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International Comparison on Accessible Technology in Higher Education

ATHEN E-Journal Issue #4 (2009)

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Abstract

In April and May 2008, Access Technology Higher Education Network (ATHEN) conducted a six-part on-line survey in order to assess practices related to technology accessibility in higher education, including those related to assistive technology, information technology accessibility, web accessibility, multimedia accessibility, alternative format production, and staffing issues. The survey was developed with input from four countries

(United States, Canada, United Kingdom, and Ireland), and efforts to recruit participants were concentrated in these same countries. Participating institutions included 52 colleges and universities from the United States, 28 from the United Kingdom, 12 from Canada, 9 from the Republic of Ireland, 3 from South Africa, and 1 each from Australia and New Zealand. This paper uses the survey results as a backdrop for engaging in international dialog regarding accessible technology in education. The authors' hope is that such discussion will yield insights and promising practices that will benefit anyone, regardless of country or culture, who seeks to provide educational opportunities that are accessible to students with disabilities.

Introduction

Access Technology Higher Education Network (ATHEN) is an international nonprofit organization based in the United States (ATHEN, 2004), which formed in 2002 to collect and disseminate best practices, and to present a collective voice for the professional practice of access technology in higher education. Historically the majority of ATHEN's members have been from the United States, though its membership currently includes five international members, and its projects in recent years have included a growing number of collaborations with international colleagues.

Increasingly, accessibility has become an international issue. In December 2006 the United Nations adopted a Convention on the Rights of Persons with Disabilities (United Nations, 2006), which prohibits discrimination against persons with disabilities in all areas of life. Article 9 of the Convention specifically calls for State Parties to ensure that persons with disabilities have access to information and communications technologies and systems. Many countries' national, state, and/or provincial governments have laws mandating accessibility, and often these laws impact higher education institutions.

The 2008 ATHEN Survey on Accessible Technology in Higher Education (Thompson, Draffan, & Patel 2008) builds upon earlier research conducted in 2001 (North Carolina State University) and 2004 (Thompson, 2004, 2005). Each of these studies was designed to assess higher education institutions' practices, procedures, and policies for addressing their students' information technology (IT) accessibility needs. In the original study, three of 72 participants represented institutions outside of the United States, and in the 2004 study, only one of 91 participants was from a non-U.S. institution. The current study was designed to assess the accessible technology situation in colleges and universities in several countries, with representatives from four countries (United States, Canada, United Kingdom, and Ireland) participating in the survey design and subsequent analysis and reporting. The present article uses the survey results as a backdrop for engaging in international dialog regarding accessible technology in education. The authors' hope is that such discussion will yield insights and promising practices that will benefit anyone, regardless of country or culture, who seeks to provide educational opportunities that are accessible to students with disabilities.

Background by Participating Country

United States

For decades, higher education institutions in the United States have been required to ensure accessibility of programs and services to students with disabilities. Section 504 of the Rehabilitation Act of 1973 prohibits discrimination of qualified individuals with disabilities by any program or activity that receives federal financial assistance. Responding at least in part to passage of the law, U.S. higher education institutions began working in the early 1970's to establish procedures by which students with disabilities could receive reasonable accommodations. In 1977, a group of service providers for individuals with disabilities in higher education organized to form the Association on Handicapped Student Service Programs in Post-secondary Education (AHSSPPE), the organization now known as Association on Higher Education and Disability (AHEAD) (DeSouza, Jackson, Yurcisin, Brown, & Pomeroy, 1999).

In 1990, the Americans with Disabilities Act was passed, affording similar protections to those afforded in Section 504, but expanding the scope of coverage to include public services (Title II) and public accommodations (Title III). Virtually all higher education institutions in the United States are required by one or both of these laws to accommodate students with disabilities.

In 1998, the Rehabilitation Act was amended, and Section 508 of the amended legislation required that electronic and information technology (E&IT) used, procured, developed, or maintained by the federal government be accessible; and charged the U.S. Access Board with developing standards for measuring E&IT accessibility. Although this legislation explicitly applies to federal agencies, many states have adopted all or a portion of the Access Board's standards, and some of these state laws and policies apply to state higher education institutions (Georgia Tech Research Institute, 2006).

Throughout the 1990's and into the new century, especially fueled by the passage of Section 508 and subsequent related efforts among states, growing numbers of higher education institutions in the United States have begun to work toward addressing the accessibility of their IT resources. For example, when comparing results of the two previous studies on which the present study is based, in 2001, 22% of higher education institutions surveyed said they had a documented web accessibility policy, and in 2004 that percentage had climbed to 53% (North Carolina State University, 2001; Thompson, 2004, 2005).

Canada

As in the United States and elsewhere, there has been an increase in the numbers of students with disabilities attending Canadian colleges and universities. The proportion of the postsecondary student population with disabilities has been estimated between 10% and 17% (Fichten, Jorgensen, Havel, & Barile, 2006), with the highest proportion of these students registering in junior/community colleges rather than universities (Fichten, Asuncion, Barile, Robillard, Fossey, & Lamb, 2003). It is important to note here that unlike in the U.S., education is a provincial and not a federal matter. Moreover, depending on the province or territory students study in (Canada has ten provinces and three territories), the availability of government and other funding to assist these students, and the means through which students with disabilities may attempt to gain access to needed computer technologies does vary.

Findings collected by the Adaptech Research Network on a large number of Canadian disability service providers (Fichten, Asuncion, Barile, Fossey, Robillard et al., 2004) provide a snapshot of the issues relative to IT accessibility in Canadian colleges and universities. In general, disability service providers are not knowledgeable about computer technologies for students with disabilities. Virtually all universities have specific, dedicated computer equipment for students with disabilities, while junior/community colleges are less likely to have this. The presence of adaptive technologies in general-use computer labs is seen as an urgent priority. The research shows that there is strong need for better technical support for adaptive computer technologies on campus. Computer-based teaching materials used by faculty are frequently seen as inaccessible. Faculty members are seen as poorly informed about the computer-related needs of students with disabilities. Finally, the accessibility of Internet-based distance education and web-based "hybrid" courses are problematic in some institutions.

United Kingdom

A recent report in the United Kingdom has shown an increase in numbers of students with disabilities, although the authors were hesitant about actual figures due to the way data is collated across institutions. The National Audit Office (2008) "found a general increase in the proportion of students declaring a disability from four to six per cent over the past five years for young people (under 21), compared with around four per cent in the general population over the same period based on Labour Force Survey data."

It is important to realize that not only is data collection different across the nation but also funding, and in some

cases the law for supporting the use of assistive technologies is also different. Therefore, what relates to England may differ in Northern Ireland, Wales and Scotland.

There are differences in funding for those attending a further education college and not taking a degree course, compared to those at university on a part time or full time undergraduate or post-graduate degree course. The Learning and Skills Act (2000) requires colleges to have "regard to the needs of persons with learning difficulties" (the definition of which includes all people with learning difficulties and/or disabilities) up to the age of 25. The Further and Higher Education (Scotland) Act (1992) provides legal backing for equal access to support in further education colleges. Also, the overarching UK Disability Discrimination Act (1995 & 2005) also applies to those with disabilities and/or specific learning difficulties including dyslexia, who are attending higher educational institutions.

Students attending college (who are not taking degrees) are usually assessed for their needs, receive individual training and may be loaned assistive technologies through the Additional Learning Support (ALS) funds or Additional Support Needs for Learning in Scotland. The assistive technologists and technical or learning support staff also tend to advise the college about networking specialist technologies, especially screen reading, magnification, speech recognition, text to speech and mind mapping software. There are usually learning resource centres available and areas in computer labs or dedicated labs set aside for the use of assistive technologies. There are also specialist colleges such as the Royal National College for the Blind or National Star College that offer high levels of specific support and an increased number of technologies that may be related to their students' disabilities.

From the time of the initial assessment various types of learning support plans may be developed for students and these may be reviewed throughout students' time at the college. Students also advise tutors, in an ad hoc manner, when they find their technologies are failing to support their needs. The services offered to students are also evaluated through follow-up forms, focus groups and audit schemes.

Once students attend university, it is the relevant Funding Councils for England, Wales and Scotland and Department for Employment and Learning, Northern Ireland, who provide mainstream disability funding. This tends to "reflect the proportion of students that each institution recruits who are in receipt of the Disabled Students' Allowances (DSA)." (National Audit Office, 2008) The DSA is a series of allowances that provide personalized support to individual students according to their needs. The technologies may be used by students in their favored place of learning including the home. Students usually keep their technologies once they have left university.

Using the number of students who have applied for a DSA as the method of providing funding for universities does not take into account the number of disabled international students or those on part-time courses that do not qualify for the DSA. The Scottish Funding Council also provides funding to Higher Education (HE) institutions through the main teaching grant, and provides Disability Premium Funding (DSP) to HE institutions to support widening access for students with disability-related additional needs (TechDis, 2007a).

Despite the addition of the DSA, there are similarities to the support offered to students in further education but it was clear from a survey of 455 dyslexic students in their first year of university, that raising the awareness of the use of assistive technologies to support study needs is still an issue - only around 8% of the students were using mind mapping and text to speech software on entry to university. (Draffan et al, 2007)

The DSA comes from separate government funding that has its own assessment procedures, training and support and quality audit systems. This service may be supplied by the university or from nationally recognized assistive technology centres around the country. Some charities such as the Royal National Institute for the Blind may become involved with the process, and there are several independent companies who also offer training

and support.

Recent developments in the copyright licenses for educational institutions have allowed all disabled students to have access to electronic and print materials in alternative formats but this has yet to be ratified by law. TechDis and the Publishers Association have developed a website "to enable educationalists working with disabled learners to get an electronic version of published texts as quickly as possible." (TechDis 2007b)

Ireland

It could be argued that, to date, the number of students with disabilities coming to third level in Ireland is lower than in other territories. Approximately 3,000 students with disabilities are currently reaching third level; ten years ago only 400 students were registered (AHEAD, 2002). However, some colleges are reporting significant increases in intake, with National University of Ireland (NUI) Maynooth recording 3% of its student body registered with the Disability Service in 2008. This may be the highest percentage of all colleges nationally, but only equalling the national average in the U.K. Statistics at primary and secondary level suggest that the numbers of students with disabilities is appreciably increasing and these will soon reach third level. Awareness of this impending increase is inspiring dialogue between the various stakeholders around how best to strategically plan to deliver accessible learning environments and pre-empt rather than react to learners needs.

Discrimination against individuals with disabilities is prohibited under the following pieces of Irish legislation: the Equal Status Act, 2000, which specifically prohibits discrimination at an "educational establishment" in Section 7; and the Employment Equality Act, 1998, in which vocational training is identified as one of the grounds on which discrimination is prohibited.

The Fund for Students with Disabilities (FSD) allocates funding to further and higher education colleges for the provision of services and supports to full-time students with disabilities. This scheme is funded by the Department of Education and Science under the National Development Plan 2007-2013, with assistance from the European Social Fund (Dept. of Ed & Science, 2007). Under this Fund, institutions can apply for supports such as additional tuition, learning support, assistive technology, or conversion of materials into alternative format (for students with sensory disabilities only; students with specific learning difficulties are not eligible for material to be converted).

Any material that is converted then is required to be deposited in textaccess, ie, a centralized and comprehensive catalogue of resources for students with print disabilities at third level. This is an attempt to reduce duplication of work and delay in getting alternative format material to students. Currently, much effort is being made to adopt a more strategic approach to the acquisition and delivery of alternative format materials. One university, Trinity College Dublin, has implemented an accessibility policy requiring that all printed resources produced in the university be produced according to Clear Print guidelines and be simultaneously available in accessible electronic form. NUI Maynooth is about to propose a similar model and it is hoped that all higher education institutions will eventually follow suit, reducing the amount of materials that need to be converted. From there, the sector is working with Librarians to work out the most efficient means of exhausting all sources before turning to conversion as a last resort.

Method

Sample

Participants in the current study were 149 individual self-selected representatives from 106 higher education institutions in seven countries. The survey was developed with input from four countries (United States, Canada, United Kingdom, and Ireland), and efforts to recruit participants (through relevant online discussion lists and personal contacts) were concentrated in these same countries. Participating institutions included 52 colleges and

universities from the United States (49%), 28 from the United Kingdom (26%), 12 from Canada (11%), 9 from the Republic of Ireland (8%), 3 from South Africa (3%), and one each from Australia and New Zealand (1%). With a few exceptions, this paper focuses on the four countries where participation was highest. Note that percentage values throughout this paper are rounded to the nearest whole number in order to improve readability.

The 52 participating U.S. institutions included doctorate-granting institutions (44%), associate's colleges (33%), master's colleges and universities (21%), and one baccalaureate college (2%). The majority of U.S. institutions (88%) were public institutions, with 11% being private not-for-profit institutions. The majority of U.S. institutions were from the West region (52%), while 25% were from the Midwest, and 11% each were from the South or Northeast.

The 12 Canadian institutions that responded to the survey were located in Alberta, British Columbia, Manitoba, Newfoundland and Labrador, Ontario and Quebec. Seven of the institutions were colleges; the rest were universities. Two respondents were French-language institutions. Before proceeding any further, it must be pointed out that Canada does have over 200 public colleges and universities.

Twenty-eight organizations took part in the survey from the U.K., including universities across Scotland, England, and Wales; plus two specialist colleges, a charity that supports disabled students, one general college, and a company. It was hard to reach all parts of the kingdom and it is regretful that the sample is small, as England alone has over 250 general funded colleges and around 22 specialist colleges (DIUS, 2005). "There are now 126 universities in the UK, and the Government's target for 50% of 18–30 year olds to participate in some form of higher education by 2010 means that this expansion is likely to continue." (Universities UK, 2007)

Nine Irish Higher Education Institutes (HEI) participated, including five of Ireland's seven universities. This represented 8% of the total international respondents to the survey, which for a country with a population of just over 5 million is a healthy response and we can take it that the findings are broadly representative of those larger institutions.

Procedure

The 2008 ATHEN Survey was a six-part survey administered via a custom-developed online survey application. The survey's six independent sections included questions related to assistive technology products, information technology accessibility, web accessibility, multimedia accessibility, alternative format production, and staffing and salaries for accessible technology -related positions.

The research method is further described by Thompson, Draffan, & Patel (2008).

Results

Overall results for the entire sample, as well as notable differences within the U.S. by Carnegie Classification, are summarized by Thompson et al (2008). The present article is specifically focused on examining issues where differences were observed across countries. The situation across participating countries is broadly similar, but some distinctive differences do exist.

Assistive Technology (AT) Products

The section of the survey devoted to AT products was completed by 46 participants in the U.S., 23 in the U.K., 12 in Canada, and 6 in Ireland. This section included issues related to AT training and purchasing, the results of which are reported in subsequent sections.

When asked to choose whether AT was deployed in a dedicated AT lab or in one or more public labs (or both), participants in the United States overwhelmingly selected public labs (93%), although a large percentage also

deploy AT in dedicated labs (63%). In contrast, participants from other countries were much less likely to deploy AT in public labs. In the U.K., similar to the U.S., participants said they deploy AT in both settings, though the percentages in both categories were less than the U.S. (70% said public labs, 35% said dedicated AT labs). Also, a higher percentage of participants in the U.K. selected "Other" than in other countries (43%), and wrote in responses such as "library". The most common response among Canadian institutions (58% of the 12 respondents) was that AT is deployed in a dedicated lab. This was followed next by AT being deployed in one or more public computing labs (50%), and other (42%). Participants in Ireland were equally likely to choose public deployment or dedicated AT lab (both were selected by 67% of participants).

When asked whether there is a method in place to assess the effectiveness of AT delivery at their institution, the majority of participants in all countries except Ireland said "No" (72% of U.S., 67% of Canadian, and 61% of U.K. respondents.) In contrast, four out of five respondents in Ireland who answered this question claim to have a method of checking the effectiveness of AT delivery. Each of the Irish institutions who reported having a method for assessing AT effectiveness elaborated on their response, and each described working closely with students who are registered with disability services offices, collecting information on AT usage and effectiveness through student questionnaires. Three participants reported conducting student surveys at the end of each academic year. One reported conducting a biannual review of usage statistics in the AT lab, and doing so with consideration for extraneous variables such as whether students have their own AT, and the types of e-learning resources their instructors are requiring.

When asked to identify specific AT products that are installed and supported by their institutions, most respondents from all countries consistently checked at least one product in the product categories "screen readers", "screen magnification software", and "scanning/reading solutions". However, there were observable differences between countries in the several other software categories. First, only 70% of U.S. respondents reported installing and supporting text-to-speech software applications, whereas 91% of all other respondents claimed to install and support at least one product in this category. Second, the U.K. showed a similar low percentage (61%) who claim to install and support speech recognition applications (compared with 98% of all other respondents).

Also, European respondents are considerably more likely than North American respondents to install and support products in the category "concept mapping or organizational software". In Europe, 100% of Irish and 91% of U.K. respondents selected a product in this category, whereas only 76% of U.S. and 75% of Canadian respondents did so. A similar trend was observed in the "word prediction" category, in which 100% of Irish and 87% of U.K. respondents selected a product, whereas only 76% of U.S. and 75% of Canadian respondents did so.

Not surprisingly, there were differences across countries with regard to the specific products that were installed and supported. Those products that were preferred by respondents in the U.S. tended to be preferred in all other countries as well, although companies based in the U.K. and/or Ireland tended to have a strong base among institutions in their home countries. For example, a majority of U.K. respondents reported installing and supporting Dolphin Supernova, developed by U.K.-based Dolphin Computer Access (56% did so for its screen reading functionality, and 52% for its screen magnification). Only one of the respondents from Ireland reported installing and supporting Supernova, and none from either the U.S. or Canada. The preferred screen reader product in all countries was Freedom Scientific JAWS (81% overall, including 65% in the U.K.). The preferred screen magnification product in all countries was AI Squared Zoomtext (75% overall, including 70% in the U.K.).

There were similar differences among products designed for students with specific learning difficulties (e.g., dyslexia). In the U.K. and Ireland, the "text-to-speech software applications" and "scanning/reading solutions" categories were dominated by products from North Ireland-based Texthelp Systems (100% of respondents in Ireland and nearly 90% in the U.K. reported installing and supporting TextHelp Read & Write). In contrast, the preferred scanning/reading solution in the U.S. and Canada was Kurzweil 3000 (installed and supported by 85%

of U.S. and 83% of Canadian respondents). In the text-to-speech software category, TextHelp Read & Write was the leading choice among U.S. and Canadian participants as well, although with percentages considerably lower than in the U.K. and Ireland (50% in Canada, 33% in the U.S.).

AT Training

When asked "When students need AT training, how is it delivered? (check all that apply)", the most common response overall among seven options was "Informal demonstrations and training for individuals, as the need arises". This option was selected by 87% of U.S. participants, 67% in Canada, 100% in Ireland, and 56% in the U.K. This was the most common response in all countries other than the U.K., where the most common response was "formal training sessions for individuals" (65%, compared to 39% outside the U.K.). Since both responses involve training provided to individuals, the only distinction concerns the formality of the training. U.K. participants perceive their training to be formal, whereas participants outside the U.K. do not. This difference may be a difference in how the word formality is defined, although it is conceivable that training in the U.K. truly is more formal: Training is funded by the Disabled Student's Allowance, and the assessor has to stipulate the amount of training they think is needed for a student depending on their skills, the course taken and the types of technologies provided. Therefore, the funding model in the U.K. might create a more formal framework in which students receive training on AT.

When asked who primarily offers AT training to students, the most frequent response in all countries was "Professional disability services staff" (83% in Ireland, 76% in U.S., 52% in U.K., and 42% in Canada). The second most common response overall, though considerably less frequent, was "Professional technology staff", selected by 44% in the U.K., 35% in the U.S., 33% in Ireland, and 25% in Canada. Canadian participants were actually more likely to identify "general disability services staff (e.g., student workers)" as the provider of AT training to students (33%) than they were to identify professional technology staff in this role. Few participants outside of Canada reported using general disability services staff for this function (17% in U.S., 9% in U.K., and 17% in Ireland). Canadian participants were also much more likely than participants from other countries to select "Other" (42% did so), but only one of these participants elaborated, explaining that training was provided by provincial services at Assistive Technology-British Columbia and BC College and Institute Library Services.

Purchasing AT

Cross-country differences in funding models is evident in participants' responses to the question "How are AT purchases supported financially within your institution?" In Ireland, almost 85% of Irish respondents selected "grants", referring specifically to purchases funded through the Fund for Students with Disabilities. This is in marked contrast to the other countries who reported just 25% of funding through grants. The country with the second-highest frequency of selecting "grants" was Canada, at 33%. However, two Canadian participants identified student grants as a source of AT funding under "other", meaning that student grants may have been more common than the data suggests.

The most common response among countries other than Ireland was "General disability services budget" (75% in Canada, 70% in the U.S., and 52% in the U.K.). Respondents in the U.S. and U.K. also reported a slight likelihood to have AT purchased covered by a "General information technology budget" (33% in the U.S. and 30% in the U.K.). This was not true of Canada, where only 17% of respondents selected this item, nor of Ireland, where no respondents selected this item.

In the U.S., 26% of participants also reported funding AT purchases with a student technology fee. This was especially high at doctorate-granting institutions (32%) and master's colleges and universities (30%). However, there were only two participants outside of the U.S. who selected this item. Both represented institutions in the U.K., and they may have interpreted "student technology fee" to be referring to the DSA. Otherwise, survey

responses from U.K. participants showed little indication of AT being purchased using the DSA. In fact, "purchased through per-individual allowance" was one of the choices for this question, but was only selected by two U.K. participants (9%). In addition to these two participants, the two participants who selected "student technology fee", and the 13% who selected "grant money", an additional 26% selected "budget set aside by institution specifically for AT" and 17% selected "other". Given complexities, including recent changes, in how the DSA is administered, it's conceivable that U.K. participants were confused by the wording of the available choices.

Information Technology (IT) Accessibility

The section of the survey devoted to IT Accessibility was completed by 36 participants in the U.S., 7 in the U.K., 6 in Canada, and 4 in Ireland.

All survey participants (100%) reported using a learning management system (LMS), but only 56% reported using a content management system (CMS). This percentage was higher in Canada (71%) than in other countries (61% in the U.S., 33% in the UK, and none in Ireland).

When asked which LMS they use, 39% reported using Blackboard, 36% Moodle, 25% WebCT, and 18% custom applications developed in-house. Participants in Ireland, the U.K., and at doctorate-granting research universities in the U.S. showed a stronger tendency toward using Moodle and/or custom-developed applications compared to other demographics groups. In the U.K., the distribution was 42% Moodle, 33% Blackboard, 25% WebCT, and 17% custom-developed. In U.S. doctorate-granting research universities, the distribution was 43% each for Moodle and custom-developed, and 29% each for Blackboard and WebCT. In Ireland 75% of participants reported using Moodle.

When asked whether accessibility was a consideration when acquiring their LMS, 51% responded "Yes". This response was stronger in the U.K. than elsewhere, where 75% responded "Yes". The percentage of participants who said "Yes" in countries outside the U.K. was 50% in Ireland, 44% in the U.S., and 43% in Canada.

When asked which CMS they use, the leading response across all countries was "Other", and the most typical explanation was that participants' institutions had not standardized on a single CMS, and a wide variety of CMS applications, both home-grown and purchased, were being used in various colleges and departments.

When asked whether accessibility was a consideration when acquiring their CMS, only 28% of participants whose institutions use a CMS responded "Yes", including 25% in the U.S., 33% in the U.K., and 43% in Canada. Two of the Irish participants responded "No" to this question, and two did not respond.

When asked whether their institution currently has policies and/or procedures that require consideration of accessibility when acquiring information technology, 46% responded "Yes". By country, affirmative responses were recorded among 100% of participants in Ireland, 44% in the U.S., 43% in Canada, and 33% in the U.K.

If institutions claimed to have an IT accessibility policy, they were asked what standards or guidelines were used to support the policy. The most common response was "standards based on national legislation", especially in Ireland (100%) and the U.K. (75%). This was also the most common response in the U.S. (50%), but 25% said their policy was supported by state standards or guidelines. Not surprisingly, none of Canadian participants reported using standards based on national legislation, and 75% reported using provincial standards or guidelines. One participant each in the U.S., U.K., and Canada, said they had developed their own standards or guidelines

Web Accessibility

The section of the survey devoted to institutional web accessibility was completed by 33 participants in the U.S.,

12 in the U.K., 7 in Canada, and 4 in Ireland.

Participants were asked whether their institutions had a single person or office responsible for consulting with their institution's web authors on web accessibility. The percentage who answered "Yes" was higher in the U.S. than elsewhere (70% in the U.S., 50% in Ireland, 43% in Canada, and 33% in the U.K.).

Those who responded "Yes" were asked to identify roles and responsibilities of the person or group from a list of choices. Roles and responsibilities varied by country. In both Canada and Ireland, 100% of participants who were asked this question selected "reviewing or monitoring institution web pages for accessibility" as a role or responsibility. This also was the leading response in the U.K., selected by two of the four participants who were asked this question. In the U.S., where more participants (23) reported having a designated person or group responsible for web accessibility, the leading roles and responsibilities were consulting-related (both "consulting with individual web developers" and "making recommendations to web designers, authors, and/or developers" were selected by 91% of participants) rather than enforcement-related ("reviewing or monitoring..." was only selected by 70% of participants). Also, 70% of U.S. participants selected "teaching about web accessibility", and 30% selected "making code-level changes to websites to correct accessibility problems".

When asked whether their institution has a documented policy regarding web accessibility, 54% of U.S. participants said "Yes", as did 50% in both the U.K. and Ireland, and 43% in Canada.

Those who responded "Yes" were asked what standards or guidelines the policy was based upon. The most common response in the U.S. was "standards based on national legislation" (50%), the implication being Section 508. In the U.K., 67% of institutions identified the W3C's Web Content Accessibility Guidelines (WCAG) 1.0 Level AA (priority 1 and 2 checkpoints) as their standard. Seven other participants identified the WCAG as their standard, at varying levels of conformance: Three participants in the U.S. and one in Canada reporting using WCAG 1.0 Level A (priority 1 checkpoints); one U.S. participant, like the majority of U.K. participants, reporting using WCAG 1.0 Level AA; one participant in Ireland reported using WCAG 2.0 Level AA, and one participant in the U.K. reported using WCAG 2.0 Level AAA.

Multimedia Accessibility

The section of the survey devoted to multimedia accessibility was completed by 31 participants in the U.S., 9 in the U.K., 7 in Canada, and 3 in Ireland.

In the U.S., 29% of participants indicated that they have a centralized service for captioning multimedia content for users who are deaf or hard of hearing; 23% have an internal centralized service for transcribing audio content (e.g., podcasts). Based on this, it should not be a surprise that even fewer (19%) reported having an internal centralized service for audio describing (i.e., descriptive narration) multimedia content for users who are blind or visually impaired.

Centralized services for making multimedia accessible were similarly rare outside the U.S. Only one of the nine participants from the U.K., one of the three participants from Ireland, and two of the seven participants from Canada, reported having a centralized captioning service. Similarly, only two participants each from the U.K. and Canada, and one participant from Ireland, reporting having a centralized transcription service. Finally, only one participant in each of the participating non-U.S. countries reporting having a centralized audio description service.

Alternative Format Production

The section of the survey devoted to alternative format production was completed by 42 participants in the U.S., 11 in the U.K., 9 in Canada, and 5 in Ireland.

Participants were asked whether they have an internal centralized service for producing alternative format material. The majority said "Yes", but the percentage was higher in the U.S., than elsewhere (88% in the U.S., 64% in the U.K., 60% of Ireland, and 56% in Canada). In all countries who provided alternative format production services, this service typically resided within the disability services office (91% overall). In Ireland, there has been a national effort to involve libraries more in the production and distribution of alternative format material, and one of the three participants who reported having a centralized service said the service resided in the library. Although this is only one institution, it represents one third of participants and is expected to grow with time. Comparatively, only 9% of participants from countries other than Ireland reported alternative format services being housed in libraries, including only 5% in the U.S.

All participants were asked how their institutions addressed requests for specific types of alternative format (i.e., whether they produce the materials in-house, outsource production, or acquire them through some other means). For most specified media, the majority of participants across all countries reported producing materials in-house (81% for large print, 86% for electronic text, and 74% for audio).

In-house production of Braille is less common. In the U.S., all doctorate-granting universities (100%) produce their own Braille, but only 60% of master's colleges and universities and 57% of associate's colleges do so. In-house Braille production is also less common outside of the U.S., with 60% of participants in Ireland, 36% in the U.K. and only 22% in Canada claiming to provide in-house Braille services. This might be indicative of an overall decline in demand for Braille within higher education due to student preferences for audio and electronic text formats. If there is indeed a decline in demand, outsourcing may be more cost effective than maintaining equipment and staff expertise internally.

In-house production of DAISY documents is also uncommon, with only 33% of participants reporting providing this service. In fact, the most common response in all countries was "Other" (43%) and when prompted for further details most participants reported that they have not yet had DAISY requests.

Participants were also asked whether their institution participates in any regional or national consortia or other efforts to share alternative format materials. Overall, 49% of institutions responded "Yes", but there was considerable variance by country. When prompted to describe these consortia, participants identified a variety of consortia that are available in their country or region.

In the U.S., 45% of participants reported participating in one or more consortia. California community colleges reported using the Alternate Media Exchange (AMX Database) through the High Tech Center Training Unit; institutions in the California State University system reported using the system-wide California Alternative Media (CAM) database; additional consortia were mentioned in Texas and Colorado.

In Canada, 67% of participants reported participating in one or more consortia. Survey participants reported obtaining materials through provincial alternate format centers that are funded by the Ministry of Advanced Education to serve most publicly funded post-secondary institutions. It is worth noting that over the last few years, issues of access to and the availability of academic material in alternative formats specifically for students with print-based disabilities has received focus by both the Canadian Association of Disability Service Providers in Postsecondary Education (CADSPPE), and the National Educational Association of Disabled Students (see Kilmurray & Faba, 2005 for a study that highlights these issues).

In Ireland, 100% of participants reported participating in one or more consortia. Participants reported receiving materials through TextAccess, a repository for all higher education institutions to share alternative format materials. Colleges are funded through the Fund for Students with Disabilities to convert materials to alternative format, with the proviso that all work should be then made available to all other colleges.

Participants in the U.K. were less likely than in other countries to participate in consortia (27%), but those who do

so reported using the UK National Library for the Blind.

The one participant from Australia reported obtaining materials from the Royal Society for the Blind of South Australia.

Discussion

Some of the differences across countries observed in the ATHEN Survey results can be attributed to small sample sizes. However, many of the differences (and similarities) help to highlight issues that warrant further exploration.

In Ireland, it should be noted that the relatively small sample actually did include most of the major universities and some of the smaller colleges, and may therefore truly be reflective of national trends, although skewed slightly toward the larger institutions, which are more likely to have dedicated staff in assistive technology and alternative format production. Only a handful of the Institutes of Technologies and other smaller institutions have designated AT officers. In the Institutes of Technologies, the Access Officer is generally the coordinator of assistive technology and alternative format supports. He or she is often also responsible for supporting mature students, students from socioeconomically disadvantaged schools and those from ethnic minorities.

The results for all countries are likely to be skewed toward institutions that are actively engaged in technology accessibility issues. It stands to reason that institutions that have no activity to report would have little incentive to participate in the survey. Therefore, the overall situation described by these results is probably much worse, a troubling notion particularly in areas such as multimedia accessibility, where very few institutions in any country are captioning, audio describing, or transcribing their multimedia resources.

In the U.K., institutions are required by the Disability Discrimination Act to ensure that "reasonable adjustments" be made "in anticipation" that students and staff with disabilities may be using these products. Institutions in Ireland, the U.S., and Canada may similarly be subject, if not to national legislation, then to state or provincial laws or policies, or to policies of their educational system or institution. Despite such requirements, only half of participants reported that accessibility was a consideration when acquiring their LMS (and 100% of participants are using an LMS). The accessibility of LMS applications is critical because of the degree to which they potentially impact all students. If these tools are inaccessible, students will be impacted across all of their academic courses. The percentage who said they had considered LMS accessibility was stronger in the U.K. than elsewhere (75%), which may speak to the perceived strength of the legal requirements in the U.K.

Many institutions in Ireland have policies requiring that goods and services acquired by the University be accessible as far as is practicable. In fact, such policy was recently shown to be effective. According to NUI Maynooth learning technologist Claire McAvinia, NUI Maynooth recently rejected a study skills product for not being fully accessible after consultation with the Disability Office (C. McAvinia, personal communication, October 26, 2008). Similar outcomes have been reported within the California State University (CSU) system, where vendors were forced to address accessibility issues before CSU would agree to purchase their products (California State University, n.d.)

Participating countries vary in their approach to web accessibility. When asked whether their institution has a single person or office responsible for consulting with their institution's web authors on web accessibility, a greater percentage of U.S. participants (70%) responded affirmatively than did participants in other countries (50% in Ireland, 43% in Canada, and 33% in the U.K.). These results can be interpreted multiple ways. One could argue that having a single office that provides web accessibility support ensures that web developers are adequately trained and supported on web accessibility issues, and that having such an office may ensure that accessibility continues to be on the radar of developers. However, one could also argue that accessibility knowledge should be embedded across all departments, not just one, and charging the existing web

infrastructure to address its accessibility may be an effective strategy for achieving accessibility. Web developers tend to seek support from a broad community of on-line sources, and the international on-line community of web developers interested in accessibility is quite strong. Additional research is warranted that would assess efficacy of various internal strategies for addressing web accessibility.

Looking ahead, it is clear that we still have some way to go before we achieve universal access to technology-enhanced learning. There are many initial training issues for students new to assistive technologies with a system that does not always allow for updates and reviews. There remain accessibility issues related to the ease of making alternative formats for documents locked in certain formats or containing complex diagrams. Finally, some newer on-line dynamic web applications, which can provide exceedingly effective learning environments, can impose further barriers. With due care these rich, interactive environments can provide an easy-to-use, effective framework for teaching and learning. They are often linked to the type of communication and social networking enjoyed by many students. As the educational environment continues to evolve and embrace new technologies for teaching and learning, the need becomes especially critical for institutions to embrace these technologies with an active interest in ensuring their accessibility.

Although there clearly is much work still to be done before our institutions of higher learning are fully accessible, the fact that higher education institutions from seven countries were represented in the survey holds promise for future accessibility. Addressing the accessibility of emerging technologies will require a global effort. Individuals in higher education must ask questions about accessibility, both internally and externally. Vendors must be drilled about the accessibility of their products, and accessibility of these products must in fact be demanded as has been shown to be effective in Ireland and at CSU. Skilled individuals must participate in open source development projects and otherwise get actively engaged in raising the level of discussion so that accessibility and universal design are integral components of all teaching and learning strategies and are built in to the tools that are used in support of these strategies.

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Acknowledgement

This article was funded in part by the National Science Foundation (grant # CNS-0540615). Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

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