Wong, L.-H.et al. (Eds.) (2013). Proceedings of the 21st International Conference on Computers in Education. Indonesia: Asia-Pacific Society for Computers in Education

Identifying Issues of a Web Accessibility Service through Examining Its Online Learning Activities

Ruey-Shyy SHIEH[a*], Yao-Ming YEH[b], Kuo-Ming HUNG[a]
*[*a]Dept.of Information Management, Kainan University, Taiwan*
[b]Dept. of Computer Science & Information Engineering, National Taiwan Normal University, Taiwan
[*]rueys99@gmail.com

Abstract: In Taiwan, a Web Accessibility Service was establishedin 2004, which provides online courses for adult learners with disabilities to acquire job-oriented skills, particularly computer skills. Although a large number of learners have registered for the courses, the percentage of learners who complete their study is rather low. The purpose of this study is to identify issues related to the current services through examining the online learning activities of its participants in the 2012 term.Data sources consist of discussion statements posted online, discourse of online meetings, and self-reported questionnaires. The results indicate that the Service support team was rather dedicated to maintaining the system and courses offered. The learners who submitted the online questionnaires also appeared rather satisfied with the overall services provided. It seems that the low study completion rate, 5.4% in 2012, may not be due to the services per se. Other factors causing the low completion rate must be further explored. Suggestions of future directions for improving the services are provided.

Keywords: Accessibilityweb, learners with disabilities, online forums, web-based learning

1. Introduction

In recent years, the development of computers, telephones, and assistive technology tools, both software and hardware, has helped individuals with disabilities become more autonomous, productive, and participatory in academics, employment, entertainment, and other activities (Burgstahler et al., 2011). Some researchers contend that ICT (Information, Communication and Technology) supported learning has the potential to equalize opportunities for those with special learning needs (Florian, 2003).In Taiwan, there are approximately 1.1 million individuals with disabilities. To narrow the digital gap for people with disabilities, the Bureau of Employment and Vocational Training (BEVT), Council of Labor Affairs in Taiwan established a web-based learning system, calledthe Web Accessibility Service system, in 2004, to help adult learners with disabilities attain job-oriented skills, particularly computer skills. It is the hope of BEVT that learners with disabilities can enhance their skills and subsequently increase their employment opportunities. The website of the service is located at http://openstudy.evta.gov.tw. Even though a variety of online courses were offered to learners, the study completion rates were rather low in the past years. The purpose of this study is to explore possible issues associated with the low completion rate, the findings of which can hopefully be used for future improvement of the current services.

2. Literature Review

2.1 The Concept of Web Accessibility

The National Science Foundation defines *access* as "the ability to find, manipulate and use information in an efficient and comprehensive manner" (Lesk, 1988). To implement the notion of the Universal Web, norms and regulations for web design must be established and some necessary computer aids may be needed by individuals with disabilities in order for them to browse WWW information without difficulty. More detailed development of accessibility regulations and rules can be found in Waddell (1999).In Taiwan, four principles are recommended for designing a publically accessible web (Yeh et al., 2003): 1) Accessibility of multimedia information, 2) Accessibility of webpage structure and its presentation, 3) Accessibility of webpage development and related techniques of input/output devices, and 4) Accessibility of website navigation mechanisms.More concretely, four aspects of accessibility components corresponding to the above four principles must be considered when designing a public website: content (the text information presented on the web), structure (the layout of the web design), technique (accessible design of browsing structure among webpages in any given website), and navigation (accessible design of browsing structure among webpages). In other words, an accessibility web must satisfy the user in those four aspects.

2.2 The Web Accessibility Service in Taiwan

As mentioned, a Web Accessibility Service was established in Taiwan in 2004, providing a web-based learning environment for adult learners with disabilities to gain job-oriented knowledge and computer skills. Since then, various online courses have been developed. In 2006, the services were made public foradults with disabilities. As of the end of 2012, a total of 48 courses were available online, broken down into five categories of courses, including Basic Computer, Web Design, Office, Computer Certificate, and Job Technique. Approximately 2,000 members had registered to study one or more of the courses offered. Each year, only one study term was offered, which lasted for nine months. The long period of the term was to accommodate slower learners. A study certificate would be conferred to those who completed their study, one for each course completed. "Completion of study" was defined as (1) having accessed two registered courses at least twice, each lasting more than 60 minutes during the studied term, (2) having participated in the online forum and made postings at least twice, and (3) having submitted the end-of-term questionnaire surveying their satisfaction with the courses they studied. To date, there are more than 260 learners who have earned a study certificate, approximately 25 to 30 learners per term. Atotal of five learners have earned one to two certificates, certified by a governmental institute,as a result of studying the courses since certificate-related courses were offered in 2011.

Although the number of learners enrolled in the courses offered has been growing steadily, the number completing their study (approximately 13%, 260/2000 to date) is far lower than the initial anticipation of the system sponsors. How to increase the usage of the government-supported system and effectively help adult learners with disabilities acquire the job oriented knowledge and skills offered is of great concern. This study intends to identify possible issues associated with the low completion rate through deliberately examining the online learning activities taking place in the system, the findings of which can hopefully serve as useful references for strengthening the current system in the future.

3. Method

The learners who enrolled in the courses offered in the term of 2012 were involved in the study. During the term, online forums, one for each course,wereestablished for learners to post information and questions. In addition, synchronous online meetings were held once a month, each lasting for two hours.Online logs posted by the learners, automatically kept in the system, and the verbal conversations conducted in the online meetings were gathered. In addition to the qualitative data, two sets of questionnaires, one administered in the middle of the term and the other at the end of the term, surveying the learners' satisfaction with the overall services, were also collected. The mid-term questionnaire consisted of eight questions, whereas the end-of-term questionnaire contained 10 questions (the eight questions of the mid-term questionnaire plus two additional ones). Table 1 displays these ten questions.

Table 1: The survey questions.

Item	Question
1	Overall speaking, are you satisfied with the services provided by The Web Accessibility Service?
2	Are you satisfied with the web design and technological processes of the service platform?
3	Are you satisfied with the stability of the service platform?
4	Are you satisfied with the content and materials of the course?
5	Are you satisfied with the degree of difficulty/easiness of the course?
6	Are you satisfied with the instructor's explanations and responses?
7	Are you satisfied with the quality of the services provided by the teaching assistants?
8	Are you satisfied with the toll-free customer service provided by The Web Accessibility Service?
9*	Are you satisfied with the electronic newsletters sent by The Web Accessibility Service?
10*	Are you satisfied with your learning outcomes?

* Only asked in the end-of-term questionnaire

The questionnaire was designed based on a five-point Likert scale, ranging from strongly disagree (1) to strongly agree (5). Microsoft Excel was used to analyze the survey data. Content analysis was adopted to analyze the online logs. A complete statement was used as the analysis unit to analyze the log data. The statements were firstly classified into types. Eight major types were identified, shown in Table 2 along with examples of each. Next, the identified types were quantified to tally frequencies by type.The verbal conversations gathered from the synchronous online meetings were firstly transcribed verbatim and then classified into types based on the discourse purpose. The numbers as well as the roles of the participants attending the meetings were also tallied.

Table 2: Types of online logs and associated examples.

Types	Question
Hands-on operation related	• "How can I create text effect in Flash?" • "How can I convert a document into a PDF file?"
Software functions related	• "What are the differences between Office 2003 and Office 2007?" • "I couldn't view the awarded PPT *(created by a classmate)* and other course content; was it because the version of my Office is 2003?"
Connectivity/ system problems related	• "It seems that the quality of video and audio is not as good as earlier. It was too noisy during the synchronous meeting, and I could barely hear the others' voices." • "We wanted to attend the online meeting but found out that Homemeeting *(the software for meeting)* was out of space."
Certificate exams related	• "Where can I download the previous exam questions?" • "What are the major changes of the current exam questions, compared to the previous ones?"
Course content related	• "Please explain the 7 layers of OSI *(Open Systems Interconnection)* to me." • "How can I distinguish ROM *(Read Only Memory*) and RAM *(Random Access Memory)*?"
Course information related	• "I have posted the message *(about the upcoming exam)* on the website in case anyone did not know it yet." • "Is only a person with disabilities allowed to access the courses?"
Social and other info related	• "You *(the classmates)* are invited to visit my personal website of Multimedia Work Studio." • "How can I contact instructor Huang?"
Feedback/ suggestions related	• "I suggest that a subject be added when *(the classmates)* uploading a file." • "I personally suggest that the courses be sorted by type in order to expedite our entering the courses."

Remark: The words in *italics* are the authors' notes.

4. Results

Six courses were offered in the studied term. Fifteen teaching assistants (TAs) stood by online to assist learners with the courses they had registered for.Although there were 881 learners registered to study the courses, many of themregistered in more than one course, so the number of individual learners was actually 443. A total of 48 study certificates were conferred to those completing the study, although the number of individual learners earning study certificates was actually 18. This completion rate is very low, regardless of viewing from the total count (5.4%, 48/881) or from the unrepeated individual count (4.1%, 18/443).

According to the log data, there were 456 statements posted by the learners during the nine-month period, excluding the TA responses. Connectivity and system related questions appeared to be the type of statements the learners posted most frequently (a total of 126 postings, excluding duplicate statements posted in multiple online forums), followed by skills oriented hands-on questions (a total of 83 postings, excluding duplicates). In contrast, social and other information related statements were the least frequently posted type (a total of 16 postings, excluding duplicates). It is also found that the learners in the Computer Certificate class posted the highest number of statements (a total of 152), whereas the learners in the Job Technique class posted the least number (a total of 27).It indicates that certificates related questions were the most concerned category.

The analysis of the online meeting data shows, in addition to TAs and coordinators of the web system, there were 10 to 16 learners taking part in each meeting. Other than announcing general information and web sources, one or two instructorswere also invited in each meeting to address a topic in a more practical manner. Examples of the topics were “Whether electronic books suit me at the current stage,” “The procedures of attending the exam of Computer Software Application – Level C,” “Overview ofsheltered workshops andwork areafacilitiesinNew Taipei City,” “Life education and positive thinking,”and “Walking in the Cloud.”

There were 8 to 13 learners who submitted the mid-term questionnaire, whereas 6 to 11 submitted the end-of-term questionnaire. The overall survey results reveal that the percentages of learners who felt (strongly) satisfied are far higher than those who felt (strongly) unsatisfied.Based on the mid-term surveys, the stability of the service platform appeared to be the item which had the lowest number of learners who felt strongly satisfied. The item forwhich most learners were strongly satisfied was the quality of the services provided by the TAs. The results of the end-of-term survey disclose that the item which had the lowest number of learners who felt strongly satisfied is the learners’ own learning outcomes. Overall speaking, the items which most learners felt strongly satisfied included the toll-free call service, the overall services, and the quality of the TAs’ services.

5. Conclusions

The study results reveal that the Web Accessibility Service support team was rather engaged in supporting the provided services. Not only were the TAs responsive to learners’ inquiries (postings), but the coordinators were also rather participatory in the learning activities. Although the number of learners attending the online activities was low, those who were constantly involved in the activities seemed to be highly likely to complete their study. Those learners, in general, were also satisfied with the overall services and courses provided. This indicates that once the learners became part of the learning community, they tended to sustain and also complete their study. Therefore, to resolve the issue of the low completion rate, the focus of the attention must be placed on those who registered for the courses but seldom or never accessed them. To improve the usefulness and effectiveness of the current system, what prevents those learners from continuing their study is the central issue to be scrutinized.

Several factors are speculated to be associated with the learners’ failure to continue their study. For example, the stability of the system may be one reason. As the log data disclosed, the statements/questions that learners most frequently posted in the online forum were related to connectivity problems. For those who were less experienced in using computers, being unable to cope

with connectivity problems might hinder their attempts to use the system. As Hegarty et al. (2000) contended, in addition to the technical aspect, the psychological aspect, such as attitudes and self-confidence, must also be considered when providing ICT intervention for learners with special learning needs. Learners with disabilities may be shyer and less confident about participating in public activities. Therefore, how to help them step out and adapt to the online learning community may demand more of the system team's effort.

Narrowing the digital gap for people with disabilities has become a global trend. Establishing a helpful, useful, and friendly online learning environment to facilitate learners with disabilities to attain competitive skills and subsequently secure a decent job is one way to that end. It is particularly important that a government-supported web service, such as the one examined in the present study, can provide such an environment to meet the anticipated goal. To achieve that goal, more effort committed to improving the current services is needed.

6. Suggestions

To encourage more learners to take advantage of the services provided by the Web Accessibility Service, the following suggestions are provided:

- Establishing an active tracking center
  The current contact center established in the Service allows members to contact service staff through either a toll-free phone line or an online stand-by service. For shy or public-phobiclearners, this kind of*passive*contact servicemay be ineffective.It is necessary that staff at the center *actively* contact those who register for the courses but do not show up in later learning activities. This contact must be systematically tracked and followed up. Rubrics for contacting and tracking learners' learning situations are also needed. In addition, staff must be trained prior to engaging in the tasks. Although the number of learners registered in the system far overwhelms the limited number of contact staff,the outcome will add up as such contact persists.
- Attending to learners' learning needs based on their computer skills background
  It is reported that the disability types of the learners registered in the current term consisted of visually, hearing, physically, and cognitive impaired, and a few others. Although the Service was thoughtful to develop both cognitive oriented and non-cognitive oriented courses for various types of disabilities, it did not consider the learners' knowledge backgroundor computer skills level. It is important that when contact staff tracks learners' learning situations, their backgrounds and computer skill levelsmust also be recorded. The RDEC report (2008) revealed that difficulties encountered by learners with disabilities included being unable to find the desired webpages from the overloaded web information and not understanding the web content written in English. To some learners, *holding their hands* to go through certain learning sessions may be necessary.
- Understandinglearners' learning situations through multiple online tools
  Designing more comprehensive questionnaire items for learners to fill out is one way of elicitingfirst-hand information about the learners.Inviting them to be speakers in the online meetings to share their learning process, learning hardships and learning outcomes is another method of identifying their learning needs and learning progress directly.

Acknowledgements

This study was sponsored by the National Science Council (NSC 100-2511-S-424 -002 -MY2).

References

Burgstahler, S.,Comden, D., Lee, S.M., Arnold, A. & Brown, K. (2011). Computer and cell phone access for individuals with mobility impairments: An overview and case studies. *Neuro Rehabilitation*, 28, 183-197.

Florian, L. (2003).Editorial.*Journal of Research in Special Educational Needs, 3*(3), 139–140.

Lesk, M.E. (1998, November, 12). Letter from National Science Foundation.

RDEC (Research, Development and Evaluation Commission).(2008).*Report of digital divide and digital life needs of people with disabilities in 2008*.Retrieved fromhttp://www.rdec.gov.tw/public/Attachment/072910524271.pdf (available in Chinese only).

Waddell, C.D. (1999). The growing digital divide in access for people with disabilities: Overcoming barriers to barriers to participation in the digital economy. *Understanding the Digital Economy*, US Department of Commerce, Washington DC. Retrieved from http//www.icdri.org/CynthiaW/the_digital_divide.htm.

Yeh, Y.M. Chou, A.M., & Lee, T. Y. (2003).*Draft of accessibility web development.*The Republic of China: Assistive Technology Promoting Vocational Rehabilitation Association (available in Chinese only).