

# Information and knowledge in the e-learning environment: aspects of education for all

Jadranka Lasić-Lazić PhD and Koraljka Golub

Department of Information Science, Faculty of Philosophy, University of Zagreb

I. Lučića 3, 10000 Zagreb, Croatia

tel. +385 1 6002 306

fax. +385 1 6156 879

E-mail: [jlazic@ffzg.hr](mailto:jlazic@ffzg.hr), [kgolub@ffzg.hr](mailto:kgolub@ffzg.hr)

## Summary

Ensuring and organising access to educational materials in the electronic environment is an important factor in determining realistic requests for development and advancement of education. If we want to participate in European processes and knowledge society, then ensuring access to educational materials across the telecommunications flow is the part in which we need to participate with solutions of our own. In the paper the authors will concentrate on organising and presenting knowledge and information in the electronic environment, on the level of postsecondary education. The context of IT is dealt with from the perspective of achieving free access to information and knowledge and providing information for all. This altogether involves planning and creating repository of educational materials, their description and indexing while implementing current metadata standards, attitude analysis of both teaching staff and students, as well as taking into consideration the concept of freedom of access to information versus copyright protection.

## I. Introduction

Let us remember only some of the changes that have been frequently spoken of: all-pervasive digitisation, electronic publishing, electronic book, electronic journals, the information policy of access vs. the policy of possession, and user-friendly interfaces. Huge quantities of documents are being daily published, organised and circulated on the levels of the Internet and Intranet. There are few important administrative, political, scientific, technical or cultural information that are not accessible throughout some of the networks as well. Electronic shopping and electronic banking have given a new dimension to the global communication by influencing development of applications for data security and protection and contributed to authenticity of communication and user privacy protection. Also in the area of education, international projects of digitising educational materials such as IMS, GESTALT, ARIADNE, EDNA, EASEL, SchoolNET etc. [1]

have largely extended the area of education support that has been for centuries related to the written word in books and libraries solely, and as such had certain limitations. Organising and providing access to educational materials in the electronic environment is an important prerequisite for providing realistic requirements for education development and advancement. New possibilities have approached the realisation of right to education of people with special needs and disabilities.

While wanting to approach the realisation of the right to education for all, we have started to plan and create a repository of educational materials at the Department of Information Science, Faculty of Philosophy, Zagreb. The idea is to describe the materials, index them and apply contemporary metadata standards, to deal with the concept of freedom of access versus copyright protection as well as the analysis of teaching staff and users' attitudes.

The steps include:

- a) planning and creating a repository of educational materials organised by subjects and in respect to the role in teaching and ways of usage (apart from exam materials, educational materials include the curriculum, assignments, guidebook throughout the study and courses);
- b) within particular courses indexing, metadata embedding and description of educational materials would be conducted, to the purpose of organisation, search and retrieval (to these purposes contemporary standards for educational materials description will be applied: IEEE Learning Object Metadata, IMS Learning Resource Meta-data Specification and Dublin Core for Education (DCE) [2]);
- c) dealing with the concept of freedom of access versus copyright protection and security and authentication of access to educational materials; and
- d) analysis of teaching staff and users' attitudes.

The following hypothesis would also be tested: whether the electronic environment does provide a greater flow of information and knowledge, greater degree of equality of education for all including people with special needs and disabilities and whether it contributes to forming of the learning society and development of society in general.

## II. The digital repository at the Department of Information Science

In 1999 a digital collection of exam literature started to be built at the Department of Information Science, Faculty of Philosophy, University of Zagreb. In 2001 a digital collection for the blind and visually impaired was created and today the two collections tend to be integrated in order to be accessible to all students with special needs and disabilities. The Web collection is designed in conformance with W3C's Web Content Accessibility Guidelines 1.0 [21] that explain how to make Web content accessible to people with disabilities. There are four major guidelines:

- Design content that allows presentation according to the user's needs and preferences
- Design content that allows interaction according to the user's needs and preferences
- Design for ease of comprehension
- Design for compatibility and interoperability

The more specific guidelines applied in the collection's design are the following:

- Guideline 1. Provide equivalent alternatives to auditory and visual content
- Guideline 2. Don't rely on colour alone
- Guideline 3. Use mark-up and style sheets and do so properly
- Guideline 12. Provide context and orientation information
- Guideline 13. Provide clear navigation mechanisms
- Guideline 14. Ensure that documents are clear and simple

There were two selection criteria: 1) the Croatian language, literary and popular-science documents that already exist in the digital format and are copyright-free; 2) exam literature as a whole (no language, format and copyright criteria).

The main problem in collecting materials was copyright, as there is no regulation on legal deposit in digital or audio format (which would be the only possible way for the blind to use an item) for a small and restricted group of users and the exception to the copyright law is not defined.

The materials have been processed by digitisation, HTML formatting, classifying, and incorporating DC metadata. The created metadata describe characteristics of an electronic resource and present elements necessary for identification and description of a document (author, title, subject, http address etc.). The problems with metadata

include a variety of digital formats that are nowadays used and aren't interoperable and also do not allow the implementation of metadata directly into its core – e.g. PDF [Portable Document Format] because it would break copyright regulations. The biggest problem with metadata is non-existence of “see” & “see also” references, which are essential to the user for finding units using alternative or non-standard forms. It has been planned that other metadata formats would be tested and applied (IEEE Learning Object Metadata, IMS Learning Resource Meta-data Specification and Dublin Core for Education (DCE)). The collection is also to be spread to other departments at the Faculty of Philosophy.

## III. The right to education for all

With technology development and advancement the right to education for all has become a closer aim to achieve than ever. Assistive technology such as, for example, electronic communication aids and computers that scan printed materials and read the text aloud, can facilitate education for the disabled, which can be thus made more accessible at the postsecondary level as well, since that level today is least accessible to people with special needs and disabilities.

In the world there are numerous national and international programmes promoting human rights of disabled persons [3, 4, 5, 6]. The programmes include a variety of rights, the final aim being the right to independent living, particularly raising of public awareness of the issues. The programmes fit well within greater aims of programmes promoting world peace and justice for all, including transition of financial resources now spent on military purposes be diverted to socially useful projects and “redirecting resources, productions, talents and abilities from the creation of the weapons of war to the creation of instruments of life”[3], in which context claiming resources for assistive technology for the disabled is only their basic right. The Disabled Peoples International [3] adopted basic principles concerning prerequisites for independent living such as a secure economic base as well as assistive devices, personal support services, education, employment, cultural and social life and other aspects, with strong disagreement with traditional systems of isolation and segregating programmes.

In the UK, a service called TechDis (Technology for Disabilities Information Service) that is a part of JISC (Joint Information Systems Committee) has been set up with the aim of taking a UK-wide approach to enhancing the use of technology to support students and staff with disabilities on the

level of further and higher education. Its aims to be "the primary information and advice resource on the use of CIT to support learners with disabilities, for all staff involved in learning and teaching, research and administration in the FE [further education] and HE [higher education] sectors... To promote, transfer and broker good and innovative practices in the use of technology to support students and staff with disabilities both in the UK and overseas... To review and advise on the accessibility of current technologies used in learning and teaching, research and administration in light of the needs of learners with disabilities..." [6].

#### IV. Assistive technology in education of people with special needs and disabilities

Although education for all is available, it is not accessible, i.e. the technology does exist but means for ensuring it and making it accessible is the responsibility of the democratic society and all participants in education. Technologies enable people with special needs and disabilities greater equality in communication and integration in general.

Groups of disabilities the authors suggest to be dealt with at a postsecondary level are the following: blind and visually impaired, deaf and hard of hearing, physically disabled and students with learning disabilities as well as those having multiple disabilities.

A rather low level of inclusion of people with special needs into university education is related to a range of various issues, such as being dependent upon helpers in daily activities and movement, lack of integration into student social life, and particularly insufficient awareness of teaching staff of the complex problems related to students with special needs and disabilities. This results in the main problem of inaccessibility of exam literature, lack of adaptation of written exams, fear of teaching staff, lack of access to student's computer, lack of access to notice-boards, forbidden lecture tape-recording, lack of access to the student's administrative office, lack of statistical data of students with special needs and disabilities, inaccessibility of web sites for all.

The blind and visually impaired can, as other, make great use of computers. Additionally, computers for the blind and visually impaired present a great change particularly in access to information. While before they were restricted to exam literature in Braille that is severely rare due to an expensive and slow production, today new technologies enable them to read information in the digital form. Additional technologies involve a Braille display

that blind use instead of a monitor, or an additional speech unit or speech software that reads aloud everything on the screen. For the visually impaired there is also screen magnification software. Braille embossers are another piece of hardware that can enable a blind student to have exam materials printed. There are also adapted electronic notebooks with Braille display and speech output. An ideal solution seem to be software that synthesize speech and do optical character processing of text on the paper put on the scanner. The local problem is that for the time being screen reading software for the Croatian language still does not exist. Conclusively, there are three main types of adapted computers for the blind and visually impaired: 1) one integrated hardware unit comprising of all necessary components (scanner, keyboard, computer); 2) PC components that are not integrated into one unit, but are separated; and 3) a typical PC with software for the blind.

The deaf and hard of hearing can use assistive listening devices (ALDs) in order to be able to communicate better. ALDs can reduce negative effects of distance, background noise and poor room acoustics and using them with hearing aids leads to better listening and communication. In a classroom lecture a useful ALD can be a personal FM system (a type of a miniature radio station operating on special frequencies; it consists of a transmitter microphone used by the speaker and a receiver used by the listener), an infrared system (the sound is transmitted using infrared light waves) or an induction loop system that is frequently used in large group areas (it is based on electromagnetic signals). There are many other assistive listening devices, out of which one-to-one communicators are used when you want to be able to easily hear one person. There are many other communication devices that enable easier communication, such as computerized speech recognition that allows a computer to transform a spoken message into a word processed document or a closed captioning TV that allows text display of spoken dialogue. Note taking is one of the features that might enable a student with special needs to concentrate on listening and watching a speaker while a trained person takes notes (also an option for students who are unable to write).

Students with learning disabilities have normal intelligence but have learning problems "in the acquisition and use of listening, speaking, reading, writing, reasoning, or mathematical abilities" (Torgeson, 1991, p. 21). They normally enrol in postsecondary educational programmes, especially if the learning disability is mild or moderate. Thus students with a reading disability can be provided an audiotape or a computer with speech synthesis software. People with learning disabilities can also

make use of equipment for other disabilities, such as personal FM systems originally developed for the deaf. Students having difficulty auditorily processing information (have problems discriminating between similar words and various letter sounds, need information repeated etc.) would need pressure-sensitive paper and a fellow student who takes notes for him/her if the person has problems with note taking, or a laptop computer or a notebook can be used instead; also, there are FM amplification devices that involve a teacher-worn transmitter and a student-worn receiver and enhance auditory attention by improving listening conditions and attention levels; there are variable speech control tape-recorders that enable a student who has difficulty processing speech to play back audiotaped material at a slower or faster rate than it was initially recorded with the same voice quality; ordinary tape-recorders are, of course, an option as well.

Learning disabilities include difficulty with visual processing of information as well (e.g., perceiving words incorrectly, not recognizing written mistakes). Assistive technologies that can help are tape-recorders, computer software options to change background and text colours and text size, magnification hardware or software, software for speech output etc.

Learning disabilities related to math can be compensated by using a variety of calculators with special features and software in general that ensure voice output. Students with reading difficulties can use voice output with optical character recognition software.

Writing difficulties can easily be compensated by the means of already existing and adjusted software such as spelling checkers; speech synthesis; all devices for note-taking. Many of the mentioned assistive technology devices can also be of great use to physically disabled.

In the context of adapted computers, distance learning provides great opportunities for special needs students. Books and materials in digital form are of great value as they can be manipulated by users with a variety of difficulties, from size to speech output at different speed rates and other computer-supported features.

## V. Conclusion

Modernisation of teaching methods, which involves modernisation through IT and the new media and ensuring right to equal access to information and knowledge for all, enables also an equal footing for inclusion of people with special needs and disabilities into the education process. The implementation of technology is a significant

opportunity for provision of equal access to education. The provision of assistive technology services is an essential element in the overall process of helping individuals with learning disabilities identify appropriate assistive technology adaptations and accommodations.

Before the teacher can determine the kinds of assistive technology that will best suit the needs of the student with learning disabilities, the functional limitations that the individual displays need to be defined. These include what coursework obligations is the individual expected to perform, in what specific areas is the individual having difficulties, and what is it specifically that the individual cannot do or does not do according to the instructor's expectations? The answers to these questions will determine the kinds of assistive devices that can be put in place to enable the person with learning disabilities to meet the requirements of a course.

Over the last 2-3 decades, persons with disabilities have challenged society's perceptions of them. The challenges have encouraged members of society to change their attitudes and expectations, particularly in the Western countries, although the participation of people with disabilities in the labour force is still low. In Croatia the number of students with special needs and disabilities is hardly known and their needs are not being systematically approached. Besides that, the equipment is rather expensive and Croatian laws still do not proscribe sufficient resources.

A national centre for students with special needs and disabilities is what the authors propose, a centre that will provide advice, help, ensure assistive technologies, adapted exam materials, raise staff awareness as well as general public awareness.

## Bibliography

- [1] Educators Access to Services in Electronic Landscape  
[http://www.fdggroup.com/easel/useful links/useful links.htm](http://www.fdggroup.com/easel/useful%20links/useful%20links.htm) (12-02-2002)
- [2] IEEE Learning Technology Standards Committee  
<http://ltsc.ieee.org/wg12/> (12-02-2002)
- [3] Disabled Peoples' International  
<http://www.dpi.org> (12-02-2002)
- [4] Internet support for a blind Internet user  
<http://www.ipsis.hr/static/en/index.html> (04-02-2002)
- [5] Permanent Missions To The United Nations  
<http://www.un.int/> (12-02-2002)

- [6] Technology for Disabilities Information Service <http://www.techdis.ac.uk/> (12-02-2002)
- [7] J. Bakran et al., «Reading rights», *Intellectual property vs. the right to knowledge? : proceedings of the 8<sup>th</sup> International BOBCATSSS symposium on Library and Information Science, Jagiellonian University Krakow*, p. 1-5, 2000.
- [8] C. Chong. A Few Notes on Buying A Computer. <http://www.nfb.org/Bm/bm01/bm0101/bm010104.htm> (06-02-2002)
- [9] Everything You Wanted to Know About Deafness - DEAF-INFO Web Site <http://www.zak.co.il/deaf-info/old/home.html> (06-02-2002)
- [10] N. Hutchinson, «Career Counseling of Youth with Learning Disabilities», *ERIC Digest*, 1995. <http://ericae.net/edo/ED400470.htm> (06-02-2002)
- [11] J. Lokerson, «Learning Disabilities: Glossary of Some Important Terms», *ERIC Digest*. <http://ericae.net/edo/ED352780.htm> (06-02-2002)
- [12] M. Raskind, «Assistive Technology for Adults with Learning Disabilities: A Rationale for Use», *Learning Disabilities in Adulthood: Persisting Problems and Evolving Issues*, 1994.
- [13] A. Riviere. Meeting the needs of adults with learning disabilities. [http://www.ldonline.org/ld\\_indepth/technology/technology.html](http://www.ldonline.org/ld_indepth/technology/technology.html) (06-02-2002)
- [14] A. Du Toit, «Teaching info-preneurship : students' perspectives», *Aslib Proceedings*, 52, p. 83-89, 2(2000).
- [15] K. H. Veltman. Augmented books, knowledge and culture. <http://www.isoc.org/inet2000/cdproceedings/6d/6d> (02-02-2002)
- [16] R. Vrana, B. Badurina and K. Golub, «Advantages and disadvantages of use of digital collections in the process of education», *Learning society, learning organisation, lifelong learning : proceedings of the 7<sup>th</sup> International BOBCATSS symposium*, p. 484-495, 1999.
- [17] J. Torgeson, «Learning Disabilities: Historical and Conceptual Issues», *Learning about leaning disabilities*, p. 3-37, 1992.
- [18] Joint Information Systems Committee <http://www.jisc.ac.uk> (12-02-2002)
- [19] National Federation of the Blind <http://www.nfb.org> (06-02-2002)
- [20] National Institute for Literacy (NIFL) <http://www.nifl.gov/> (06-02-2002)
- [21] Web Content Accessibility Guidelines 1.0 <http://www.w3.org/TR/WCAG10/> (08-02-2002)