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Résumé de l'article

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Technical Evaluation Report

36. Advanced Accessibility Features for Inclusive Distance Education

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Abstract

Report #32 in this series has considered the special attention required to make online collaborative tools fully accessible. The particular challenge for software developers is to optimize the accessibility of online education for persons with disabilities. In the process, the software's efficiency for all users is likely to be increased. The current paper expands on Report #32, by the same author, in reviewing specific software products that are rising to the online accessibility challenge: *Allen eC*, *iCommunicator*, and *OpenCampus*.

Introduction

Vanderheiden, Harkins, and Barnicle (2002) indicate that accessibility incorporates the ability to use online content without vision, without hearing, without pointing or manipulation, and without speech by persons with cognitive limitations, with language disabilities, with low vision and limited or no hearing, and with alternative languages. While many distance education programs incorporate website accessibility according to World Wide Web Consortium (W3C) and other website standards, few offer advanced accessibility features. Real-time simultaneous interactions, such as chat, can have many applications in distance education, but finding programs offering full accessibility for a variety of disabilities is problematic. The ideal interface would provide for simultaneous speech and text interaction, as well as specific disability accommodations. Providing real-time, simultaneous translation of speech to a form appropriate for persons with hearing difficulties (whether sign language, lip-reading, or text), concurrent with real-time simultaneous translation of text to a form appropriate for persons with visual difficulties (whether audio or Braille), remains a fundamental barrier to inclusive distance education.

Zimmerman, Vanderheiden, and Gilman (2001) of the Trace Research and Development Center at the University of Wisconsin outline what they see as the need for “translation services” to accommodate the widest variety of user needs. These needs include permanent functional limitations such as visual, hearing and cognitive impairments; temporary functional limitations relating to a particular situation (e.g., a factory worker who cannot hear due to a noisy environment); limitations created by the use of handheld and wireless Internet devices with

restricted input/ output capabilities; and limitations created by the need to communicate in a non-native language. The modalities they identify to meet these needs include:

Text-to-speech translation

- Speech-to-text translation
- Speech-to-sign language translation
- Language translation from one international language to another
- Language and cognitive level translation to reframe material into a higher/lower literacy level while maintaining the same meaning
- Automated image and video description to make graphics and video comprehensible to an individual who cannot access them directly, due to a physical or situational impediment

Zimmerman Vanderheiden, and Gilman (2001) foresee a triple tier of services beginning with local automated services such as those found in hardware or software on an individual's computer, and evolving to advanced services at the network level, and to personalized access including human assistance. If services at one level do not supply a user's needs, the individual would access those at the next level until their needs are met. Hellstrom, speaking at the Federal Communications Commission Solutions Summit on VOIP (2004), outlines a similar concept which he terms “total conversation”: a single, affordable interface permitting varied combinations of voice, text and video, to meet the needs of the participants in real time. The interface would include interoperability with a variety of personal communication services.

The current report reviews three programs that incorporate advanced accessibility features. Two utilize Voice-over-IP (VOIP), while the other (*iCommunicator*) plans to incorporate its use within the next year. VOIP may provide an effective medium for incorporating audio, text and video, allowing the creation of integrated communication tools that feature speech, text, language translation, captioning, speech recognition, and speech synthesis from text, with the potential to lower long distance telephone access charges. Other advanced accessibility features include compatibility with screen reader and Braille display technology. (For a review of another VOIP program with some accessibility features, *iVocalize*, see Report #32 in this series.)

Product Trials

1. Allan eC

Allan eC (All Languages Electronic Conversation). Produced by the Swedish company, Omnitor, *Allan eC* is a multifunctional computer add-on kit designed to provide an accessible online communication tool for persons with hearing, speech, or visual difficulties, and to accommodate a range of learning disabilities. The product provides a real-time, simultaneous video, text, and voice tool incorporating audio chat, text chat, video chat, speech to video lip-reading, and speech-to-sign language translation via video telephony relay service (VTRS). The program is compatible with multi-party meeting systems and the text portion of conversations may be recorded for later review. By coupling hardware and software with access to human sign language translators, *Allan eC* comes close to demonstrating the three-tier access system described by Zimmerman et al. (2001).

Minimum requirements include a Pentium III 800 MHz, *Windows/98* or higher, an available PCI slot for video capture card, a sound card, speaker for optional alert signal, COM ports for optional alerting adapter, COM port for optional text telephone, broadband Internet connection at greater than 200 kb in both directions, support for *DirectX* v.8.0 or higher, graphics resolution with at least 65K colors, firewall/ router that accommodates SIP calls (Session Initiation Protocol) for Internet conferencing, telephony, and instant messaging. Participants choose the communication features they need, with combinations such as speech from one participant, translated into sign language for another who replies via text. Additional optional features include compatibility with Braille display, speech synthesis software, text Internet telephony, and audio and/ or flashing light alerting system. Several kit combinations offer a webcam, PCI-card for video capture, headset, alerting system adapter, external modem for text telephony, user manual, and software. A special model is available with extra high resolution images. Combined with a large screen, 2 mb/s connection and a computer with 4 GHz processing speed, the program can accommodate up to eight persons at one site for sign language, or 12 for voice-only calls.

For persons with visual difficulties, *Allan eC* is compatible with *Zoomtext*. The *SuperNova* reader magnifier is recommended for complete accessibility. The vendor states that the program should be compatible with other screen readers, but this, apparently, has not been tested. The speech synthesis within the program is provided by add-on screen reader software. The program has been specifically tested with *Infovox* in *SuperNova* in relation to user interface and text conversation. Using the in-built features of *Allan eC* with add-on screen reader software would therefore allow a hearing-disabled person to type in a conversation that could be synthesized into speech for a person with a visual difficulty. Multi-language features include controls in English, Swedish and Norwegian. *Windows* multi-language options are supported. The software does not provide cross-platform access for *MacIntosh*, *Unix* or *Linux* users. *Allan eC* can accommodate *NetMeeting* in a networked environment, but true application sharing, whiteboard and Web co-browsing are not integrated. Pricing is negotiated by contract for markets outside Sweden.

2. iCommunicator

iCommunicator is presented as a multi-sensory, two-way communication tool for persons with hearing difficulties or other communication challenges. It is an alternative to sign language interpreters as a means to communication with hearing individuals. After participants have created a speech profile, the software provides real-time speech-to-text conversion, and then converts the text to video sign language or a computer-generated voice. Recommended requirements include: a Pentium III, 800 MHz, l GHz or better processor, 512 MB RAM (minimum 256 MB), 2 GB hard drive space, parallel port, video card with 8 MB member, 800 x 600 display resolution, *SoundBlaster Pro* compatible sound card, speakers, 24X CDROM drive, *Windows 2000* or higher, a word processing program, and a broadband Internet connection. The professional version with wireless microphone setup retails at $3,999 US with a standard version (wired microphone) at $3,689. Pricing for site licensing is currently being formulated.

Dragon Naturally Speaking is the accompanying software, and speech recognition software training is required for participants, using a quick training program which can be completed in approximately 30 minutes. Multiple speech/ voice recognition files can be created for an unlimited number of users, and the program can be switched from one user to another in minutes. A user-independent version is anticipated. The program is compatible with the *JAWS* screen reader and with *Windows* accessibility features. Using a “Speak Incoming Words” feature, speech may be converted to a computer-generated voice for output to a cochlear implant speech processor. This feature also has applications for persons with speech difficulties. The video sign

language vocabulary includes finger spelling and over 9,200 signs with adjustable signing speeds. The text size, text box color, and size of the sign language frame, may be adjusted by the user. Multi-language controls are not available for *iCommunicator*, but the vendor plans to offer a variety of languages including the appropriate video sign language. At present, the program does not incorporate online audio chat. Students speak via telephone, and comments or questions by students have to be repeated by the instructor in order to be converted into sign language or computer-generated speech. The vendor plans to incorporate VOIP within the next year.

iCommunicator users have the ability to place their own notes in the text chat box. These are visible only on their desktop, and can be recorded along with the rest of the presentation for later review. With the use of an incorporated *iText* tool, students can place content from email, webpages, or documents created in other applications into the *iCommunicator* program, for translation into video sign language or speech. Testing is underway in relation to distance education uses of the product, with the program made available to the instructor and viewable on students' desktops. At present, the program can be used in conjunction with web-based presentations such as *PowerPoint,* using a split screen or, possibly, picture-in-picture. In a live demo session via a broadband connection (dial-up is not supported), browser-based download of the student software took minutes only. The rapid speech-to-text translation was estimated at 95 per cent accuracy. The software was pre-trained for the user. Text-to-sign language translation lagged behind speech translation, but usually appeared within minutes of the text translation.

3. Open Campus 4.0

***Open Campus* 4.0** is software designed to provide accessible desktop lectures and live online meetings via one- or two-way VOIP or conventional telephone. The program can handle live audio and video chat, an interactive whiteboard, application sharing, student content notes, course and private text chat, instant messaging, and breakout rooms. Accessibility features include messaging, text descriptions of slides, keyboard shortcuts, *PowerPoint* slide descriptions, and interoperability with closed captioning services, browser accessibility features, and screen readers. Minimum requirements include *Windows/* 98 or later, *MacIntosh*/9.0 or later, or *Linux*, 64 MB RAM (128 MB recommended), 56K dial-up connection or higher, *Internet Explorer* 5.0 or higher, *Netscape* 7.0 or higher, *Mozilla* 1.0 or higher, *Safari* 1.1 or higher, *Java* and *JavaScript*, and a sound card with dual audio streams. Closed captioning is possible via an interface with human captioning services. Client-side use of speech recognition software has not been tested. The program is compatible with several screen readers, including *JAWS* and *Window-Eyes*. *OpenCampus* sessions can be recorded for later playback and review. Closed captioning can be displayed from the recorded files, and the interface remains compatible with screen readers.

Conclusions

Distance education is not the primary function of any of these accessibility products, but their development indicates the progress that is being made toward truly inclusive communication interfaces. Cost is the major barrier to development and adoption of these interfaces, particularly in relation to the need for high-speed bandwidth connections, the need to incorporate human sign language interpreters, and the costs of specialized hardware and software. In addition, there is a need for the technology (particularly VOIP, speech recognition, speech synthesis, and sign language avatar programs) to mature. As long as sign language and closed captioning require the features described by Fitfield and Webster (2001) as “a trained and available cadre of sign interpreters, note takers, and realtime captionists,” costs will be high for these features. The

California Virtual Campus, for example, uses *OpenCampus* with *RapidText* for live streaming text transcription at $190 US per hour.

Although products of this type show initial progress toward multi-language support, none incorporate international language translation. Apart from *OpenCampus*' slide descriptions, none of the programs reviewed contain the important cognitive level translation and automated image and video description features identified by Vanderheiden et al. (2002). Much of the accessibility in these programs is not yet integrated but is provided via compatibility with add-on programs. In all of the programs, application sharing, whiteboard and web co-browsing would be highly desirable for distance education use.

The next report in the series reviews a further range of assistive software for disabled learners.

> **N.B.** Owing to the speed with which Web addresses are changed, the online references cited in this report may be outdated. They can be checked at the Athabasca University software evaluation website: http://cde.athabascau.ca/softeval/. Italicised product names in this report can be assumed to be registered trademarks.
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> *JPB Series Editor, Technical Evaluation Reports*

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