Possibilities of web-conferencing systems for disabled students

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Abstract

This paper deals with issues of web-conferencing systems accessibility and usability. These systems and applications are becoming increasingly popular in the educational process. Unfortunately, the majority of web-conferencing systems are not designed for users with disabilities. The aim of this paper is to describe possibilities of web-conferencing system for teaching handicapped students and explain the benefits of using this solution for common education. The main part of testing the hypothesis and possibilities were carried out in the Adobe Acrobat Connect system which is commonly used in the educational process at CULS.

Key words

Accessibility, web-conferencing system, education, assistive devices Anotace.

Anotace

Příspěvek se zabývá problematikou přístupnosti a použitelnosti web-konferenčních systémů. Tyto systémy a aplikace jsou ve vzdělávacím procesu stále populárnější. Bohužel, většina web-konferenčních systémů, není pro uživatele se zdravotním postižením přístupná. Cílem této práce je popsat možnosti web-konferenčních systémů pro podporu výuku zdravotně znevýhodněných studentů a nastínit výhody použití tohoto řešení při běžné výuce. Ověřování hypotéz a možností systému bylo prováděno zejména v programu Adobe Acrobat Connect, který je běžně využíván pro vzdělávání studentů na ČZU.

Klíčová slova

Přístupnost, web-konferenční systém, výuka, kompenzační pomůcky.

Introduction

Accessibility to the Internet information defines a set of standards which make information technology and software applications more easily usable by those who are affected by various disabilities. The solution of the disabled students' problems by means of information technology is based on the acquisition and information processing by disabled student with the help of specialised equipment. The main objective in education of disabled students is to find optimal technical equipment. They can therefore have education as easy to access as any other student and quality life without any information barriers. The Adobe Connect (formerly Breeze) system is exploited at CULS. This system allows designing education with the help of the videoconferencing system. One of the possible utilizations of this system is to offer the educational material for disabled students.

Material and Methods

The aim of this paper is to describe the possibilities of the web-conferencing system for teaching handicapped students and explain the benefits of using this solution for a common educational process. The method involves processing of several expert sources and their comparison as well as utilization of the web-conferencing system in education. The main accessibility guidelines are based on WCAG, version 1. The Adobe Acrobat Connect web-conferencing system is exploited at CULS, on that account the main part of testing the accessibility issues is made in this system.

In the first step, the system was tested for the fundamental elements of accessibility. The second

step was to identify opportunities for the web-conferencing systems in the educational process. The proposed hypothesis and possibilities, which are mentioned below in this article, have been tested in teaching of regular as well as distance students. Several users with different disabilities were identified among these students.

Results and discussion

Assistive devices for visually handicapped people belong to one of the financially most costly pieces of equipment. Visual restrictions pose such a severe disadvantage in the working environment that their compensation through the usage of special tools is financially very demanding. In the majority of cases, the degree of visual impairment or a full loss of vision require a solution at a high technical level. Over the past three years information technology has developed to a stage which allows even the vision impaired people to choose from several possibilities of using the Internet.

Assistive devices are used as an instrument which makes it easier to cope with disabilities and helps the clients to live more like a healthy population. These devices do not provide only the compensation of deprivation of certain physical, mental or sensory functions, but they also may prevent further losses (for example - to help a person to engage in employment and social integration process). [4]

Confrontation of costs of assistive devices for visually handicapped people

This section provides a comparison of several assistive devices in terms of their performance and cost. The solution for visually impaired users is based on the mobile or stationary personal computers which are equipped with special software according to individual angles of usage.

These assistive devices are a collection of separate tools, which are based on a personal computer, monitor (for the visually impaired users it is usually larger), keyboard and other standard components and specific equipment (scanner, sound card, amplified speakers or headphones, tactile display). This collection is also equipped with the standard and specific software.

In the Czech Republic the types of assistive devices are described by legislation. The visually impaired people are covered by Act No. 182/91 Coll., as amended, No. 206/95 in Point III, paragraph 4 [2] as follows:

- − - Digital reading device for blind people with voice output (voice reader)
- − - Digital magnifier for visually impaired people (digital magnifier)
- − - Digital magnifier for almost blind people with voice output (digital magnifier with voice support)
- − - Electronic notepad with voice output and Braille display for blind people (electronic notepad)

As described further, the solution based on the usage of the web-conferencing system is not considered assistive technology as listed in the Act No. 206/95.

This system can partially replace some of the financially expensive equipment, which is installed in the lecture classrooms in order to provide the equalization of education for handicapped students as required by the university policy.

Web-conferencing systems and applications are becoming increasingly popular in educational, corporate, and non-profit organizational settings. These applications are used for a variety of purposes, including online collaboration, presentations, webinars, training, desktop sharing, and more. Unfortunately, the vast majority of web conferencing applications are not designed with people with disabilities in mind, and as a result, such tools are not accessible to people with these special needs. [6]

Possible utilization of web-conferencing system for visually handicapped students

Visually disabled user (also student) uses the personal computer with special arrangement in standard and also in specific way. Personal computer can facilitate some work with information for common user. In other way, sightless users are not able to perform some common activities without special equipment or only in considerably complicated way. Simple example of such activities for students during the lesson could be the projection of presentation in PPT format or description of some C++ program functions by the help of data projector on canvas in lecture room.

Comparison Aspect	Voice reader	Digital Magnifier	Digital Magnifier with voice support	Eletronic Notepad
Range of prices (EUR)	4000 – 5000	4000 – 6000	5000 – 6500	4000 – 6000
Monitor	15" - 17"	19" - 21"	19" - 21"	---
Sound Blaster + CD (DVD)	yes	yes	no	yes
Screen reader	yes	no	yes	yes
Enlarging software for Windows (software	no	yes	as necessary	no
Enlarging software for scaner (scaner	no	yes	as necessary	no
Text editor	yes	yes	yes	yes

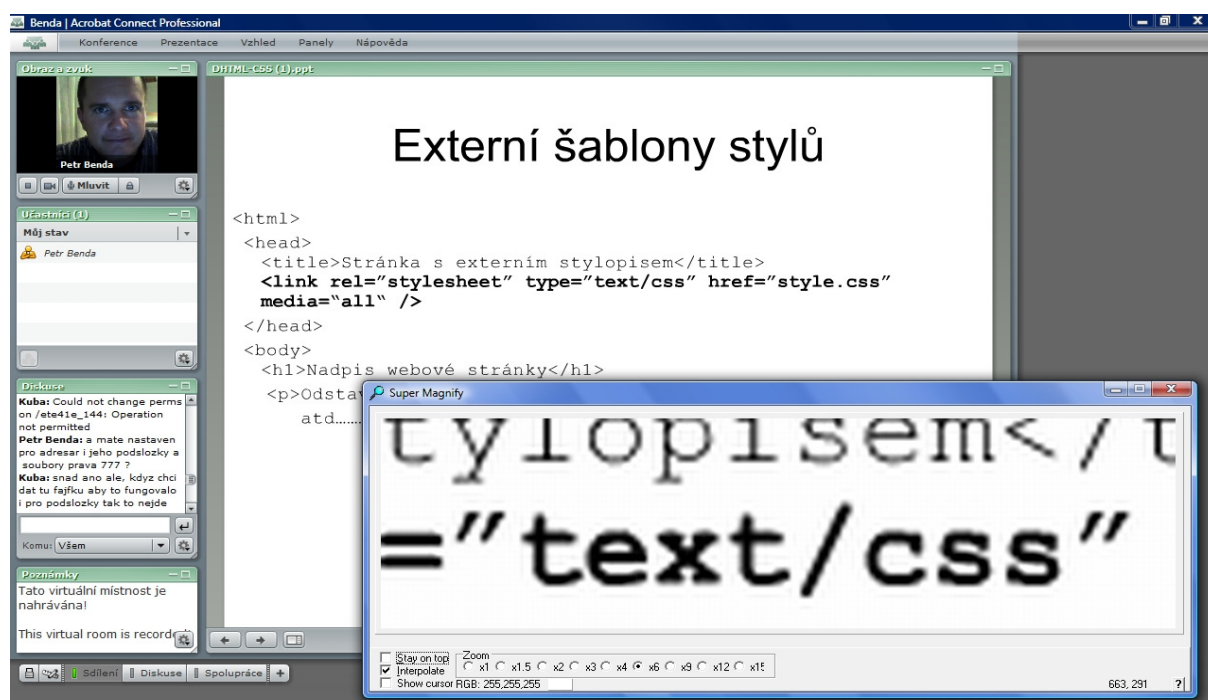Table 1: "Assistive devices for visually handicapped user – autonomous PC equipment" [2]

Figure 1: Adobe Connect web-conferencing system in combination with software magnifier"

If it is necessary to make accessible this sort of presentation also for students with visual handicap, it is necessary to equip lecture room by the special equipment, that is very expensive and often it can not cover specific needs of student. Or it is possible to prepare whole presentation before and attend to student for example special consultation, in which is given topic described without visual presentation.

By the usage of web-conferencing system it is possible to offer whole lecture for students by the help of data projector right in the lecture room and at the same time distribute it online via the internet. So, the lecture is in the same quality like at common projection of electronic materials, but for students, there is offered another information channel, which in addition it is possible to record, etc. In case of Adobe Acrobat Connect - for display this presentation on the side of student, it is necessary to have only common web browser with free Flash Player software and internet connection. For the creation of this type of presentation on the teacher's site, it is enough to upload education material to the virtual room at the Adobe Connect server or for example start to share the screen of

teacher's computer in virtual room, etc. Students are able log into this room by the simple www link and access specifications.

Student with visual handicap can listen to the lecture right in lecture room and further they can use special accessories, which they have for example in their laptop, for magnification or specific display of offered presentation. If there are involved students with lower level of infliction, it is possible to use common functions of operating system or internet browser for display the presentation. By the usage of this system of students with higher level of visual handicap, it is possible to magnitude the presentation in browser through the software magnifier at the student's computer, etc.

Possible utilization of web-conferencing system for student with auditory impairment

The principle of this system for the hearing disabled students is very similar to the previous case with the difference that a teacher must contact the teaching of applied microphone attached to teacher's computer. Auditory impaired student can use this audio channel to adapt and increase volume of the presentation to his headphones or to his induction loop. Student is connected to this channel only through the internet browser. Teacher can speak quite normally and the change of the volume is attached already to each student. In the case of online consultations, and recorded materials, there is an appropriate option the connection of the web camera, which picks up teacher's face. Students with a higher degree of hearing disability can try speech reading without greater problems and fully understand the issues of presentation.

Adobe Connect

Adobe Acrobat Connect (former Breeze) is the web conferencing software that enables individuals and small businesses to instantly communicate and collaborate through online personal meeting rooms. [1]

Hosts can expand the viewing area for shared applications, documents, and whiteboards to fill the entire screen of participants. Hosts can choose to synchronize the view of all participants. Hosts can view who is in the meeting room in addition to the participant's role (host, presenter, or participant) and status (whether the participant is connected). Share presentations, videos, or applications in full-screen mode. Annotate over screen sharing using standard whiteboarding tools and shapes. [1]

Teacher can share presentations and multimedia right from your desktop, and get feedback from hundreds of participants - students, all using a web browser and the Adobe Flash Player runtime, already installed on over 98% of internet-connected personal computers.

There are a lot of possibilities for the usage of this system in education. It could be online consultations, creation of tutorial materials or the participation at scientific conference. At CULS, there is this system managed by the IT support - Center of IT support in education. This system is in common usage of several departments at FEM CULS on the present. But the main utilization of this system is still focused especially on scientific conferences. For every teacher in this system can be reserve special virtual room, which can be visited by only selected users, all users, or users who knows the password. Education in these virtual rooms is possible to record, but it is not condition. Eventually this record would be accessible by the help of standard web address from any other web page, like in Moodle system etc.

Additional features

It is possible to use special set of keyboard shortcuts as well. In Adobe Connect system there is necessary to install Adobe Acrobat Connect Add-in. If the application focus is placed in the main window, it is possible to press, for example, the CTRL + space bar to place the focus in the top-level menu and then use arrow keys to browse through the menu options. User can navigate vertically and horizontally within each menu. Or if virtual user wants to toggle "Raise Hand Status" it is possible by shortcut CTRL + up arrow, user can go from slide to slide by using the left/right arrow keys or, alternately, Page Up and Page down, etc. There are a lot of shortcuts for specific situations. There are described in detail in Acrobat Connect Add-in help menu. [1]
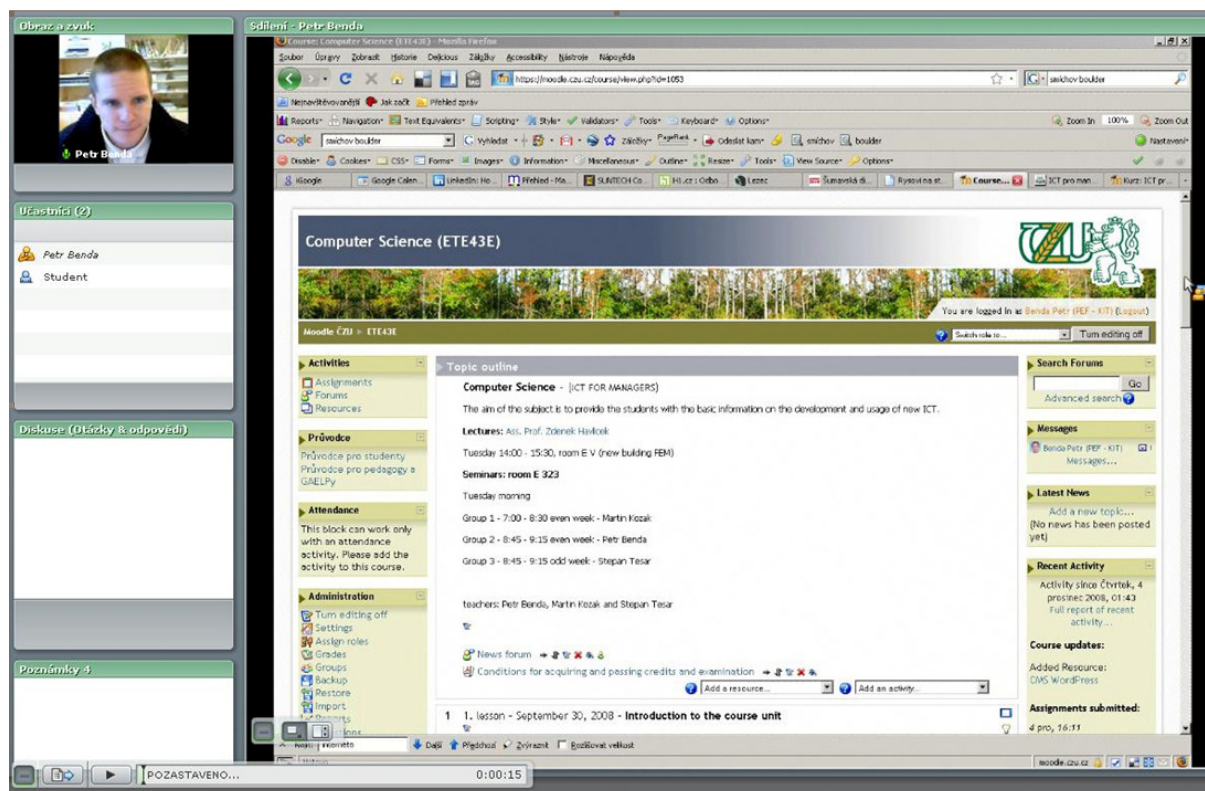
Figure 2: Adobe Connect web-conferencing system.

Other advantages of the Adobe Connect system not only for students with disabilities

In addition to the above-mentioned possibilities and advantages of the use of the Adobe Connect system in education, there is a benefit in the form of the possibility of recording the lecture, exercises and online consultations. Thus material can be prepared for students to multiple views through their internet browser with a freely available Flash Player software installed, headphones, and without any additional demands on the equipment. The data intensity of this record is much smaller than by the usage of the conventional digital record and teacher has a set of tools to finalize the product.

The advantage of this teaching is the possibility of connection to the lecture for students who are currently sick or they are on their internships abroad, etc. Student may attend this lectures or exercises from home and do not lose the important information. Another option is the management of consultation or lecture to students from the distance. For example, consultation of seminar projects with students of distance learning is very convenient both, for the teacher as well as for interested students. By the possibilities of this system would be practically at the same quality as the contact consultation in the office, but the potential of videoconferencing to enrich distance learning needs to be widely recognised as well as the technology embedded in curriculum delivery and in distance learning programmes. [5]

Accessibility problems

If it is needed to create a working environment for a disabled employee, it is necessary to take into account his disability and adapt the work environment to an individual's specific needs. For systems witch serve a large number of different users, there is not possible to make adjustments for each user. Many systems still have some accessibility barriers for some group of users. Hadi Rangin's study suggests that Adobe Connect supports a fair degree of keyboard accessibility but it is still not sufficient for effective interaction by keyboard users. It is also not accessible to screen reader users. [6]

This study compares several web-conferencing systems, and each shows various problems from the perspective of some groups of disabled users.

Webcasting proved the most acceptable way of supporting a common synchronous environment.

Having identified a feasible synchronous method we can now investigate hypothesized benefits for staff, students, and patients of combined e-health e-learning. [3]

Conclusion

This paper describes the commercial Adobe Connect System. This web-conferencing system is commonly used at the Czech University of Life Sciences Prague and the authors have a lot of experience with this system. Some free or open source software which is based on similar principles could also be used for the needs of impaired students, but no free systems of comparable quality have been found. Although the Adobe Connect System is described here, the key principles and the ways of how students – users can work with this kind of systems, remain the same and the described methods would be useful in any other system or solution.

The solution described by the authors has been tested primarily in general education in the Department of Information Technologies, FEM CULS, where it had proved very well. It would reasonably be expected, on the basis of information that has been acquired, that having another information channel would be a big advantage for the students who have some degree of disability. This channel would enable such students to significantly reduce their handicap, both in contact and distance teaching. For the students with a high degree of disability, such as blind or severely visually impaired, this form of presentation of materials would provide a quality tool for their self education. However, due to the current technological level of the web-conferencing systems, such as Adobe Connect, their serious handicap cannot be completely overcome. Possibilities for solving the above-mentioned solution will be further tested in the educational process of regular and disabled students at CULS.

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