carried out by UFSC Educational Accessibility Coordination (CAE) there are 111 students with disabilities enrolled, of whom 17 are visually impaired.

With national policies support, UFSC was able to enhance its efforts to promote accessibility. The creation of CAE in 2013 was a milestone. Before the establishment of CAE, assistance to students with disabilities was carried out by a committee composed of professors and faculty members. Besides their regular activities, these professionals had to work on improving accessibility. By requirement of the federal government, in 2012, UFSC created an accessibility center which, in 2013, was institutionalized, giving birth to CAE.

CAE is an office linked to the Undergraduate Studies Office (PROGRAD) which is located at the Administration building. Its operations cover all areas from basic education to graduate studies. Its final goal is to promote personal independence and access to knowledge for the students with disabilities enrolled at UFSC. CAE's functions include:

- a) Offering educational accessibility actions to the university community, proposing courses and events for the ongoing education of staff members and faculty;
- b) Connecting different sectors of the university with the aim of developing inclusive public policies at UFSC;
- c) Offering support with basic education, undergraduate and graduate studies and other academic activities in order to guarantee a welcoming environment for discussion about everyday teaching practices related to the inclusion of students with disabilities.

CAE also notifies students with disabilities and the academic community about the actions related to accessibility at the university. As soon as students enroll at the university,

CAE identifies those with disabilities and works together with the undergraduate and graduate programs – faculty members and professors – to offer equal access to academic life. Those students whose disability compromises information access are guided to the University Library, more precisely to the Information Accessibility Environment (AAI). There, they get appropriate support to overcome the barriers that hinder access to knowledge.

2.2 Accessibility at UFSC University Library

Given the important role a library plays in promoting access to knowledge, the Information Accessibility Environment (AAI) was created in 2007 as a result of an institutional project named “Accessibility and Inclusion at UFSC”. It was also approved by the Ministry of Education, in accordance with the Inclusion Program.

Today AAI refers both to the physical space and the information services that address the needs of students with disabilities at UFSC. In the hierarchical structure of UFSC Library, AAI is connected to the Reference Section and it is located on the ground floor of the main library.

The students with disabilities are directed to AAI by CAE, which analyses each student’s individual case. Those whose disabilities compromise information access are led to AAI with a dossier card that presents their academic information needs and the services and equipment that should be provided. The demands may include anything from printed document adaptation to equipment lending. The following services are offered by AAI:

- a) Instruction about information sources and technological resources
- b) Digital, audio and Braille collection
- c) Reading service
- d) Adaptation of printed documents
- e) Lending of equipment such as magnifying glasses, electronic magnifying glasses, notebooks, adapted keyboards, Braille displays, Braille typewriters and adapted cartographic material
- f) Computers with specific software for users with disabilities
- g) Text printing and enlarged copy
- h) Study room

Document scanning and adaptation are the most frequently requested services by students at AAI. Demands come mainly from visually impaired students who rely on screen reader software. For a proper reading, the texts not only need to be scanned but also to have special characters removed. Texts should be organized in a way that allows the student to identify pages and footnotes; graphics and images need to be carefully described. Each document is adapted according to the student's needs, and that requires an individualized approach.

The textual material adjustments made by AAI do not breach Brazilian copyright law. According to this law, the reproduction of literary, artistic or scientific works for the exclusive use of the visually impaired, for non-commercial purposes, made through the Braille system or other procedures offering support to these individuals, does not constitute a copyright offense (Brasil, 1998).

AAI also lends assistive technology to the students, as mentioned before. According to each student's disability, CAE determines which equipment will be needed to monitor their academic activities. Among those devices, the most commonly required are netbooks and notebooks. Students are allowed to keep the equipment during the whole period of their studies. They only need to return them to AAI every six months for maintenance.

Besides the activities mentioned above, AAI also promotes events which stimulate debate related to accessibility and encourage networking among students, professionals and anybody interested in promoting accessibility in different contexts.

3 Information literacy and students with disabilities

During the last 20 years, UFSC University Library has shifted from being a storehouse of a predominately print collection to a digital library with a significant variety of online resources.

The diversity and complexity of the academic online information resources has

increased the demand for instruction. To fulfill this need, UFSC University Library has created an information literacy program which offers several classes and instructional material. The classes present printed and electronic resources provided by the library, instructions on how to write academic papers, citation and reference guidelines, and reference management software use.

The main purpose of an information literacy program is to help people recognize their information needs and show them how to locate, evaluate and use information effectively and in different contexts. In short, people who are information literate are those who have learned to learn, and they know how to learn because they understand how knowledge is organized, how to find information, and how to use it (American Library Association, 1989).

At the university, developing these abilities is fundamental to supporting studies and research. Information literacy promotes student autonomy, and for individuals with disabilities becoming more independent is one of the most important challenges. According to Schiff (2010, p. 67), "information literacy can promote independent critical thinking skills and help sustain life-long learning for a constituency of students who for the most part had been compelled to rely on others to find and evaluate the information they sought".

Mastering information sources can be a challenge for any student. A visually impaired student needs to be skilled in using the available assistive technologies, which requires an extra effort.

Therefore, any programs assigned to this group need individualized strategies. Applin (1999) has argued that an information literacy class assigned to people with disabilities must have a multi-sensory approach, and to this end "the basic strategy to remember is that anything that is taught should include short, specific, verbal instructions or explanations; simple, large, visual representations; and immediate, hands-on experience" (Applin, 1999, p. 141). Practice, study and constant feedback from users will make the difference in improving the process.

Thus, creating adapted services goes beyond conventional practice. According to Dermody and Majekodunmi (2011) there are not many studies on information literacy among academic students with visual disabilities. For librarians, this is both a fascinating area of study and implementation.

4 The pilot class

The pilot class on online information sources took place on December 16, 2014, at UFSC Library training laboratory. The authors of this article were the teacher and assistant teacher respectively. Three undergraduate students with visual disabilities, an AAI intern, and a psychologist from Santa Catarina Special Education Foundation attended the class. The psychologist took part in order to observe an accessible class, since she works at an institution that also serves individuals with visual disabilities.

Planning the class involved a few choices. The first one was to determine the appropriate number of participants. It could not be a large number of individuals because it was a test. But, at the same time, it would be interesting to have volunteers with different degrees of visual impairment as well as different skills levels in using assistive technology. Ten visually impaired students were invited, but only three accepted or were able to participate. They were all undergraduate students and will be identified as Students A, B, and C.

Regarding Student A, by the time the pilot class was offered, she was only two semesters away from getting her degree in Geography. Student A is considered congenitally blind, that is to say, blind since birth. She has perception of light and a few colors. Concerning her assistive technology skills, she is very experienced.

Student B was finishing his undergraduate studies in Social Services. He gradually lost his sight during adolescence and was considered blind during high school. This is known as acquired blindness. He is very skilled in using assistive technology.

Student C had just finished her course on Philosophy and would graduate that semester. She is a person with low vision but her degree of disability is growing, causing difficulties in accessing written information. She can still use an electronic magnifier and for this reason she is not familiar with screen reader software. She had been reluctant to use assistive technologies. But, since her sight loss is progressive, she has been encouraged to learn how to use screen readers and keyboard shortcuts instead of the mouse. Today she accepts her disability better, but this tends to be a tough transition in visually impaired people's lives.

Another choice concerning the pilot class planning was to decide which reading

software should be used. Screen readers are software that translates computer textual information into synthesized voices, allowing user interaction with the computer. In this way, individuals with disabilities have the autonomy to interact with the computer system tools using keyboard shortcuts. For this class, Non Visual Desktop Access (NVDA) was chosen. The choice of NVDA was due to the fact that it is easy to use and free software. NVDA was developed in 2006 by NV Access, an Australian nonprofit organization. The project is still evolving and offers continual updates; now it is ranked with other high-quality screen readers. It can be easily carried in a USB flash drive and there is no need to install it on the computer (Instituto Federal do Rio Grande do Sul, 2013).

Student A brought her own computer and used JAWS, a commercial software program that, according to the majority of visually impaired AAI users, is superior in quality, especially regarding synthesized voices. CAE is purchasing JAWS licenses, which will be available to students soon.

Another decision to be taken in order to carry out the pilot class was the content to be presented. Visually impaired students enrolled at UFSC rely on adapted materials, such as magnified texts or documents legible to screen reader software. However, most students do not know that the library also provides online information resources that could help them become more independent regarding information search and access. That said, it would be necessary to present these resources in a way that was suitable for beginners.

Another issue to be considered was language. Since none of the volunteer students had sufficient knowledge of English, it was necessary to present information resources in Portuguese, which allow keyword search and document retrieval in that language.

So, as a starting point, the "Online Information Sources: basic module" was presented. This module is part of the UFSC Library information literacy program and is offered, in general, to undergraduate students. It aims to present basic concepts about academic information resources, subject definition, keyword selection and how to develop a search strategy. Examples of databases, virtual libraries, and portals – among other kinds of academic information resources – are also included in the class content.

For the pilot class, six information resources were chosen: UFSC Library OPAC; a search tool – Google Scholar; a digital library – Scielo; and three eBooks databases. Scielo is a digital library that gathers Brazilian scientific journals in open access. The eBook resources are three databases subscribed to by UFSC, which can be accessed through the students' ID number.

The information resources selected had not been previously evaluated regarding accessibility. The time estimated for the activities was two hours. The first half hour was dedicated to presenting theoretical concepts about scientific research and communication, academic publications, and online information resources for retrieving scientific information, as well as how to create search strategies.

As soon as the Library OPAC was introduced, problems emerged. The major one was accessibility difficulties related to the search screen interface, especially results presentation. For example, students could not verify the availability of books. Another difficulty was the group performance. While student A and student B were more able to execute the activities, student C had a lot of difficulties. She was relying on NVDA as well as the computer magnifying glass. It was thus necessary to give her more time and help her more frequently.

Student A used her own computer to compare JAWS and NVDA in relation to the library catalog screen reading. She noticed that JAWS was more efficient but also observed that some of the problems were due to the OPAC interface design. One of the strategies deployed to overcome the problem was the adoption of the catalog mobile interface. Since it is simpler, it allowed better screen reading.

Even with the mobile option, a long time was spent identifying and dealing with problems. So, there was insufficient time to present all the information resources proposed. Prior testing of all the information resources could have prevented these problems. The whole activity lasted about three hours with a short break.

Despite the obstacles, the students were really interested in participating and contributing. They often acted collaboratively, sharing their knowledge about assistive technology in order to solve problems and help each other.

5 Students' feedback and discussion

During the class, the main obstacle faced by students with visual disabilities was

the OPAC program's lack of accessibility. Schiff (2010) also observed the same issue in her work with blind and visually impaired students. According to the author, students often had difficulties in acclimatizing themselves to the screen. For example, sometimes they were not able to locate a search button due to the complexity of the screen design.

Concerning the library catalog, it is becoming much more user-friendly for sighted individuals but the windows and pop-ups may make screen reading difficult. Dermody and Majekodunmi (2011) conducted a study with visually impaired college students and results showed that the ability to locate items online was jeopardized by the design of the database and limitations of the screen-reading software.

Another factor which influenced the performance of the activity was Student C's struggle with assistive technology. Even with the aid of a magnifying glass and the assistance of an auxiliary teacher, it was evident that student C lacked technological skills. Schiff (2010, p. 70) also faced this situation and suggests that in this case "[...] a one-on-one approach might prove more effective". As student C was concluding her undergraduate studies and intends to get into a graduate program, she was offered the option of scheduling an individual session later.

The other students demonstrated great knowledge of NVDA and shared information about keyboard commands and ways to overcome the problems that arose. They also helped student C whenever it was possible.

Regarding the scheduled time for the class, the traditional module on information resources, basic level, lasts approximately two hours. On the pilot class day, three hours were necessary and yet it was still not possible to teach all the planned content. One reason was the lack of prior knowledge about the accessibility problems presented by the information resources. However, even if these accessibility problems had been taken into account, it is believed that such sessions should really be longer for students who depend on assistive technology. In order to solve the problems, the course could be divided into separate sessions to be taught on different days. Another option would be to offer it part-time, both as an on-line course with accessible instruction material and as a regular course.

Regarding the number of participants, it is considered that even with the help of two assistant instructors a large group is not recommended as the participants who were most skilled in using assistive technology also needed some attention. After the activity, feedback was requested and the volunteer students were able to indicate the positive and negative aspects of the pilot class.

Student A praised the authors' idea of offering a course and the attempt "to check what is accessible". At the same time she pointed out what could be improved. One aspect which was criticized was the planning of the course. According to her, it is important to verify in advance which information sources will be used by individuals with visual disabilities. She suggested an extra 30 minutes in order to complete the tasks and find links on the screen. Finally, she proposed "a report on what could be improved in relation to database accessibility".

Student B mentioned the teachers' ability "to keep pace with the group", giving attention to all students, as a positive point. He mentioned that "the room was prepared to welcome them". He also pointed out the importance of doing accessibility checks on the computers in advance and checking the browsers compatibility with databases and sites. That would have made the class more productive. He also criticized excessive "theoretical exposure" over a short time of "practical application". As a suggestion for future classes, student B recommended the content to be taught was sent to students for advance reading.

Student C praised the course and "the attempt to think of ways to make search tools accessible". She also mentioned the "opening for dialog" with visually impaired students as a positive aspect. As a negative point, she mentioned the short time available to deal with a large amount of content. She recommended the class be more carefully organized, adding that "she couldn't get enough of it".

6 Future actions and final considerations

The pilot class on online information resources for students with visual disabilities, in spite of the problems that occurred, managed to achieve its goal, which was precisely to serve as a test bed. The situations that arose provided information which will help to improve and enlarge the efforts to offer a genuinely accessible service.

Recommendations include effective preparation of the instructor, especially regarding assistive technology. Testing the accessibility of the academic information resources

available at the University Library is necessary, even if they will not be used in the specific module for students with visual disabilities. To the purpose of this is to make the library entirely accessible to all students. In addition, UFSC Library is developing its Electronic Collection Development Policy, and accessibility is a factor which should be considered with regard to acquisitions, subscriptions, and renovation.

Furthermore, the difficulties students may encounter with all information resources could be part of the class content. This could reduce the time required and make the activities more comprehensive.

As suggested by one of the students, preparing accessible instructional material is essential. This material could be sent to students in advance of the class and later be made available on the library website. All the material adopted in the information literacy program is now available to anyone for consultation or downloads.

Considering the experience obtained in this pilot class and the students' suggestions, a new class will be offered soon. It is expected that, after this second pilot, it will be possible to offer an information literacy module for students with visual disabilities as a permanent service.

Thinking about accessibility more broadly, UFSC University Library still needs to improve physical space resources as well as increase the number of services offered. On a medium and on a long term basis it will be necessary to ensure that more librarians and other library staff members are qualified to better serve the increasing number of students with disabilities who attend the university. The way to a completely accessible library is thorough preparation and team commitment to offering products and services to all, regardless of their condition.

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