Implementing Assistive Technology: Opportunities and Challenges

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ABSTRACT

In this paper, I describe some of the challenges and opportunities presented when attempting to be proactive in improving the accessibility of the University of North Carolina at Greensboro's (UNCG) 20 open-access computer labs.

Keywords

Assistive technology, accessibility, handicapped access.

1. INTRODUCTION

Over the past two years, the Department of Instructional and Research Computing (IRC), the office at UNCG that manages the campus computer labs, has taken a proactive approach regarding the accessibility of campus computing resources. We are in the midst of a project that examines the accessibility of the hardware, software, and physical layout of the labs. This has involved the education of IRC staff in both the area of technology and in the area of the special needs of part of our user population as well as the building of relationships with various campus administrative offices, especially the Office of Disability Services (ODS).

2. UNCG'S COMPUTING ENVIRONMENT

The particular nature of the computing environment at UNCG sets the context within which we hope to address the computing needs of our disabled student population.

2.1 Scope of Computing Resources

UNCG has a centralized computer network with about 570 computers in 20 open-access labs (154 Macs and 416 PCs). To the greatest extent possible, all software is delivered to every lab, so students do not have to travel to particular labs to complete class assignments. The Macintosh labs are more individually configured, with specialized hardware and software which is delivered locally to meet the specialized curricular needs of the largest user group (i.e., Music, Housing and Interior Design, and Art).

The largest lab on campus is the "SuperLab," which contains 130 computers and is housed in Jackson Library. One of the most widely used and busiest labs on campus, the SuperLab's central and convenient location makes it a necessary and desirable venue for Assistive Technology (AT) resources, but it also presents special challenges for their implementation.

2.2 Strategic Role of Computer Labs

As in other universities, UNCG's computer labs have evolved from locations with a peripheral pedagogical role to ones that are central to the teaching and research mission of the University. The labs are used not only by students completing assignments and engaged in recreational or personal pursuits but also by faculty who reserve them both for occasional use and for the entire semester as the primary class location. This use of the labs as classrooms has increased every semester as faculty has integrated computer technology into their classes and has created an environment of often competing demands. Faculty reservations increasingly preempt the number of available open lab hours, while at the same time, the integration of technology into their classes means students must have lab time outside of class to complete assignments. Even students whose instructors are not directly using technology find they are expected to use word processing to complete assignments or the perceived quality of their work suffers in comparison to the "product" turned in by more computer literate students.

This state of affairs also means that students with visual or other physical impairments are increasingly likely to be required to spend time in the campus computing labs whether in class or out. In order to provide computing services on a comparable level to that provided other students, IRC has been faced with the need to improve on the nature and level of services offered to the disabled student population. In addition, the passage of

the Americans with Disabilities Act on July 26, 1990 makes it not only a moral imperative to provide equal access to computing but a legal one as well.

2.3 Current State of Service Provision

UNCG is in a period of transition in how computing services are delivered to our disabled users. As new and growing needs are identified, the need to develop new structures and practices becomes increasingly evident.

2.3.1   Office of Disability Services

The vast majority of services provided to disabled students on campus has traditionally been delivered by ODS. As the demands for specialized computing resources have increased, ODS has attempted to meet those demands with limited technical expertise and a budget inadequate for doing the constant upgrades today's technological environment demands. In addition, maintenance pressures are considerable as students with varying levels of computer skills load programs onto ODS computers, which tends to render them inoperative in a relatively short period of time. Lacking professional computer staff, ODS has had to rely on student workers and the Department of Client Services (DCS), an administrative support department, for assistance in maintaining their computers, the latter often having delays in response time of weeks. Pressures to provide specialized computer services for students who need them for class or testing purposes makes such a delay in service unacceptable. An informal relationship has developed between IRC technical staff and ODS as a result of recent initiatives between our two offices, but it represents an undesirable strain on IRC resources to respond to frequent calls to repair machines.

ODS has up until recently had space within the both the student union and Jackson Library for students to use specialized hardware and computers for class work and tests. The current renovation of the student union has resulted in the loss of that room, and they have also lost the room they occupied in the Library, which has been reclaimed for Library office space. Current negotiations are underway between ODS and the Library over alternative space.

2.3.2   Instructional and Research Computing

Up to this point, IRC has addressed the need for AT in a relatively piecemeal and ad hoc fashion. A few labs were outfitted with a single computer with a large screen monitor, which in some cases were outfitted with the screen reading program JAWS and the screen magnifier program ZoomText. These programs would sometimes be accidentally deleted during the course of reimaging computers and labs, and special headsets and microphones intended for use by disabled students disappeared. Students searching for the programs would be forced to go to the IRC administrative office, which would then search for missing media to reinstall the programs. In still fewer labs, adjustable height desks could also be found. One particularly computer literate student with a visual impairment was permitted to set up a surplus computer with his own software and for his own use within a partitioned area of one lab. (This student has since graduated and been hired by another campus Information Technology department, Systems and Networks. It is our intention to continue to draw on his expertise in the implementation of our AT project.)

In 1996, a restructuring of IRC resulted in the creation of a new position, Assistant Director for Student Computing, designed to have greater policy making and management authority than the existing Lab Manager position, which it later replaced. The first occupant of this position stayed only briefly. In 1998, this author took over the position of Assistant Director and began an examination of the current state of AT in the IRC labs. Convinced that the status quo was inadequate, the author met with the Director of Disability Services and began a coordinated effort to improve the level of computing service provided to the disabled users. The remainder of this paper addresses the challenges inherent in this undertaking and discusses the steps we have taken to improve our AT offerings.

3.   OBJECTIVES

The primary objective established for this project was to increase the level of accessibility of the hardware and software offered in the campus computing labs as well as their physical accessibility. Additionally, the desire is to establish an on-going, cooperative relationship with ODS in which the resources of both offices could be extended and complement each other. It is not the intention of IRC to replace the role of ODS in providing certain specialized services or equipment for disabled students but rather to ensure that those computing services offered by IRC to all students are accessible to disabled students as well.

4.   CHALLENGES AND RESPONSES

The challenges faced in the implementation of this project fall into the following three broad categories: technological, logistical, and bureaucratic.

4.1 Technological Challenges

Technological challenges involve both the limited familiarity of IRC and ODS staff with AT software and problems with the software itself in a networked environment.

4.1.1   Training

Virtually none of the technical or management staff in IRC has had any familiarity with the installation and operation of the AT

software. Prior to the recent restructuring of IRC, there was only one professional technician, in addition to the Lab Manager. Most machine repair and software installation were done by student workers with unpredictable lengths of employment. The restructuring of IRC has resulted in an expansion of the professional technical staff. The former sole technician is now the Technical Coordinator and oversees three technicians and a software specialist, the latter also working closely with the Assistant Director in the AT project.

In April 1999, ODS secured a spot for the IRC Assistant Director in a two-day AT workshop in San Jose, CA. This was the first exposure the author had to the scope of AT offerings and the variations in how different schools provided it. Although all the other attendees were representatives from Disability Services offices, it became clear that the central objective was the same: to make computing services accessible to all students. Since that time, the addition of the staff software specialist has provided the opportunity to expand IRC expertise in the particular software packages being offered.

A benefit resulting from the informal support relationship that has developed between ODS and IRC has been the informal training the IRC software specialist has had in the software currently offered by ODS. New software (Kurzweil 1000 and Kurzweil 3000) has recently been purchased by ODS, which the IRC software specialist has been investigating with an eye to its installation in IRC's SuperLab (to be discussed below). ODS is also purchasing additional software (Continuous Speech) in the near future and has agreed to sponsor a trainer who will train both ODS and IRC staff in August 2000.

In addition to staff training, it is becoming clear that training for disabled students is also a necessity. Many students come to campus with limited experience in using AT and need to learn how to use the new programs and hardware provided by ODS and IRC. IRC student consultants will also need to be trained in order to assist disabled users as AT becomes more widespread in the labs. This is an area in which both IRC and ODS need to plan and implement on a cooperative basis.

4.1.2   Technical Software Difficulties

One of the technical challenges faced by IRC is the difficulty in delivering certain types of AT software in a networked environment. Networking software is desirable as it insures that the failure of individual machines will not mean the loss of the software. However, certain types of programs—such as speech recognition programs that need to be "trained" by each individual user—traditionally have not worked satisfactorily across a network. At UNCG, students are unable to save any personal material on local hard drives but are assigned 10 MB of personal network space. To respond to this challenge, one of the next stages of our project is to investigate whether students can save voice recognition files in their network space.

An additional network-related problem involves expense. The cost of licensing each lab machine to service a relatively small number of users would be prohibitive and not cost effective. While UNCG has a site license for ZoomText, which has allowed us to deliver it to all campus machines via the network, we do not currently have such licensing agreements for the other

software packages, and there are currently no adequate license server options available to limit their use in a network environment. At the present, the solution is to limit the availability of the software to certain machines in the SuperLab and to those labs where ODS determines is the primary locations to be used by students needing the software for class. We will be investigating alternatives as the project proceeds.

Other technical problems involve hardware. Some users feel ZoomText works best with the very large screen monitors (e.g., 21 inches) on which it was originally installed, while most monitors in the labs are 17 inches. However, some visually impaired students have expressed preferences for the smaller monitors. Networking the software allows students to choose either large or small screen monitors. Another unanticipated problem involved the need for students using ZoomText to be physically close to the monitors when in one lab the monitors were installed below the surface of the desk with a glass panel on the desktop. In that lab we have altered one desk and placed the monitor on the top of the desk.

4.2 Logistical Challenges

Logistical challenges fundamentally involve answering questions concerning what goes where, what can be provided within a lab environment, and how to balance the desire to limit noise in the lab with the need to mainstream and not "ghettoize" disabled students.

4.2.1   Physical Accessibility

Physical accessibility is not a significant problem in IRC labs. There is only one lab that is truly limited for those with mobility impairments. That lab is an "amphitheater" style room in which 18 of the 25 machines in the lab are on stepped levels. However, the first row of six machines is at ground level and provides ready access.

We have experienced access problems in only one other lab— the one in which the monitors are mounted beneath the desktop. Students in larger wheelchairs are unable to get their chairs entirely under the desks. We also discovered, belatedly, that the aisles of that lab are too narrow to accommodate larger wheelchairs. We were somewhat chagrined to realized that the student consultant (as we call our lab assistants) who assisted us in determining clearances owned a smaller, streamlined type of wheelchair that was not characteristic of those used by some other students. In response, we raised the level of one of the desks on the end of the row to accommodate the larger wheelchair. While somewhat ad hoc, and not an ideal response, it has proved adequate for the short term at least.

4.2.2   Noise

Two categories of software have the potential of creating challenges associated with noise: screen reading programs such as Kurzweil or JAWS (which turns text into speech for visually impaired users or those with reading-related disabilities) and voice recognition programs such as Dragon Dictate or Dragon Naturally Speaking, in which users who are unable to use keyboards due to either visual or mobility impairments dictate into microphones. In addition to software related noise, Braille printers are extremely noisy.

The noise of screen reading programs can be dealt with fairly easily with the use of headphones. In all but one lab, students must bring in their own headphones if they wish to use any type of multimedia software as the speakers in the computers themselves are disabled. In the lab where the computers and monitors are mounted beneath the desktop, headsets are permanently mounted due to the inaccessibility of the headphone jacks.

Speech recognition programs are a more difficult problem. Although at present there is only one computer in IRC labs with Dragon Dictate on it, the new initiative of making access to this type of software more widely available in the labs means we need to determine how to deal with the issue of noise. On the one hand, there is the noise from people dictating that could distract other users and represents a loss of privacy for the person doing the dictating. On the other hand, there is the ambient noise in the lab that might interfere with the program itself. We have not yet developed an adequate solution. Although partitioning certain parts of the lab has been proposed, that solution carries with it the potential of "ghettoization."

A final logistical difficulty I will address is equipment loss. Even with a process of checking headsets out through our student consultants, we have lost a significant number of inexpensive headphones. In addition, the more expensive integrated headphone and microphones provided in past years by ODS have also disappeared. A more rigorous checkout process accompanied by a primary reliance on students to provide their own headsets should help alleviate the problem to some extent.

4.3 Bureaucratic/Organizational

As in any large organization, some of the most daunting challenges are bureaucratic ones. Offices often have overlapping responsibilities and budgets are limited, especially in a state institution. The organizational challenges this paper addresses are both interdepartmental and intradepartmental.

4.3.1   Interdepartmental

At this level, there are two primary types of challenges: the struggle over scarce resources and the difficulty of coordinating responses to problems that cut across areas of responsibility.

4.3.1.1 Budgetary Outlays

Although enthusiasm exists for the concept of accessibility, the provisions of the Americans with Disabilities Act of 1990 represents a potentially enormous drain on resources to administrators juggling a variety of competing demands. Some administrators fear that a failure to adequately define boundaries of responsibility could lead to an open-ended demand for resources. The most direct budgetary demands involve expenditures for computers, peripheral devices, and software. As discussed above, ODS has traditionally maintained a handful of aging computers along with specialized equipment such as an old and cumbersome Arkenstone system, which scans text and converts it to speech, and a recent vintage scanner attached to an aging PC.

IRC's response has been to enter into a cooperative arrangement with ODS where ODS buys computers for their own dedicated computer space and also buys software licenses adequate to cover their own computers and those in IRC labs. IRC in turn has agreed to develop an AT area within the SuperLab dedicated to use by our users with disabilities. We have purchased three new computers which will have a full complement of accessibility software and a scanner for use with programs such as Kurzweil 3000, which scans documents and converts them into electronic text and speech. This will serve to alleviate some pressure on ODS computing resources by moving them into the SuperLab, while ODS relieves some of the pressure on IRC's software budget.

4.3.1.2 Technical Support

ODS has suffered in the past from a lack of adequate technical support and has compensated by using student help and informal help from IRC technicians. IRC's technical responsibilities are supposed to be limited to supporting the open-access lab, while administrative offices like ODS are supported by the Department of Client Services, which has the responsibility of maintaining all staff and faculty offices and usually experiences significant delays in providing support. As students often need access to computers that have become inoperative on an immediate basis, IRC has provided some stopgap support. The frequency of ODS computer downtime and the complexity of restoring the machines has created a drain on IRC technical resources.

In response, IRC and ODS have agreed to coordinate the purchasing of computers, with ODS buying new computers that are identical to those installed in IRC labs. In addition, ODS has agreed to install on their machines the same Centurion Guard hardware locks that are installed on the IRC lab machines. These locks were first installed in IRC labs two years ago and have resulted in an enormous decrease in computer downtime as students are prevented from installing or deleting any software or introducing viruses onto the machines.

This consistency of hardware will allow for greater consistency in software support. Every semester IRC creates an "image" for the lab computers, which consists of a configuration of software built on specific machines and detailed in a lab specification (see www.uncg.edu/irc/labs/LabSpec.html). IRC has agreed to create an "Assistive Technology" image for the ODS machines built from the base lab image. ODS has agreed to prevent the installation of any software on their machines by anyone other than IRC technicians, which will allow us to provide them with an image on CD that they can then reinstall in the rare instances that the machines become inoperative (in IRC labs this usually only happens when a machine component fails). Changes to that image can then be made in a consistent and reliable way.

This will decrease the number of service calls made by ODS as a result of improved machine reliability, will decrease the amount of technical support provided by IRC and DCS to ODS (thus relieving pressure on staff resources), and provide for a more consistent computing environment for disabled users.

4.3.1.3 Space

The competition for space is one of the most fiercely contested conflicts in any university or college. In a period of growth,

especially, financial resources are often more available than spatial ones.

As noted above, ODS has experienced a loss in the space available to them for computing use. The room they occupied in the Elliott University Center was attached to an IRC lab, which has also been decommissioned as a result of the building renovation. The Library has reclaimed another room for office use. This has led ODS to search for both alternative spaces and to export some of their uses into IRC space.

Although the decision to establish an AT area in the SuperLab was driven by a general desire to increase accessibility in the computing labs, it has also turned out to be a response to the loss of space experienced by ODS. However, it is only a partial response as the SuperLab is not an appropriate area for some sorts of use. The lab is a large open room with a certain amount of ambient noise and a great deal of activity with students coming and going, picking up printouts from the Help Center desk, receiving help from student consultants, and engaging in conversation. Students have complained that the SuperLab is a difficult place for concentration and study.

With the loss of their Library room, ODS suggested they install their new Braille printer in the SuperLab, a request which we had to turn down, at least for the present, because of already undesirable noise levels in the lab. If adequate soundproofing can be developed, it might be possible to revisit that decision, but for now, it is IRC's belief that this need would be better satisfied in another location within the Library. If Jackson Library joins with ODS and IRC in providing space for specialized computing needs, this would be a positive step toward building a multi-departmental cooperative relationship in the service of our mutual clients. Negotiations between ODS and Library administration are currently underway.

4.3.2   Intradepartmental

There are challenges to be met within IRC as well. As indicated above, communication problems have resulted in programs being deleted from computers, a lack of information about where certain programs could be found, and a delay in responding to the needs of disabled users or a failure to respond at all. AT was a virtually unknown concept, or at best, an afterthought.

IRC has responded to the lack of adequate resources for disabled users by all the initiatives noted above but also in a change in the internal process of semiannual lab upgrades. While in the past, programs used by disabled users were added on in a piecemeal fashion in this lab or that, they are
now part of the lab specification. Networking ZoomText has prevented its accidental elimination as has occurred in the past. The AT project currently underway within IRC is centrally concerned with discovering which pieces of software can also be either networked or strategically located.

In addition, an AT Specification is being developed for the SuperLab AT area and for ODS. As many of these programs become more mainstream (for example, more computer users are experiencing repetitive strain injuries necessitating more widespread use of speech recognition programs), they will see wider use in the labs.

5.   CONCLUSION: WHAT LIES AHEAD

The needs of disabled users have gone from being an afterthought dealt with by clumsy and ad hoc accommodations to being a central part of the process of planning for the computing needs of all students. While there are still many challenges facing both IRC and ODS, we have made great strides in addressing them. At the heart of our successes lies a cooperative approach and an understanding that we serve the same clients although in different venues. An emphasis on building bridges rather than establishing departmental boundaries has allowed us to combine resources in order to meet these needs.

Future needs include training programs for IRC and ODS staff as well as for students, continuing investigation into software and hardware, and a needs assessment to determine exactly what is needed by our disabled student users and how those needs can best be met. One of the next steps is to create a focus group to articulate some of these needs and to draw our clients into the planning process itself. By bringing together ODS, IRC, and our student users, we will be better prepared to address the computing needs of the entire campus in a rapidly evolving technological society.