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Contents

Section 1

Standards of Universal Learning Design at Universities and Testing of Persons with Special Needs

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The section focuses on:

- The concept of a special need, diversity and its categories.
- Design for All (DfA), Universal Design for Learning (UDL), Universal Learning Design (ULD), Universal Design for Instruction (UDI) and Universal Instructional Design (UID).
- The confines of universal design and individual accommodation, the right for a universal learning design and its enforceability, the right for an individual accommodation and its eligibility, rights and duties of parties at a case.
- Legislative, methodological and technological standards of universal design and individual accommodation for persons with visual, hearing or mobility impairment, neurodiversity and chronic diseases.
- Management and financing of services providing universal learning design and individual accommodation in tertiary education.
- Universal design of Learning Potential Tests and Qualification Tests, standards for individual accommodations of partial sub-tests, and measurably of results.
- Universal design in national and international contexts: cooperation of schools during transition between various levels of education; school networks providing students' mobility.
- Universal design of science and research.

Universal Learning Design: A View from Conceptual Goals to the Actual Implementation

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Universal Learning design embraces a number of guidelines for producing educational material that can be enjoyed by all. The design principles do not point to a concept of one solution for all, but rather solutions that can be used by various groups of learners using common tools that can be adjusted to serve a large and disparate community of learners with special needs. In this talk, some of the key concepts of ULD discussed and then design as a foundation for the development of a tool for the blind. In the remainder of the talk the key elements of the learning tool will be discussed in light of the ULD guidelines. During the discussion of the actual tool, the audience will be encouraged to make formal notes on their assessment of the task. At the end of the talk, audience participants will be free to make salient comments.

1 Universal Learning Design – Its Stakeholders and Their Interests [Discussion]

Searching for the roots of the concept of *universal design* for learning, we may have the impression that they lie outside of Europe and have only marginal impact in Europe so far, but it is not exact. There are two original ideological sources, just one of them rooted in the USA:

- American industrial psychology – *instructional design* (1930s and 1940s, USA)
- British interior design (originally architecture) – *universal design* (1960s and 1970s)

However, if we put aside the first source linked to American WWII preparations, we have actually to start our consideration with Selwyn Goldsmith, a British architect who passed away two years ago, after a battle with Alzheimer's disease. Goldsmith's *Designing for the Disabled*, first published in 1963, has been considered a "Bible" for architects around the world, and served as a model on which US accessibility standards are based. The first American architect to be influenced by Goldsmith was Ronald L. Mace (1941–1998, North Carolina State University) who coined the term *universal design* to describe the concept of designing all products and the constructed environment to be aesthetic and usable to the greatest extent possible by everyone, regardless of their age, ability, or status in life.

Thus the *universal design* emerged during the seventies and eighties, replacing the earlier barrier-free concepts: the broader accessibility movement, and adaptive and assistive technology. Universal design is now being applied to the design of technology, and also in instruction, services, and other environments. Curb cuts or sidewalk ramps, essential for people in wheelchairs but also used by all, are a very common example which is repeatedly mentioned by those who are not aware of the further steps. Later came cabinets with pull-out shelves, kitchen counters at several heights to accommodate different tasks and postures, and low-floor buses equipped with ramps rather than on-board lifts. Later on, the term *Design for All* (DfA) started being used for nearly the same concept. Design for All is a design for human diversity, social inclusion and equality (EIDD Stockholm Declaration, 2004). According to the European Commission, it "encourages manufacturers and service providers to produce new technologies for everyone: technologies that are suitable for the elderly and people with disabilities, as much as the teenage techno-wizard."

In the case of education, *universal design* is typically extended to *universal design for learning* or *universal instructional design* in order to stress the fact that the concept covers the educational area as well. Unlike universal design, the design for all is rarely used for learning or education, and instead, the very generic attribute for all is applied in different environments such as *web for all* or *education for all*. However, such constructions tend to leave out the original idea of accessibility for people with special needs. The social and psychological aspect of accessibility is much more important than services if W4A or E4A is mentioned. A number of European countries actually skipped the pragmatic technological phase of instructional design with its sophisticated theoretical procedures applied in commercial or military practices, as well as, the phase of *universal design*. The all-embracing *design for all* is now accepted instead. There is usually agreement on the abstract level and helplessness or stereotyping in technological, administrative and teaching practice. University managements accepted formally the idea of including as large a part of the population as possible. They began to fulfill that task in a way that resembles the desegregation policy in the United States in the second half of the 20th century with all its excesses (as it tends to be exaggerated) and paradoxes (as it has often no impact at all or it makes life more difficult for the target group, instead of including them).

To avoid these excesses and paradoxes we invite the participants to think about the stakeholders of the process of universal learning design. To mention one extreme (by the way not so rare at Czech universities) in identifying the stakeholders, it is clear that it would be too narrow a focus to see them just as the group of students with disabilities and the disability counselors. It is generally accepted that teachers are considered stakeholders as well, but it is not always clear that it is extremely politically incorrect to think about disability among students, not among teachers. If we continue our consideration, we have to include service providers as stakeholders, as in most cases it makes no sense to give advice – an accessible book or interpreting is needed and if the counselor is not ready to provide them (thus proving that he or she is a provider), their advice is unnecessary. But as soon as we consider all students, all teachers, all managers, all service providers to be stakeholders, we risk being so generic that we are not effective any more. Responsibility of all, property of all, leadership of all etc. are ineffective or even dangerous, more even than the concept of education for all.

The conference participants will be split into mixed groups and in the framework of the topic of *Universal Learning Design – Its Stakeholders and Their Interests* they will discuss their experience and points of view based on specific questions provided to each group. A speaker will represent each group and present the conclusions related to the discussed question to the rest of the conference participants in the final concluding session.

1

Hybrid Book, New Perspectives in Synchronized Multimedia Content Publishing

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History

Hybrid Book is a document format which was created at Masaryk University and has been used to publish digital documents at the University since 2002. It was originally a digital text **synchronized** with an audio recording and navigable through its hierarchical structure, primarily intended for students/users with visual impairments. Over the last ten years, the Hybrid Book has developed into a mature document format enabling an undistorted access to information to students and other users with various disabilities (visual or hearing impairment, learning disabilities etc.) as well as users without disabilities find this document format advantageous for its multi-modality.

Introduction and the Latest Development

The original text/audio data setup has been **extended to the triad text/video/audio** and the main aim of the designed data structure is to synchronize thus distinguished types of records and it allows including more than one of each media (text, video, audio).

The extension of the data setup with video component has been made primarily in order to add a translation of the document into **sign language** (besides the mentioned audio recording) to enable access of the content to deaf using sign language. But it is obvious that it offers further applications – the hybrid document is a convenient format to save and publish **recordings of live events** (such as lectures, presentations etc.) as a synchronized compilation of audio and video record of the event together with text transcript of the speeches of the event.

As the primary application of the Hybrid Book is publishing scientific documents, the system has to provide several advanced features considering complexity of access to such a content. Currently, the development of those features mainly concerns:

- extended navigation in tabular data which supports screen-reader users and considering sign language translation of those data
- inclusion of symbolic structures (e.g. math formulae) and flow diagrams
- tool to handle user's commentaries

Characteristics of the Format

The descriptive structure is designed so that it allows synchronization of records of various types based on "synchronization points" only, i.e. if it is possible to describe a given record with a succession of points (e.g., timestamps in an AV recording), it is then also possible to add this record to a Hybrid Book document. It is also possible to add static data (such as images and graphs) in the form of links. Individual records are bound in the Hybrid Book by an external description. Records as such are not altered. Thus, it is possible to add content to the document from any storage. Any type of record may be added mostly without a need of any special modification. A record or document which is being added must have the above mentioned properties: synchronization points must be applicable to the record/document. The HTML format may serve as an example. It is used in the Hybrid Book for storing text – for example, attributes such as ID or NAME may be used to mark individual synchronization points.

There are two ways to navigate in the Hybrid Book:

1. "linear" navigation, i.e. moving forward/backward by individual synchronization points;
2. "structured" navigation, i.e. by the hierarchical (tree) structure of the document.

It depends on the equipment of a particular browser which navigation steps will be at the user's disposal; most often, navigation by adjacent synchronization points and by chapter titles is used.

Reading the Hybrid Book

It is obvious that individual types of records of the document content (text, video, audio) are equal and each of them represents an information channel. It is nevertheless possible to freely switch between those records or follow them simultaneously and thus take advantage of further characteristics of such arrangement: to comprise the final form of information from multiple sources (so called "hybrid reading") and as such it provides a universal access to the content. It was the original aim of the Hybrid Book to provide this way of access to information; and to avoid creating documents aimed directly at a particular user with all his/her needs and requirements; we are creating a virtual document described by a physical structure which enables the reader to choose his/her own access to it and the method of receiving offered information.

For this goal, it is naturally necessary to provide users with platforms to read Hybrid Book documents:

1. **Hybrid Book Reader as a web application** (http://www.teiresias.muni.cz/hybridbook). The first tool implemented to browse hybrid documents

providing all features described above and its functionality is continously expanded.

2. **Hybrid Book Reader as applications for mobile devices.** To enable access to a document content "everywhere", we consider to implement the Hybrid Book Reader in versions for mobile devices as an outlook for the further development.

Summary

The development of the Hybrid Book format and tools at Masaryk University over the last ten years has brought the complex system to enable access to content for users with various disabilities as well as for users without disabilities, and as such it provides universal access to content of various types of documents – from scientific publications to compiled recordings of live events. The Hybrid Book is based on synchronization of various types of components of audio, video and text media.

Enlarged Breadboard Kit for Students with Severe Visual Impairment

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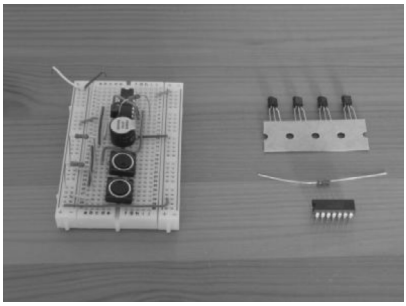
1 Introduction

A solderless breadboard is a construction base for prototyping of an electric circuit. It is also called as a protoboard or a plugboard or a simply breadboard. On the surface of it, there are many tiny holes which are aligned as matrix. These holes are to insert electric parts as resistors, capacitors, diodes, transistors, coils, ICs, and so on. Horizontal lines of these holes are electrically connected each other and vertical lined holes are not connected. Because of that connection, it is possible to make prototype of an electric circuit without soldering these parts each other, and it is also easy to remake a circuit. This is the reason why the breadboard is useful to learn how to make a circuit and how it works. A lot of students who study engineering in the tertiary education use the breadboard, some textbook in the field of robotics introduces breadboard as a first step of making a system[1]. Figure 1 shows an example of circuit using normal breadboard and electric parts.



[Fig. 1] An example of electric circuit using breadboard

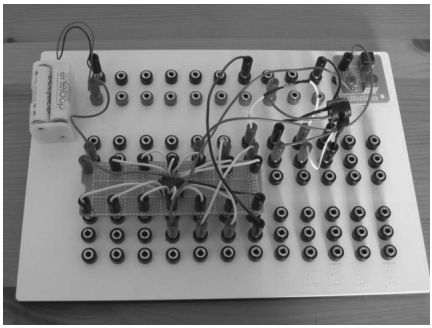
By the way, our university is unique one which accepts only visually impaired and hearing impaired students and there is a lecture class in the field of mechatronics for the visually impaired students. In this class, students try to make a circuit using breadboard and weakly sighted students can enjoy learning it. However, for students with severe visual impairment including totally blind, it might be really difficult to search right position of the hole and insert tiny parts to it. To solve this problem, a large breadboard kit with electrical parts were developed and tried to use it in this class.

2 Features of developed breadboard kit

1

The basic idea of the developed breadboard is simple. It is just to enlarge original breadboard using banana plugs and jacks, and adding Braille information. Blind person can find right position touching the Braille. Figure 2 shows an overview of the developed breadboard kit. To fit for the enlarged board, electric parts also should be enlarged by connecting banana plugs with cables. The connecting point between cables and terminals of the electric parts is covered by heat-shrinking rubber tube to insulate and avoid shorting them, but not covered the body of the parts. It is important point and one of the features of the developed kit. Keeping original shape of the electric parts enables students to touch it and understand what it is. There are several electrical block systems of consumer version in the market[2] and they can construct arbitrary circuit, but these blocks are completely covered and visually impaired student cannot understand real shape of the parts.

The other feature is that the length of cables and its color. For example, transistor has three different terminals called emitter, collector, and base. These terminal lengths are same and difficult to distinguish. Therefore I make the lengths and colors of cables different so that visually impaired students can distinguish them. The same strategy is applied to the parts which have polar character, like capacitor or electrical buzzer.



[Fig. 2] An overview of developed breadboard kit for the visually impaired students

3 Trial using of the kit

Developed kit was used in the class of mechatronics in our university mentioned above. The contents of the lecture included making transistor circuit and logical circuit using 74 series of IC. Students with severe visual impairment could construct these circuits only by themselves.

References

[1] Cook, David. *Robot Building for Beginners*, 2010. Springer. ISBN 978-1-4302-2749-6.

[2] http://otonanokagaku.net/products/kit/index.html

Universal Design of Inclusive Learning Environment

1

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Education and work are the main conditions of human independence and substantially contribute to the fulfillment of life. Therefore is essential to create an environment that does not restrict an access of persons with disabilities to education and work.

The main goal of Universal Design is to create an **inclusive non-discriminatory environment** that is designed to help all people to fulfill basic human rights, including the right to education. One of the biggest obstacles is the **existence of physical barriers** in schools and campuses. When designing new buildings or renovating existing buildings, the architects are often focusing only on barrier-free entrance to the building, while another movement, use and orientation in other parts of the building remain unresolved. To ensure a consistent inclusive learning environment, it is necessary to create a barrier-free environment of the whole school facilities, not only for students but also for teachers and other staff with limited mobility and orientation. The aim is to achieve an environment that is **accessible, comfortable and safe for all** its users as much as possible.

The **overall concept** must include accessibility of outdoor spaces, parking, building entrance, sanitary facilities, classrooms, the library, the dining room and other school and campus spaces and also access to information and service counters. Within the campus and its facilities is necessary to ensure easy orientation for people with sensory disabilities through orientation and information systems (such tactile plans and models, and other multi-sensorial components). For the safety of persons with visual impairments it is also necessary to apply the principles of clear and easy identification of the different elements of the built environment. For example, glazed entrance doors must be contrasting marked and is also recommended to place the embossed tiles in front of the entrance.

New buildings must have the main entrance at the same height level as pavements without any steps. Renovated buildings should have the barrier-free entrance and the level differences can be overcome with ramp or exterior elevator. In designing the ramp is necessary to use proper slope, appropriate width, slip-resistant surface and correctly placed handles. For bigger height differences or in case of a lack of the space, a better solution is to use exterior elevator or platform, but it is not recommended to use a staircase lift installed on the staircase handrails. This staircase lift is not universally accessible to all people and has operational deficiencies (slow speed, complicated to use, or unsightly appearance).

In front of the entrance door to the building is necessary to create enough space to maneuver with the wheelchair or pram.

The principles of Universal Design should be implemented also in interior spaces of the school facilities. At the **entrance halls** is necessary to make accessible services and counters (information, internet kiosk, cloakroom and refreshments) for all people. All information and orientation systems should be solved in **multi-sensorial form**, which uses combination of minimum two different sensory perceptions. The counters and kiosks should be designed to enable an access for a person on a wheelchair or small stature, therefore some part of the counters should have reduced height. If we propose in cloakroom area self storage space (shelves, racks, cabinets), they must be placed within easy reach for wheelchair users.

Hall and corridor areas of school facilities should allow easy orientation in space with secure guiding lines for people with visual impairment. Corridors should be simple and clear, so it is suitable to use orthogonal system with minimal walking distance. Adequate lighting and colour contrasting wall and floor solutions facilitate orientation in the hallways and staircases. It is appropriate to distinguish different units with colour – blocks of classrooms, dining spaces and sanitary facilities. Each room is necessary clearly to mark with label in tactile form placed at the wall next to the door, but never directly on the door because of safety reason.

Learning spaces is necessary to design accessible and comfortable for every students or teachers with limited mobility and orientation so to allow smooth movement without any collision. **Auditorium** must allow easy access for the students, but also for the lecturers. In the auditorium with stepped floor is required to reserve an appropriate number of places for wheelchair users. These places have to be situated on a flat floor and not to narrow escape corridors. Furnishings and interior equipments should allow the possibility for comfortable use also for wheelchair users therefore there must be a space to insert wheelchair towards a school desk, bench or a table. According to the requirements of Universal Design is necessary to create a barrier-free access for teachers (lecturers), that is why the classical elevated podium is not allowed in auditorium, so there should be a flat surface offering a convenient access to the board or screen.

The **library, resource centre and reading rooms** should accommodate also people with physical or sensorial disabilities or a lower stature and provide them an access to the different kind of books and multimedia. The library shelves must have reduced height and appropriate space for manoeuvering among shelves, so that a people on wheelchair were able to serve themselves. Individual reading tables and internet kiosks, especially their height and sitting space, should be designed to enable comfort access for wheelchair users. The books and resources

should be accessible in multi-sensorial form for the people with visual impairment.

The **university pastoral centre** must be design with barrier-free access to the premises of the chapel, as well as other social and club premises with the necessary sanitation facilities, which must include at least one wheelchair-accessible toilet cabin.

Inclusive environment of school facilities and sites must be solved comprehensively by the principles of Universal Design - Design for All, not only partial modifications such installing ramps or staircase lifts at the entrance to the building. All students and staff of higher education establishments and premises should have an equal opportunity to participate in educational activities, but also in social life so as not limiting by any architectural or communication barriers.

Universal Design of Student Housing

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Within the meaning of Article 24 of the UN Convention on the Rights of Persons with Disabilities (UNCRPD) all programs and activities related to higher education must be accessible to students with disabilities to live independently and participate fully in all aspects of student life. Now is the time to transform higher education. To participate in this process, all of us in higher education need to explore a concept of Universal Design. Universal Design was originally aimed at innovations in architecture, community spaces and products, but today it is also about creating accessible services and IT products, from the beginning, to the benefit of the widest array of users, including those with disabilities.

Design of campus should demonstrate the ability to change and adapt to various functions, for example innovative flexible and accessible common spaces â€“ informal learning settings, such as non-traditional spaces for students to collaborate on projects, flexible and accessible student's housing, or recreational areas constructed to meet the needs of students with disabilities and to other compatible user groups such as single parent households.

Our Centre of Design for All invents new creative design concepts using the method of Universal Design. This presentation shows why features of flexibility and Universal Design should be included in student's housing design and describes how to create such environment. Flexible design has the potential to make a key contribution to more sustainable buildings, showing how it has clear social and economic benefits.

Flexible and adaptable student's housing environment should offer accessible spaces in all parts of facility, incorporates flexibility and choice in moving to, from and within a unit or dwelling, including gently sloping pathways from public spaces to private spaces, level entries, wider doorways and passage ways. In designing process we should not forget to apply Universal Design in creating common spaces such as foyer, terrace, grill/convenience store, mail collection areas, waste management facilities, storage lockers, laundry, washing and drying facilities, bike lockers, parking and outdoor areas. The design of facility must provide a balance in addressing the individual living needs of students with social opportunities and the convenience of academic assistance.

Accessible units are equipped with variety of accessible features aimed to address the unique needs of the resident. Flexible or adaptable units, in contrast, have the ability to be modified to reasonably accommodate the student's needs,

which also means to have the ability to readily adapt the unit with features and fittings as possible needs of change.

Essential condition for inclusion disabled students in student society is accessibility of all buildings and outdoor areas of campus or separate university units. The intent of Universal Design is not only to allow wheelchair access to the physical environment, but also to create orientation and information systems in the environment to improve ability to perceive environments for users with sensory impairment. This concept removes barriers to communication and services, taking into account the safety of users and similar aspects of everyday life. The environment created by this method ensures adequate conditions for all users and therefore can be a measure of the quality of physical environment.

Architectonic Solution of Making Accessible Tertiary Education for Disabled, Campus CTU in Prague – Dejvice

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The Rights Agreement for disabled people recognises the importance of the access to the education. That is important to the fulfilment of one of the basic human rights. Equal access to the education is the primary assumption for social integration and independence. Lower education and expertise is a big disadvantage even for people without disabilities.

Nowadays, the integration is promoted. The Ministry of Education, Youth and Sports of the Czech Republic service education in the primary and secondary schools to everyone, disabled people included. Tertiary education is a different case. Regarding tertiary education, it is up to their own initiative of each institution to provide the access to its students. At this moment there are student's centres, advisory centres for disabled students at most of the universities, both public and private. Significant of their work is that they don't wait the disabled student ask to study. They initiate changes in order to be able to offer study opportunities. Of course, there is possibility to study at a distance, thanks to the IT technology, internet, electronic books, etc. This solution is acceptable when there are no other possibilities, sometimes it is neccessary because of the specificity of the impairments. But it is not point of accessibility, it still excludes disabled from the society. All the agreements lead toward the participation in social life. In the second half of 20th century, a group of people with limited physical abilities and orientations, seniors, pregnant women and people accompanying children junior to 3 years was defined. People with mental disease and viscera disease included. And since then there are Public notes for designing accessible environment. The barrier free environment designing is governed by the Public Notice No. 398/2009 Sb. of the Czech Republic(the general technical requirements ensuring barrier-free use of buildings).

The main issue is access to university environment and higher education for people with disabilities. The aspects affecting access was defined in the case study solution, campus CTU Prague – Dejvice. Found out whether it is always sufficient design by decree without consulting with experts and target group. Compared the needs of students with disabilities and building adjustments in accordance with the Public Notice No.398/2009 Sb. Proved that these needs are changing, can not be treat as a constant units. Demontrated that even if the environment satisfies legislative requirements for access to universities for disabled, it does not mean access to higher education. On the other hand confirmed the need for

access to higher education. accessible university environment, in addition to provision of supporting tools, adjustments, and other special educational support.

This thesis is used as a basis for preparing the development plan the elimination of barriers in buildings CTU.

We Aim for Accessible Seznam.cz

Irena Zatloukalová

Seznam.cz, Czech Republic

As the Seznam.cz company grows, our social responsibility rises, too. We understand helping others as a thank you for our own success. And as the support of innovation is one of the basic corporate values, we try to bring such innovations that will help everyone to use the Internet.

We officially began to make Seznam accessible back in 2006, yet this does not mean that we had not dealt with accessibility before that. In 2000, for instance, our company acquired the Blindfriendly certificate for its portals Seznam.cz and Novinky.cz.

In 2006, the "fated" meeting of the then R&D Director Mr. Vlastimil Pečinka and Mr. Radek Seifert of the Tereza Centre in Prague (now the ELSA Centre of the Czech Technical University in Prague: www.elsa.cvut.cz) took place. Mr. Seifert rightly convinced Mr. Pečinka then that a long-term, systematic work on Seznam's accessibility is worth the effort.

It was Mr. Lukáš Marvan, who was then commissioned to take care of accessibility of our services. Besides the initial deepening of his knowledge about these issues, he also prepared a method to implement simple rules for making Seznam accessible into our corporate practice in collaboration with the Tereza Centre. The simplicity of these rules turned out to be a key factor concerning their adoption by our employees.

Seznam aims to increase accessibility of the widest possible range of our services. We do not approach accessibility in a dogmatic way, though, as we always strive for a reasonable, functional compromise. Neither do we consider the process of making Seznam accessible as finished and we still try to get better.

Other activities concerning accessibility:

Besides the general improvement of accessibility of our web pages, Seznam also engages in other projects that help with an easier access to information.

- **Barrier-free Fulltext** – a specially programmed web page with web search results for the best possible readability with a screen reader.
- **Keyboard Shortcuts Standard** – in unique collaboration with the Atlas, Centrum, iDnes and Jyxo companies, Seznam introduced a unified implementation of keyboard shortcuts on web pages.
- **CAPTCHA API** – we enhanced the freely available interface for automatic recognition of persons and their distinction from spambots with a voice output so that it ceased to be a barrier for blind users.

- **WCAG 2.0 Translation Authorization** – Mr. Lukáš Marvan was involved in authorizing the Czech translation of Web Content Accessibility Guidelines 2.0.
- **Tactile Mapy.cz** – in collaboration with the ELSA Centre at CTU Prague and Teiresias Centre at Masaryk University Brno, we are developing special source data for maps that will enable tactile map printing.

How to Ensure Accessibility of Study Materials Published at Masaryk University

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Introduction

Universal learning design is an educational framework, which calls for creating curriculum from the outset that provides:

- Multiple means of representation to give learners various ways of acquiring information and knowledge,
- Multiple means of expression to provide learners alternatives for demonstrating what they know, and
- Multiple means of engagement to tap into learners' interests, challenge them appropriately, and motivate them to learn.

Although the vast majority of university students with visual impairment in the Czech Republic are students of Masaryk University, it is true that study materials are almost exclusively created and published with respect to the needs and preferences of students without special needs and without universal learning design principles. Changes, leading to the document accessibility, are often made only with an intuition and empathy and reflect only actual student's needs.

Our mission is to change this state and prepare a conception of complex universal learning design environment, in which following goals are reach according to the general standards and regardless this or that specific kind of accessibility is currently required.

In this paper we focused on demands and needs of students with visual impairment, which can be covered mostly by technical means.

Current state

Sources, where study materials are published, and ways, how they are created, are very heterogenous. There can be found files in different formats (docs, xls, ppt, html, audio/video recordings) and technical quality.

Nowadays we quite common face following issues and although employees of Teiresias Centre are quite often moderate its impacts, there is still a lot what should be done to ensure better accessibility of study materials:

- Authors don't have sufficient awareness and knowledge about accessibility or they aren't interested in accessibility.

- Students have outdated technical equipment (screen readers, screen magnifiers).
- There is no (authoritative) source of techniques, practical advices and tutorials how to create accessible documents (study materials).
- Some "umbrella web portal", gathering all information about accessibility, links to other resources, contacts, help, etc. is missing.
- There are accessibility issues concerning not only the study materials, but also the environment in which they are presented.
- Sometimes it's quite difficult to get the information which study materials student really needs.
- There is no way how to in time and easily get the information that student with special needs enroll for concrete course.
- Students don't have sufficient knowledge how to use their powerful assistive technologies to work with study materials.
- There is no conception in evaluating accessibility of study materials. Nowadays it's is done only on demand.

Proposals of possible solutions

There are several ways, how to solve this situation. Here are some of them:

- Include a duty to create accessible documents as a part of some university directive.
- To have a possibility to get from Masaryk University Information System information, that student with special needs enrolled for concrete course.
- To have a permanent approach to sources, which can be an alternative for standard study materials, that aren't publicly available.
- To have a tool, enabling automatic accessibility evaluation of study materials, which are uploaded to Masaryk University Information System.
- To create Web portal (e.g. pristupnost.muni.cz), gathering all the information about accessibility and universal learning design, contacts, tutorial, directives/guidelines, etc.
- Training courses for both authors and students – courses for students are already in progress.
- Technical and methodological assistance to authors of study materials – already in progress.

Conclusion

Topic of universal learning design and accessibility of study materials is really wide, is influenced by a lot of aspects and it's not easy to find a simple way, how to ensure accessibility of study materials in general. On the other hand, some ways are quite easy to implement and they are already tested abroad (e.g. university web portal, concerning accessibility). From my personal point there is no reason to start right with them.

1

Implementation of Universal Design For Learning Principles for Development of Spatial Visualization Skills of Students

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Mastering the basic professional skills for interior design students require development of visual spatial perception.

"Spatial abilities" refer to, in general, a collection of cognitive, perceptual, and visualization skills. While lists may differ, substantial agreement exists that spatial abilities involve (Sutton and Williams, 2008; p. 115):

- the ability to visualize mental rotation of objects
- the ability to understand how objects appear in different positions
- the skill to conceptualize how objects relate to each other in space
- three-dimensional (3D) understanding.

Based of the concept and principles of universal design for learning (UDL), providing availability of environment, objects and information and the opportunity of their application for everyone, educational researchers of USA have developed several methodologies on adaptation of UDL principles in education.

UDL principles offering the most comprehensive and developed theoretical formulations and practical recommendations were applied in the current study.

The framework for UDL is based on findings from cognitive neuroscience providing understanding on the needs of individual learners. It embeds accessible pedagogy into three specific and central considerations in teaching: the means of representing information, the means for students' expression of knowledge, and the means of engagement in learning (Rose and Meyer, 2002, and Rose, Meyer, and Hitchcock, 2005).

Universal design for learning is a part of the overall movement toward universal design. UDL requires design not only of accessible information, but also of accessible pedagogy. The distinction between UDL and other domains of universal design is its focus on learning.

UDL means multiform and incorporating educational environment that would be available and accessible as much as possible to everybody, without special adaptation. UDL provide every student with an opportunity to develop his/her skills of learning, as well as to find out motivation and set up goals for development of personality by formulation of the following three principles:

Principle Nº 1: Multiple Means of Representation.

There is more than one way of presenting information or transferring knowledge optimal for all students.

Principle Nº 2: Multiple Means of Expression

Students differ in the way they can navigate a learning environment and express their knowledge. There is not only one way of expression that will be optimal for all students, nor one kind of scaffolding or support that will help them as they learn to express themselves. Multiple means are essential.

Principle Nº 3: Multiple Means of Engagement

Students also differ markedly in the ways in which they are engaged or motivated to learn. Students must develop the internal standarts and motivation that will prepare them for successful work and future learning.

Objective of this study: improvement of interior design students visual special perception skills through application principles of UDL in study course. Standardized programs do not contain methodology for evaluation and improvement of this skill.

Method of obtaining data: Data processing and analyses carried out by dispersion analyses. Study performed in the period from January 2010 till November 2011 within the scope of basic curriculum of architecture.

In order to perfect visual perception skills of students, the following issues were incorporated in the curriculum:

- Teaching methods corresponding to variety of learning styles;
- Different teaching styles in order to promote students having dominant learning style to build up also other, less developed learning styles;
- Various expressions, types of activity (free hand sketching, layout design of objects into material, virtual modelling tasks provided via software, designing of orthogonal and isometric projective).

Visual spatial perception skills of students at the beginning and in the final stage of this study were evaluated by application of standardised ARCH PROFILE, *Visual-Spatial Intelligence Test* spatial perception test consisting of three components:

1. set of „mental rotation" tasks;
2. set of two „mental transformation" tasks;
3. 2D-3D relational tasks and „paper folding" tasks.

Results obtained: level of students spatial visualization skills indicated in the beginning of the study was different i.e. the average data for index of visual special perception was of 0.45. In the end of this study - after principles of universal design for learning have been incorporated in the curriculum students demonstrated considerable increase of their spatial visualization skills i.e. the index of visual special perception reached 0.79.

Conclusion: Implementation of universal design for learning principles in learning process of interior design students stimulate development of their spatial visualization skills.

To promote spatial visualization skills of interior students, the basic curriculum of architecture should be implemented based on UDL principles.

References

Rose, D. H.; Meyer, A. *Teaching every student in the digital age: Universal design for learning.* Alexandria, VA: Association for Supervision and Curriculum Development ASCD. 2002. (Also available in digital format at http://www.cast.org).

Rose, D. H.; Meyer, A.; Hitchcock, C. *The universally designed classroom: Accessible curriculum and digital technologies*. Cambridge, MA: Harvard Education Press, 2005.

Sutton, K.; Williams, A. Developing a Discipline-Based Measure of Visualization. In the *UniServe Science Proceedings*, 2008. p. 115–120.

Section 2

Linguistic Competence of the Hearing Impaired and the Role of Sign Languages and the Text Reporting in Tertiary Education

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The section focuses on:

- The issue of native language and language of communication among persons with severe hearing impairment; the issue of official, instruction, foreign and world languages of persons with severe hearing impairment compared to other linguistic minorities.
- Linguistic standard and linguistic diversity in speaking and writing of persons with severe hearing impairment.
- Language instruction and the achievement of prescribed linguistic competences of persons with severe hearing impairment.
- Spoken language visualisation, speech-to-text reporting, and other systems of communication for persons with hearing impairment usable in tertiary education.
- E-learning systems, videoconferencing and instant messaging in sign languages.
- Sign language as a tool in tertiary education and specialized communication, its stylistic diversity and standards.
- Application of the Common European Framework of Reference for Languages on sign languages and testing of linguistic competences in these languages.
- Phonology, morphology and syntax of sign languages, their interference with spoken languages and influence on communication within a university environment.

- Lexicology and lexicography of sign languages, development of vocabulary, issues with terminology and internationalisms.
- Sign languages recording and noting systems, creation of databases and linguistic corpora, software tools for handling databases and corpora.
- Linguistic, organizational, didactic and legal issues of translation and interpreting in academic settings.

From "Hearing Impairment" to "Deaf-Gain": A Theoretical Framework for Universal Design for Learning?

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This presentation invites a dialogue between two allied areas of inquiry: Deaf Studies and Universal Design for Learning. These fields have much to gain from a long and sustained discourse. Deaf Studies and Deaf education stand to benefit enormously from the advances in technologies and pedagogies arising from UDL practitioners. Similarly, the theoretical framework of UDL may more consistently articulate its revolutionary contribution by incorporating insights from Deaf Studies – namely, the notion of "Deaf-gain" which reframes the nature of human difference from abnormality to a new normal of biocultural diversity.

Deaf-gain is a counter construction to the traditional notion of "hearing loss" and "hearing impairment." Deaf-gain refers to the cultural, cognitive and creative contributions that arise from deaf ways of being in the world (Bauman and Murray, 2009, 2010). Within a Deaf-Gain frame, notions of 'access' and 'accommodation' are admirable and much needed to ensure more equal educational opportunities for everyone; however, they may not always go far enough to redefine the very construction of normalcy and therefore may leave fundamental pedagogical assumptions unchallenged.

A case in point within bilingual deaf education is that all individuals, regardless of hearing status could benefit from the visual, spatial and kinetic modality of signed languages. A brief review of relevant research on the gains of visual and gestural learning will be presented to emphasize the often overlooked role that the hand and/or the eye play in cognitive activities.

To illustrate this point in practice within tertiary education, brief videos will be shown that demonstrate the pedagogical benefits of academic discourse in a signed language. Insights will also be presented from the Gallaudet Scholarship of Teaching and Learning Initiative (GSTLI) which studies the practices of some of the finest teachers at Gallaudet University who pay particularly close attention to the embodied experiences of students within the classroom.

A Deaf-gain approach to UDL, then, reframes disabilities as a part the incredible diversity of ways of knowing, which is actually the norm rather than an imaginary statistical body of people. As UDL asks us to consider the role of the body, of perception and of the ethic of full inclusion in education, UDL pedagogy is about more than access and accommodation for people with disabilities; it could be about making education a more humane and hospitable process for everyone.

Velotype and Text-on-Top. Real-time Captioning Solutions and Products

Sander Pasveer

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Velotype, The Netherlands

Text on Top®[1] is a wireless, affordable software and hardware solution that provides real-time captioning on top of any application running on the secondary computer and without interfering with the use of this secondary computer.

Problems to be solved with Text-on-Top:

- A second overhead screen is needed
- User needs to sit close to screen
- Interpreter needs to sit close to beamer
- A user needs to look at two different screens
- One of the applications for this product will be real-time subtitling of a (Powerpoint) presentation or the subtitling of a videostream which is being made visible through a computer. This can be at big meetings, like a congres where the presentation is shown on a large screen. But also at seminars, workshops, trainings, weddings, funerals.

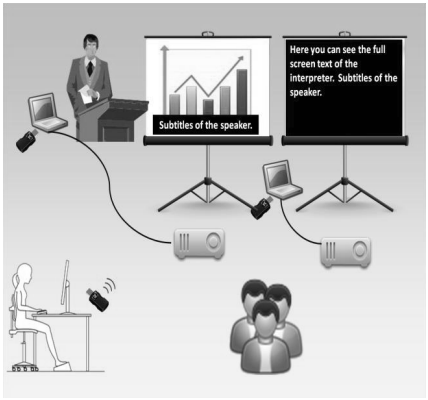
Benefits

- Low cost solution.
- Eliminates the need of a separate CART screen and beamer/projector setup, thus:
  - Cost reduction.
  - No space occupied on the stage.
  - Better communication: The audience stays focused on the presentation.
- Solves segregation issues: The audience, especially those with a hearing impairment, don't need to gather around the CART text screen.
- CART/STTR reporter is free to sit anywhere (not tight to a beamer/projector video cable).
- Improves communication: The audience can read back what is being said, especially valuable when the presenter and audience does not share the same (native) language.

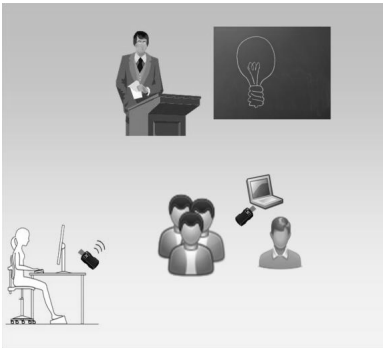
1 www.text-on-top.com

- Plug & Play, no drivers needed.
- Both Apple and Windows computers supported.
- No USB slot of your computer is being sacrificed: the device supplies a free USB socket located at the rear end.
- Presentor doesn't need to worry about the appearance. The CART/STTR reporter take care of this remotely.
- No interference with other running applications on the presentor's computer.
- Robust wireless connection over 150 meters. No BlueTooth, no WiFi, hence no complicated configuration issues or paring pitfalls!

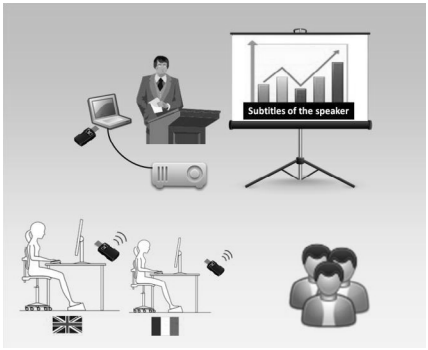
Subtitling a presentation in a group



Presentation with subtitles and second screen



Speech to text for one in meeting or classroom



Subtitling of a multiligual presentation in a group

Polygraf – Universal Access to Presentations and Lectures[1]

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1 Introduction

The Support Centre for Students with Special Needs at Masaryk University, Czech Republic, provides hearing impaired students (typically, hard of hearing students that comprehend written Czech) as well as visually impaired students, with services in educational setup.

One of the major services for students with hearing impairment is the speech-to-text reporting service, when a reporter records the speech (a lecture or a seminar in a university environment or even any similar event outside of a university environment) as a text on a computer by means of a simultaneous typing, and several students reading the report on one common screen at the same time.

As students with visual impairment are concerned, one of the major problems is the accessibility of the visual documents and other materials presented by a lecturer via a presentation screen. Distance to the presentation screen as well as light conditions or the presentation layout creates readability barriers and obstructs the students to perceive presented information.

2 Visualisation of the Synchronous Transcription (Speech-To-Text Reports)

As the number of students who are dependent on that service and who attend classes together has been increasing, Masaryk University tried to find a satisfactory solution to situations when groups of three or more students needed to follow a transcript at once and provide them with a comfortable access to the report.

2.1 Requirements for a New Solution

From this experience we gathered several key points which the new system should fulfill. The requirements for a new solution were the following:

- simple and quick technical preparation;
- independence on a local technical infrastructure;
- speech-to-text report must be synchronized with a reporter's typing;
- the look of the reported text should be customizable;

1 http://www.teiresias.muni.cz/polygraf

- a possibility of two-way communication;
- support for Czech and English language.

2.2 Analysis of Comparable Existing Systems

When analyzing existing systems comparable, we intentionally skip those which provide speech-to-text transformation based on automatic speech-to-text recognition. Systems which have been analyzed **involves a human speech-to-text reporter**:

- Google Documents (http://drive.google.com)
- Bee Communications (http://www.bee-communications.com)
- eScribe (http://www.escribe.cz)

Their common denominator is dependency on Internet connectivity in the location of text reporting. We consider this crucial requirement to be the most disadvantageous because utilization of the systems becomes highly dependent on local technical infrastructure. Additionally, most of the systems have quite complicated process of initialization and fail in the requirement of document layout setup independent among users.

2.3 Polygraf – Own Developed System

Defined requirements and analysis led us to the developing of our own system – **Polygraf** and practising it. The system meets all the requirements listed above and presents a technical solution to all those issues. It is based on a technology which can be used independently and which considers common technical parameters of an environment such as a wireless network signal coverage. The only requirement is access to electricity. All those make it quite a universal transcript visualisation system.

- The key benefits and features of Polygraf visualisation of transcripts:
- It consist of three main hardware parts only, therefore it can be easily transported and prepared for work in a very short time.
- It does not require Internet connection, initial network set-up, or its own server.
- It is compatible with Microsoft Word environment commonly used among Czech speech-to-text reporters.
- It uses handheld devices (e.g. smart phones or tablet) as a text display to ensure the basic user comfort.
- The reports are available in the environment of native applications (Windows, iOS, Android) and are also accessible via standard Internet browsers.

- It enables two-way communication: reporter to user and also user to reporter by simply typing a short message which will then appear in the text-reporters screen.
- The software solution also enables to show a report as dynamic captions on a speaker's computer and thus immediately supplement the speaker's presentation when there is one.

2.3.1 Hardware Components of the System

1. The **computer for the reporter** – desktop or a laptop computer with Microsoft Windows operating system and Microsoft Word in version 2003 or later installed, and equipped with Wi-Fi network interface.
2. The **communication bridge** – A Wi-Fi access point to create a wireless network connecting all devices together and transfer the text between them. There is no need of Internet connectivity for this wireless network.
3. The **display for the user** – Any device with the iOS, Android or Windows operating system. Typically, an smart phone or tablet computer with Wi-Fi interface. There can be many of those user's devices used as a handheld displays to follow a transcript.

2.3.2 Software Components of the System

1. The **application for the reporter's computer** – Microsoft Word Add-In. This is installed separately alongside the Word, and its purpose is to "share" the text out of the Word documents to the users' devices.
2. The **application for the handheld devices** – it handles the reception of a text report and its continuous updating and displaying according to a custom setting of the user (font type, font size, colors, line-spacing etc.).
3. The **application for the presenter's computer** – it is an alternative viewing application which displays the reported text in the form of continuously updated subtitles of up to four lines displayed as a floating caption, which can be attached to a speaker's presentation.

3 Presentation Screen Mirroring Enhancing the Readability for Users with Visual Impairment

Many lectures and presentations are supplemented by presentation slides using a projection. Speeches of the presentations often contain only part of information and referring of the speaker to his/her visual documents projected is very common. While blind users may work with accessible formats and have the material at their disposal, visually impaired users try to follow the mainstream visual

content. Visually impaired people, but not only them, have to struggle with bad visualization conditions on the spot as well as with slides prepared inproperly. To reduce the difficulties and to offer the possibility to magnify the content by the user, Masaryk University has extended its Polygraf application to provide a screen mirroring of the presenter's computer.

3.1 Requirements of a Solution

Observing students in lectures at the university and participants at presentations on conferences we gathered a list of key features required to such a system:

- simple and quick technical preparation;
- independence on presentation technologies;
- speech-to-text report must be possible to be added;
- magnification of the content must be possible;
- compatible with handheld devices of users;
- nearly real-time update of the mirroring without consuming too much battery power.

3.2 Analysis of Comparable Existing Systems

When analyzing existing systems we encountered software solutions providing the active screen sharing including control handling as well as screen casting solutions:

- TeamViewer (http://www.teamviewer.com)
- Quick ScreenShare (http://quickscreenshare.com/)
- Skype Screen Sharing (http://www.skype.com)

The common disadvantage on all software solutions is the time needed for the preparation. While it is possible to prepare a presentation computer within a lecture room, it is impossible to maintain the installations and provide the service with personal devices (such as laptops) or, at a conference, to manage a situation when speakers are exchanging together with their presentation computers.

Additionally, the software we tested is quite complicated in processes of initialization of sharing and partially it is limited in number of participating users. None of the software offered the possibility to include a transcript.

3.3 Polygraf – Continous Developed System on Universal Access

For those reasons mentioned above, Masaryk University considered to continue the development of the Polygraf application, adding the function of screen mirroring. It is implemented utilizing external hardware without needs of adapting presenter's software environment. The combination of screen mirroring and the speech-to-text services should be provided.

The key benefits and features of Polygraf screen mirroring:

- It consist of three main hardware parts only, therefore it can be easily transported and prepared for work in a very short time.
- It does not require Internet connection, initial network set-up, or its own server.
- It is platform independent on the side of presenters.
- It uses handheld devices (e.g. smart phones or tablet) as a display to ensure the basic user comfort.
- The mirroring is available in the environment of native applications (Windows, iOS, Android).
- The software solution also enables to show a screen mirroring in combination with a speech-to-text; it offers the magnification of the screen capturing and the transcript visualisation can be displayed color-inverted.

3.3.1 Hardware Components of the System

1. A **screen capturing device for the presenter** – a broadcasting device (e.g. Epiphan VGA Broadcaster) capturing the VGA signal and providing it, apart from the output for data projectors, as a broadcasted motion JPEG through network interface.
2. The **communication bridge** – a Wi-Fi access point to create a wireless network connecting all devices together and to transfer the text between them. There is no need of Internet connectivity for this wireless network.
3. The **display for the user** – any device with the iOS, Android or Windows operating system. Typically, a smart phone or tablet computer with Wi-Fi interface. There can be many of those user's devices used as a handheld displays to follow a screen mirroring.

3.3.2 Software Components of the System

The only software required for the visualisation of screen mirroring is an application for the handheld devices which handles the reception of a screen capturing and it is continuously updating and displaying it according to a custom setting of the user.

4 Usage and Practical Experience

Polygraf system was used throughout the last three academic years in lectures of Masaryk University in total amount several hundreds of them. Commonly, there were 3–6 students attending each of the lectures. There were several sessions to adapt the reporters to the new system, which they were supposed to get familiar with.

Polygraf system was also used for the text-reporting and subtitling of presentations in the International Conference Universal Learning Design in Brno, Czech Republic, 2011. The text transcript was available to the audience through LCD displays situated on both sides next to the speaker stage as well as to any user of the iPad handheld devices which were available to borrow. At ULD conference, four text-reportings were running simultaneously – one report for each of two languages in each of two conference rooms. Additionally, during the last year, the usage of Polygraf system at conferences has been enhanced. The service was realized at INSPO Conference, Prague, Czech Republic in 2011 and 2012 as well as at the International conference ICCHP 2012 in its Universal Learning Design Track.

During the next academic year and the 3rd Universal Learning Design conference in February 2013 the screen mirroring will be introduced to users and a wider user feedback will be available by the time of the conference.

CART in the USA

Jennifer Schuck

JS Reporting, Inc, Scottsdale, United States of America

2

Jennifer Schuck is a Registered Diplomate Reporter, certified through the National Court Reporters Association in the United States of America. She also holds the Certified CART Provider as well as the Certified Broadcast Captioner certifications as well. Currently, she sits on the committee that creates both the written exam as well as the skills tests for the CCP and CBC certifications. It should be noted that Jennifer uses the steno method and not the voice method to provide her services.

Both the CCP and CBC exams are a five-minute dictation at 180 words per minute. Passing rate is 96% accuracy without the opportunity to make corrections after the dictation has ended. That calculates out to 36 errors in five minutes. There is also a 100-question written exam that focuses on technology, writing ability and ethics with regarding to providing CART (communication access realtime translation) or broadcast captioning. These certifications are not required to provide CART. There are a few states in the US that have laws requiring some sort of certification. This is an issue that is a hot topic and many groups have been formed to discuss how to ensure quality CART services to all deaf or hard-of-hearing individuals.

Jennifer owns her own business in Scottsdale, Arizona, USA. Her primary focus is on providing CART in the educational setting, primarily K-12 grades. This has been her focus since 2004. However, she's been a court reporter since 1993.

In the USA, court reporters use computer-aided transcription (CAT). This requires the purchase of CAT software. There are approximately three big ones to pick from, with a few smaller companies as options. All the software is PC-based. A Mac computer may be used but Windows needs to be installed on it in order for the software to work. The cost for this software is approximately $4,000 USD. In order to provide CART, only CAT software is needed. In order to caption to television, a special add-on software is needed. Captioning software is approximately $7,500 USD for the complete package.

In the US, there is a distinction between CART and captioning. CART is used in educational settings, business settings, churches, both remotely and onsite. It is the same as STTR in Europe. Captioning in the US is very similar to CART except that it requires a little more technology and captioning by its strict definition means the test is embedded into a video feed. "Realtime captioning" is the term used for both CART and captioning. When a consumer or client requests "realtime captioning," the professional needs to clarify exactly what services are needed so they know which equipment is required for the job.

CART providers strive to be verbatim, write everything word for word. This requires the skill to be able to write 225–260 words per minutes, if not more, with extreme accuracy. Some hard-of-hearing (HOH) consumers do request the CART provider to not write verbatim if their reading skills are not fast enough to be able to read the screen as fast as the speaker is speaking. CART is requested often for higher-level classes in a college. In the high school setting, it is requested for students who have proficient reading skills and are college-bound.

The goal for CART providers is to provide communication access. There is a debate amongst CART providers about what this means. Some believe this means we write only what is said while the consumer is present in the class or meeting. Some believe that even if the consumer is not present, the CART provider should still write everything being said and provide a transcript later, in essence, providing communication access then. There is no rule on this issue and it is something that should be discussed with the client in the case of the educational setting. There's difficulty in making these types of decisions because the entity paying for the services is often not the HOH individual, thus the HOH individual has no say in the types of services that are provided.

How does stenography work? The stenograph machine is made up of consonants and vowels. Consonants are both the left and right hand. The vowels are struck with both thumbs. In this way, you are able to type phonetically syllable by syllable and create words. The strokes that are typed are then matched against a dictionary, a sort of database, that the CAT software then translates into the matched English word in the dictionary. When there are words typed that are not in the dictionary, or mistyped by the CART provider, then there is artificial intelligence built into the software to make a best guess of the word that was meant to be typed. Sometimes the translation is correct. Sometimes it is not. Also, a CART provider may type a word letter by letter if they know a spoken word will not translate correctly. This slows down their speed so they must have the skills to then pick back up the spoken words once they type letter by letter.

Because there are only approximately 750 CART providers in the entire country, they are all very busy. There is a lot of work. This means that services may be requested in parts of the country that there are no CART providers. In this instance, it can be provided remotely. To provide remote CART, it requires the CART provider to output their text to a Website that then provides a link to the text. That link is shared with the HOH individual to view the CART text during the meeting or class.

Introducing CART to Ireland

Shane Finnerty

Premier Captioning & Realtime Ltd, Wicklow, Ireland

2

In 2005 we realised there was a scarcity of accessibility solutions for Deaf/deaf, hard-of-hearing and those for whom English is not their first language, in Ireland. At this time we were providing live subtitles to the national TV broadcaster and realtime text to the legal and government sectors and we already had in place the skillset and experienced staff that could be put towards providing CART in Ireland. In order to gauge the need for CART services in Ireland we undertook a 12-month programme of travelling to most of the 3rd level colleges and universities, charities, businesses and government agencies and engaged with their disability officers, providing a practical demonstration to illustrate how the CART service would be of benefit to students, colleagues and the public. It became very evident that a large proportion of the organisations that we contacted were in need of such a service, but they either didn't know it existed and weren't aware of its benefits or that it was possible. What has become apparent is that CART as a service, alongside other solutions (loop systems, etc), has wide ranging implications for the deaf and hard-of-hearing in order to allow them to participate in the world around them.

STTR in the Netherlands

Gea Duister
freelancer STTR, The Netherlands

I will tell you about the situation of STTR from the start in 2000 until today. How the education is formed, in those days of the pilot until today the Associated Degree.

We work in the Netherlands as freelancers and that means we either need mediation or get our own network. How that is done, I will show in a short summary from mediation office until the contracts we need for the payments.

In 2001 the Sign-interpreters started a register for their CPD. Because also STTR felt that Continued Professional Development would increase their skills and knowledge they joined in 2005 this register. I will explain the different sectors how the STTR will show their professional growth.

Figures on the amount of STTR-users and the amount of money involved will be shown in flow charts.

In the Netherlands there is an association of STTR. It started in 2009 and shortly I will tell of all the tasks we had and the way we plan for the future of our job.

Of course STTR do have equipment to do their jobs, Veyboard and Velotype will be introduced to you.

For the Netherlands online interpreting for both STTR and Sign interpreters is a new working field. In September 2012 a pilot started to figure out what criteria must be followed to have successful online sessions.

Last august 2012 there was in the Netherlands the first meeting of European STTRs. This meeting was the start of an European organisation which will be a great way of sharing knowledge of our profession.

Situation and Experience with Transcribers and On-line Speech-to-text Service for Hard of Hearing and Deaf People in Czech Republic

2

Martin Novák

Czech Union of the Deaf, Czech Republic

The article deals with history of simultaneous transcription for deaf and hard of hearing people in the Czech Republic. Simultaneous transcription with physically present transcribers is offered as a social service by Czech Union of the Deaf (CUD), Online version of transcription is provided by a new social company Transkript online Ltd as social service in sphere of commercial institutions. Transcription services in educational domain is represented especially by Teiresias Centre of Masaryk University. Transcription services have a huge potential to increase quality of life of hearing impaired people. Expansion of these services require education of transcribers and development of online tools for transcription services which reduce costs, increase quality of service and cover much wider areas, than physically present transcribers.

Between Wictionary and a Thesaurus: Some Dilemmas of a Sign Language Dictionary

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Over the past few decades, lexicography has undergone dramatic development, which completely changed the original concept of dictionaries fixed on paper. Two illustrative examples of lexicographic structures hardly conceivable 15–20 years ago are: wiki dictionary (whose tribal representative is the Wictionary[1], or Wikislovník[2] in the Czech version) and a linguistic thesaurus[3]. A key feature of the first is the use of the creative potential of a large number of volunteers and/or volunteering (semi)professionals to produce an online dictionary of a size which would be extremely expensive and time consuming to do in a professional way. The second term is now defined as a structured system of semantic relations between lexical units, i.e. a database of terms having as a core part not the definitions of meanings, but the set of synonymic-antonymic and hyponymic-hyperonymic links; it was only by means of the web hyperlinking that this second concept became fully functional.

Both concepts actually stand in opposition to each other, even though they repeatedly try to integrate some features of their opponent. The first system out of necessity gives up some advantages of professionalism: the sophistically built-up glossary and the uniform processing of the entries is substituted by a large number of entries more or less standardized for a very reasonable price; as an added value there is the motivation of a large number of contributors to achieve

1 *Wictionary: the free dictionary* [online]. Wikimedia Foundation. [Cited 16 Jan 2013]. Available from: <http://en.wiktionary.org/w/index.php?title=Wiktionary:Contact_us&oldid=14194479>.

2 *Wikislovník* [online]. Wikimedia Foundation. [Cited 16 Jan 2013]. Available from: <http://cs.wiktionary.org/w/index.php?title=Wikislovn%C3%ADk:Hlavn%C3%AD_strana&oldid=330346>

3 Examples:
Eionet: GEMET Thesaurus [online]. EEA, ETC/CDS. [Cited 16 Jan 2013]. Available from: <http://www.eionet.europa.eu/gemet>
Open Office spell checker based Online Spell Check, Hyphenation and Thesaurus [online]. [Cited 16 Jan 2013]. Available from: <http://www.spell-check-thesaurus.com>
WordNet [online]. Princeton University. [Cited 16 Jan 2013]. Available from: <http://wordnet.princeton.edu/>
See Fellbaum, Christiane. WordNet and wordnets. In: Brown, Keith et al. (eds.), *Encyclopedia of Language and Linguistics*, Second Edition, Oxford: Elsevier 2005, p. 665–670.

the result. The second system is logically contrary, requiring high professionalism and processing in most cases to date, not used as a practical tool for a large number of users, but as a specialized tool in teaching, research or specific professional situations.

The advantages of both systems are of the type which is difficult to implement in signed language lexicography, due to several factors inherent in a signed language and to the culture of its users:

- an interest in using sign language for the communication between the hearing and the deaf, dates not so far back in history, and if we take into account the small number of native signers, the consequence is that there still is not much demand for standard lexicographical work
- technical requirements for building up a sign dictionary are extraordinary (high-quality video capturing, editing, data basing, retrieving), compared to a written dictionary
- obstacles during the education of sign language users lead to the fact that those who manage technology for lexicographical work and who have the intellectual interest in it are not identical with the group of sign language users

Existing dictionaries of sign languages therefore have several features in common:

- relatively small number of lexical units registered (due to the structure of the signed language and to its high iconicity which helps making concepts comprehensible without previously defining them)
- limited grammatical information (mainly confined to the determination of the part of speech where it is unambiguous, and to elementary stylistic assessment)
- poor structure of the glossary (phrases and compound lexical units are often ranged at the same hierarchical level as the units from which they are composed)
- absence of exemplification (samples used in the context)
- bilingual character, but with a very small number of semantic equivalents in the target language (often just one) and missing comments on the semantic conditions for differentiating if more of them are listed
- processing the glossaries of partial semantic fields (thematic areas) separately in various dictionaries
- no or minimal information about synonyms/antonyms and hyponyms/hyperonyms

The database and interface of the Czech sign language dictionary online are an attempt to overcome these traditional limitations, without making the structure too complex and impossible to implement some wiki features. This paper comments on the structure of the developed vocabulary and its anticipated system management.

Effects of SZKIT in the Designing Software Lecture for Hearing Impaired Students

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Introduction

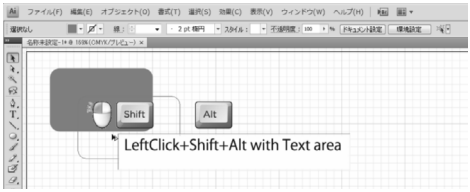
Our university is only for visually impaired and hearing impaired students. In the lecture class for hearing impaired students, we use several methods with sign language. They are projecting Power Point file or captured image to the screen, writing some experiments to the white board, and playing subtitled video materials, etc[1][2]. These methods are useful for the hearing impaired students and produce some educational effects in the lecture. However, even using these methods, it is difficult to teach how to operate graphical designing software like Adobe Illustrator or Photoshop. We prepared many video materials and e-learning system to teach such kind of software though, some of students could not comprehend how to use the designing software. We think the reason why is that showing real time operation to the students is needed in such lectures. Showing real time operation is quite effective to the "hearing students" in the normal case, because we use oral explanation in the same time. On the other hand, hearing impaired students cannot hear such oral information. Even though there is sign language translator or subtitling service to the real time operation, the hearing impaired students cannot see both of them simultaneously. Addition to it, these translation services has slight delay in general.

Synchronized Key points Indication Tool

To solve the problem mentioned above, we developed support software named "Synchronized Key points Indication Tool: SZKIT"[3] [4] [5] [6]. The overview of the software is shown in Figure 1. The software is composed of several icons and an instruction text area. The mouse icon appears when the teacher clicks mouse button and the key icons appear when he/she presses real keyboard. The figure shows most of icons to explain how it looks like, but they are hided at first and appear just after teacher's actions and gradually disappear. About instruction text area, it is a space for showing text to explain how to operate the designing software. Basically the instruction texts should be prepared in advance by

the teacher and he/she can control a changing timing by using hotkey. Figure 2 shows how SZKIT works in the real situation. In that case, teacher is drugging a mouse with pressing Alt-key and Shift-key. Hearing impaired students can understand what kind of operation is done in real time with these icons and they can also get text information without moving visual axis. The SZKIT is already used in the practical lecture in our university.

[Fig. 1] Interface of SZKIT



[Fig. 2] Look of teaching with SZKIT

Evaluation of SZKIT

To clear the effect of the SZKIT, experimental lecture sessions of Adobe Illustrator were conducted. We prepared two types of lecture which has different difficulty level, easy one and hard one. Both lectures have two sessions each, which is conducted with SZKIT and without it. Therefore the number of conditions of the experimental lecture was four. To avoid effect of order, these four conditions are shuffled. After these experimental lectures, students answered several questionnaires which estimate effects of getting information. The number of hearing impaired students was 11, but validate number is 10 because one person knew examination contents in advance.

Two types of tasks were performed in 8 minutes. Both tasks were scored on 100-point scale. We compared tasks. Whether there is a difference between the two tasks, we performed t-test. As a result, statistically significant was observed.

References

[1] Murakami Hiroshi, Minagawa Hiroki, Multimedia education system for hearing impaired students, IEIC Technical Report (Institute of Electronics, Information and Communication Engineers), vol. 100, 2001, p. 143–148.

[2] Tokunaga Satoru, Fujita Miyu, Asano Satoshi, Okamoto Akira. Research on the information design through the works of creating educational Contents for auditory handicapped people, The Institute of Electronics, Information and Communication Engineers, Well-being Information Technology 101(73), 2002, p. 13–18.

[3] Kobayashi Makoto, Suzuki Takuya, Wakatsuki Daisuke. Teaching Support Software for Hearing Impaired Students Who Study Computer Operation – SynchroniZed Key Points Indication Tool: SZKIT. ICCHP (1) 2012, p. 10–17.

[4] Suzuki Takuy. Research on Design Practice Support Intended for Hearing Impaired Students, Tsukuba University of Technology Techno Report Vol.18(2), 2011, p. 68–72.

[5] Kobayashi Makoto, Suzuki Takuya. Support Software which Instructs Hearing Impaired Students of Computer Operation – SZKIT: SynchroniZed Key points Indication Tool, Tsukuba University of Technology Techno Report Vol. 18(2), 2011, p. 35–39.

[6] Suzuki Takuya, Wakatsuki Daisuke, Kobayashi Makoto. Support Software which Instructs Computer Operation for Hearing Impaired Students: SZKIT, Human Interface Society, 2011.

[7] Suzuki Takuya, Wakatsuki Daisuke, Kobayashi Makoto. Evaluation of Support Software which Instructs Computer Operation to Hearing Impaired Students, The Institute of Electronics, Information and Communication Engineers, TECHNICAL REPORT OF IEICE 111(472), 2012, p. 33–38.

Willingness to Communicate in English as a Foreign Language of the Deaf and Hard of Hearing University Students

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Introduction

Research on deaf and hard of hearing students learning and using foreign languages has started not so long ago – in the first years of the 21st century. So far the main topics of it revolved mainly around issues of grammar and vocabulary, reading, writing and speaking acquisition, difficulties experienced by students during this process and strategies of overcoming the possible problems. Some of the personality characteristics, like motivation and learning style were also investigated. In the background of each of these research a conclusion might be visible that a foreign language is best acquired within the context of an interaction. It implies the fact that greater attention of both scientists and practitioners should be devoted to active usage of the target language, be it in class or in the more naturalistic setting. The key factor guaranteeing a success is the students' willingness to start and maintain a conversation in a foreign language.

Willingness to communicate is by some of the researchers understood as the main goal of language instruction and defined as "the probability of engaging in communication when free to choose to do so" McCroskey & Baer, 1985). Thus, it can be treated as a psychological readiness to use a second language and understood as something different from objective linguistic competence. Formally speaking, willingness to communicate is observed as a certain type of communication behavior, but this act can be described as a multi-layered one. It is implied by the intention to perform a certain behavior, usually in a specified interpersonal and situational context. This results from motivational, affective and cognitive propensities, such as self confidence, interpersonal motivation, group motivation, attitudes, communication competence, intergroup climate and personality (cf. J. R. MacDonald, R. Clément, P. D. MacIntyre 2012).

Research

The issue of willingness to communicate is of an utmost importance in forming and assessing linguistic competence in a foreign language of the deaf and hard of hearing English as a second language students. It happens more than often that even if they master English grammar and vocabulary, they feel very much

reluctant to use a foreign language as a means of communication. It is probably connected with some personality features, lack of self confidence and unfavorable social attitudes and prejudices.

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In the present paper the results of research on the deaf and hard of hearing university students willingness to communicate will be presented and analyzed. The research group consisted of 22 deaf and hard of hearing Polish and Czech participants of a workshop *English as a tool of international communication*, conducted at KUL university in Lublin within the program *Network of Expert Centers Providing Inclusion in Tertiary Education – ExpIn*. The control groups consisted of 20 hearing students and 20 deaf and hard of hearing students who did not participated in the workshop. The method included a questionnaire checking the students' involvement and motivation to participate in English as a foreign language classes and a questionnaire checking their willingness to communicate. The results were analyzed statistically, showing high level of willingness to communicate among the research group of students for whom the workshop mentioned served as a supporting communication environment.

Conclusion

Willingness to communicate should be treated as one of major factors facilitating the process of teaching and learning English as a foreign language for the deaf and hard of hearing subjects. Bothe language teachers and administrators should pay more attention to develop this characteristics among the students and organize supporting communication environment for students to practice their language competence.

References

Domagała-Zyśk, E.; Podlewska, A. *Umiejętności polskich studentów z uszkodzeniami słuchu w zakresie posługiwania się mówioną formą języka angielskiego*. In: Kutek-Składek *Student z niepełnosprawnością w środowisku akademickim*. Wydawnictwo Sw. Stanisława BM, 2012. p. 134–157.

Domagała-Zyśk, E. Poziom motywacji niesłyszących studentów do uczenia się języków obcych. W: Kutek-Składek K., Godawa G., Ryszka Ł (ed.). *Student z niepełnosprawnością w środowisku akademickim*. Kraków: Wydawnictwo św Stanisława BM, 2012. p. 173–200.

Domagała-Zyśk, E. Kompetencje wzrokowe osób niesłyszących i możliwości ich wykorzystania w zakresie nauczani języków obcych. In: K. Krakowiak, A. Dziurda-Multan (ed.) *Wychowanie dzieci z uszkodzeniami słuchu – nowe wyzwania dla rodziców i specjalistów*. Lublin: Wydawnictwo KUL, 2012. p. 255–270.

Domagała-Zyśk, E. Trudności osób niesłyszących w zakresie opanowania systemu leksykalnego i składniowego języka angielskiego jako obcego i strategie pokonywania tych trudności. In: Z. Palak, D. Chimicz, A. Pawlak (ed.). *Wielość obszarów we współczesnej pedagogice specjalnej*. Lublin: Wydawnictwo UMCS, 2012. p. 361–382.

Domagała-Zyśk, E. Podstawowe trudności osób niesłyszących w opanowaniu pisowni języka obcego i ich kompensowanie. In: K. Krakowiak, A. Dziurda-Multan *Ku wspólnocie komunikacyjnej niesłyszących i słyszących*. Lublin: Wydawnictwo KUL, 2011. p. 149–162.

Domagała-Zyśk, E. Kompetencje uczniów niesłyszących i słabosłyszących w zakresie posługiwania się językiem angielskim w szkołach podstawowych, gimnazjach i szkołach ponadgimnazjalnych. "*Neofilolog*" (Czasopismo Polskiego Towarzystwa Neofilologicznego), 36 (Niezwykły uczeń – indywidualne potrzeby edukacyjne w nauce języków obcych, ed. K. Karpińska-Szaj), 2011. p. 91–110.

Domagała-Zyśk, E. Style uczenie preferowane przez niesłyszących uczestników lektoratu języka obcego. In: M. Białas (ed.) *Specjalne potrzeby niepełnosprawnych*. Kraków: Arson, 2011. p. 243–260.

McCroskey, J. C.; Baer, J. E. (1985). Willingness to communicate: The construct and its measurement. Paper presented at the annual convention of the Speech Communication Association, Denver, CO, In: J. R. MacDonald, R. Clément, P. D. MacIntyre (2012). *Willingness to Communicate in a L2 in a Bilingual Context: A Qualitative Investigation of Anglophone and Francophone Students* (manuscript).

Section 3

Universal Design of Electronic Documents and Public Electronic Libraries for Purposes of Tertiary Education

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The section focuses on:

- WCAG and comparable documents, their enforceability, advantages and imperfections in relation to persons with various types of special needs; web accessibility and usability.
- Transferability of WCAG and comparable documents to E-learning environments and digital documents; accessibility, readability and content comprehensibility of official and specialized documents.
- Standards for digital documents intended for tactile or auditory perception, hybrid documents and the Digital Talking Book.
- Digital documents intended for reproduction of tactile, audio or visual documents, hybrid documents and DAISY.
- Universal design of video and audio formats.
- HTML, XML, MathML standards and digital tools for handling mathematical, physical, chemical and other symbolic notations via tactile or audio outputs.
- Digital libraries and their accessibility, digitization and standards for conversions among formats.
- Copyright issues related to universal design and individual accommodation of documents and individual access at national and international levels.
- Public library catalogues and their accessibility, sharing and internationalization.

- Cataloguing of tactile, audio and graphical documents; cataloguing of digital documents intended for individual reproduction of tactile, audio or graphical documents; cataloguing of the Web.
- IT literacy of persons with special needs, its standardization for individual impairment categories and academic public's awareness of the specifics of such literacy.

Organising Student Support Using Accessible Electronic Documents, E-Books and Audiobooks: an Overview

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Overview

In this presentation, I will discuss several technological and pedagogical items related to university level teaching for students with a functional limitation (or an impairment). It is well known that many universities pay a lot of attention to making their education as accessible as possible, also to students that need special support or extra help.

In a first part, I will discuss the different types of limitations that students might have as well as some existing technical solutions adapted to their specific limitation.

In the next part, I will give a critical overview of the possible support techniques, based on my experience in international project work and local actions. Finally I will talk about what I learned from my contacts with the many other universities that invest in real support for the group of students we have in mind. A small list of good advices will be added at the end of the full text version.

Overview of major functional limitations and how to cope with them as a university level student

Deafness and hard of hearing

As most of the course materials are still in a printed form, they are accessible for this group of students. However one must be aware that for many of them, sign language is their mother tongue and the written language (that is not just a pure transcription of the signs) is often their second language. This group evidently has serious problems in following oral courses. Although several systems for automatic speech recognition (IBM's Liberated Learning Consortium is the best known example) have been tried out, results are still mediocre for most languages except for English.

Depending on the level of state and university funding, these students can call in the help of sign language interpreters. Automatic sign language generation is still far from a reality although quite a lot of research is going into this problem's solution.

The situation is a bit easier for students that are hard of hearing. Quite often, it suffices to connect a lecture room's public address audio system to a special receiver.

Low vision

Students with some rest vision can use enlargement systems (optical or computerized) to have access to course texts. Here the problem is often related to viewing the explanations written on the white- or blackboard. Special cameras and software do exist: a computer screen is split in two: the blackboard can be seen in the upper half of the screen, the course material in the lower part.

Big improvements are made through the use of computerized teaching boards (although not yet widely used in university level education). Their screen information can easily be transmitted to a visually impaired student's portable computer, can be enlarged and can be recorded. Especially video to usb devices from Epiphan are quite popular in this respect.

Blind students

Students without any rest vision need to turn their written materials into another modality: audio (talking computer) or Braille (on paper or on temporary Braille reading devices).

Main challenges here are:

- What kind of document types are accessible, adaptable en cost effective? Furthermore can they be realized in the usually short time span that is available for course material conversion? I will briefly refer to my ICCHP2012 presentation on this subject.
- There are no general solutions for mathematics access and no solutions at all for making most graphical material accessible

Students with dyslexia

Dyslexia is a neural complication in the brain that results in an increased difficulty for understanding written material. Therefore very often students choose to turn written texts into audio. This can be done with special software packages, usually capable to read and handle pdf documents.

Role of e-books and audiobooks

E-books and audiobooks are a relatively new phenomenon with a very slow start in take-up for many years now. In our experience very little use of this material is made in university level education. The large attention paid nowadays to iPad (or other table) use in education might change this but e-books with course material

are still very rare. This might change when the e-book standard EPUB3 becomes widely spread (heavily promoted by the International Digital Publishing Forum). This standard has the extra benefit that EPUB3 books can easily be turned into audiobooks usable for blind persons.

Student support organisation

My own university, KU Leuven started accepting students with a motor handicap since the early eighties. In that period a small group of volunteer fellow-students was recruited per person with impairment and they provided all daily support. But over the last decades, especially the last one, accessibility became a much wider concept. As all teaching and organizing at the university is now done through computer access, eAccessibility became a prime factor in the teaching process for the group of reading impaired students (low vision, blind, severe motor handicap, dyslexia). The same is evidently true at other universities.

I will report briefly about our own experiences and point to a couple of special solutions implemented at other universities.

Accessible Video as a Support for Teaching in Higher Education

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This paper presents a joint project of the University of Lleida (UdL) (Spain) and University of Barcelona (UB) (Spain) for the development of a specific programme dedicated to define, exemplify and promote the process of usable and accessible video creation and editing in higher education. The main aim of the project is to disseminate best practices through examples tested by a pilot study in order to facilitate the introduction of accessible video as a learning support for on-site courses and blended courses. The project is mainly focused on the application of Universal Design and Accessibility concepts in the use of audio-visual resources in higher education. This aspect has been little studied in comparison to other aspects concerning the educational use of video in the classroom (Dale, 1969; Bruner, 1997; Ferrés 1997; Sancho, 1994).

The rationale of the project is based on the assumption that video is a format increasingly used in communication by Web (Maaden 2007, Purcell 2010; Moore 2011) and many universities systematically record classes and redistribute video for web and mobile platforms. Distance learning or blended universities record teaching content in video format in order to recreate part of the "richness" usually offered in the classroom learning experience.

According to ethical principles of education and the Declaration Of Human Rights, which states that "everyone has the right to education" and "higher education shall be equally accessible to all", higher education should be accessible to everyone and should avoid creating new digital barriers. Unfortunately accessibility subjects have been seldom discussed in the literature related to teaching and their inclusion in audiovisual content offered in university courses is currently very low. It is very common to come across videos hard to access because of the lack of subtitles, for being offered with a video player not supporting accessibility features, or other mistakes caused by the lack of knowledge of better options.

Therefore, taking into account the current trend where the universities invest increasingly efforts to provide their expertise in video format (enabling a large number of students to access higher education), this project will increase the freedom of using specific lessons by video in the classroom or anytime and anywhere and will thus increase the teaching quality for students in general and for students with special needs in particular.

The project has been performed by a multidisciplinary group of academics (pedagogues, librarians and computer and multimedia technicians) and generated many outputs. The technology and knowledge transfer is one of the main purposes of the project and the nature predominantly applied of the project has fostered the creation of several products and demonstration readily available to the educational community. These materials gather information about different key issues to consider in designing materials, different useful tools are recommended to make the user capable to create accessible audiovisual content autonomously with basic skills or to add accessible features to an existing video in the most common formats. The project briefly reports possible barriers to universal access on common platform and recommends the most affordable publishing options to guarantee the accessibility to the content.

The following list shows the generated outputs of the project:

- A short video to increase the awareness of accessibility in multimedia, and in particular of the importance and benefits of subtitles, audiodescription and accessible players (http://www.youtube.com/watch?v=d-IUOWiG-sa4);
- slides presentations to create awareness, parallel to the short video;
- audio description audiotrack;
- subtitle track in Catalan and Spanish;
- tutorial on guidelines on how to plan and prepare the creation of an accessible video;
- tutorials on the use of ccplayer and HTML5 as accessible players (Gonzalez et al., 2011);
- tutorials on the creation of subtitles with Youtube, Universal Subtitles, VSync and Subtitle workshop, with guidelines to create a timed text version;
- tutorials on the creation of an audiotrack with Capscribe;
- tutorials of automatic speech recognition with the aid of Dragon Naturally Speaking and Audacity tools;
- tutorials on the creation of metadata for accessible video as a learning resource;
- demonstrations of the several tools used.

All the outputs will be available soon on the project's website (http://www.videoaccessible.udl.cat).

References

Afra, P.; Ribera, M.; Masip, L.; Granollers, T.; López, J. Guías de contenido digital accesible. In *25 Años de Integración Escolar en España: Tecnología e Inclusión en el ámbito educativo, laboral y comunitario*. Región de Murcia. Consejería de Educación, Formación y Empleo. Secretaría General. Servicio de Publicaciones y Estadística, Spain, 2010. ISBN 978-84-693-1781-5.

González, M.; Moreno, L.; Martínez, P.; Iglesias A. Requisitos de accesibilidad web en los reproductores multimedia. In *Proceedings of the XII Congreso Internacional Interacción 2011*, Lisboa. N. Garay, J. Abascal (Eds.), 2011. ISBN 978-84-9281-234-9.

Kathleen, Moore. 71% of online adults now use video sharing sites Washington. *Pew Internet* [online]. 2011. Available in URL: <http://pewinternet.org/Reports/2011/Video sharing sites.aspx>.

Madden M. Online Video Washington. *Pew Internet* [online]. 2007. Available in URL: http://pewinternet.org/~/media//Files/Reports/2007/PIP_Online_Video_2007.pdf.pdf.

Moreno Lourdes.; Ruiz-Mezcua, Belén; Martinez, Paloma; Carrero, Juan Manuel; Martinez, Juan Ramón. *Accesibilidad a los contenidos audiovisuales en la web: una panorámica sobre legislación, tecnologías y estándares*. Madrid: Centro Español de Documentación sobre Discapacidad, Spain, 2008. ISBN 978-84-691-7754-9.

Purcell, K. The State of Online Video Washington: *Pew Internet* [online]. 2010. Available in URL: http://pewinternet.org/Reports/2010/State-of-Online-Video.aspx.

Ribera, M.; Pascual, P.; Salse, M.; Masip, L.; Granollers, T.; Lopez J. M.; Oliva, M.; Gil, R.; Garcia, R.; Gimeno, J. M.; Chiné, J.; Comas, A. 2010. *Guia de contingut digital accessible*. ISBN: 978-84-693-8489-3. Available in URL: http://griho.udl.cat/export/sites/Griho/documents/GuiesContingutAccessible/Llibre_Guia_de_contingut_digital_accessible.pdf.

Accessibility Issues in Digital Mathematics Libraries

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The growing number of digital libraries does not serve only metadata of scientific or educational documents, but also the fulltext data themself. This brings new possibilities, but also accessibility issues to cope with when designing user inferfaces for exploratory search and for accessing and reading the fulltexts, provided usually in some version of PDF format.

We have participated in the design and solutions for the European Digital Mathematics Library (EuDML) and participated in primary data preparation of the Czech Digital Mathematics Library DML-CZ. In the paper we describe the developed technologies addressing

Braille output of document content including mathematical formulae, document prepreocessing and enhancement that increase accessibility, readability and explorative qualities (similarity of mathematical documents) of the documents in digitla libraries of texts for tertiary education and research in STEM domain.

In the paper we describe mathematics processing in EuDML, canonicalization of math formulae, their indexing, searching a using in similarity computations.

Math and Lambda: the Experience of Blind Students and Their Teachers

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3

The LAMBDA system is a software application designed to facilitate blind students in making mathematics at school. The main features of the system include:

- a 8-dot Braille code that blind that extends the national 6-dot Braille codes. This code was designed to be easy to learn and read;
- an interaction paradigm, based on the linearization of the mathematical notation, designed to navigate and process mathematical expressions through speech synthesizer and/or Braille display;
- graphical rendering of the mathematical expressions. This feature aims to support communication between blind students and sighted people (e.g. school-mates, teachers, assistants, etc.);
- printing of the document including text and mathematical expressions.

In recent years the system has been adopted by many Italian schools (primary schools, secondary schools and by some students at university).

This speech examines how the LAMBDA system is used by blind students in primary schools, secondary schools and early years of university. The analysis concerns the use of LAMBDA both by students and teachers.

Mathematical Algorithms and their Modification for Blind Students

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Mathematics is very visual in its nature. We put objects into different positions in space (plane) that helps us understand the relationship between them better and enables us to handle them more easily. Many algorithms are based on visual work with data, e.g. graph theory, linear algebra, calculus, etc.

The authors of the proposal are teachers of mathematics for students with visual impairment at Masaryk University, Brno, Czech Republic. When giving instruction, they face the following problem: how can blind people use a given mathematical algorithm in view of the fact that they follow all the information in linear way. They often have to decide whether to adapt such an algorithm or let blind students work with it in the same manner as their sighted peers do. Their goal is to find an optimal set of methods which would respect blind people's linear manner of working with information and at the same time be sufficiently effective. The process of the computation as well as the result should be understandable to others as well, especially to those who supervise and evaluate the work.

The article will provide two specific examples of mathematical algorithms (matrix multiplication, polynomial division) and their modifications for blind students. These modifications will be evaluated according to their effectiveness and complexity. We also bear in mind comments and remarks we received during the workshop Typical Mathematical Problems in University Studies presented at the ICCHP Summer University on Maths, Science and Statistics for Blind and Partially Sighted Students held in 2012 (Linz, Austria). We will compare the modifications with the results of several existing publications focused on the didactics of mathematics. Finally, we will provide a summary of some other algorithms which we will analyze with regard to their accessibility for blind people. We intend to present our results during the next ICCHP Summer University 2013 in Karlsruhe, Germany.

Accessible Tests and Tactile Audio-graphics for Totally Blind University Students

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3

The paper presents some challenges faced university students with a visual impairment and solutions available at the John Paul II Catholic University of Lublin. While the university policy is to follow, whenever possible, available guidelines, some non-standard, innovative solutions are used whenever they prove beneficial to students.

Although the need to make all educational materials (including tests) accessible to students with a visual impairment is generally understood and accepted by university authorities, implementation of these requirements poses certain problems which are not always easy to overcome.

Some of these problems are caused by the still popular myths about abilities and limitations of totally blind and partially sighted persons:

- that replacing print with Braille is enough to make course books accessible for totally blind students
- that all blind people read Braille
- that all partially sighted persons need large print
- that totally blind persons cannot use computers

While these myths and misconceptions can easily be clarified, some challenges still remain for anyone involved in making adaptations of educational materials, for example:

- understanding that different types of visual impairment have different pedagogical implications and may require different solutions
- availability and knowledge of standards in making accessible adaptations of text
- availability and knowledge of standards in making accessible adaptations of illustrations (drawings, diagrams, tables and maps)
- knowledge of and access to specialist software and equipment for designing and producing accessible adaptations of both text and graphics
- knowledge of the access technology used by students with a visual impairment.

While standards for adaptation of text are relatively easy to observe (for example by following the BANA Guidelines), adaptation of the graphic content of course books still remains a major challenge. Confident use of tactile graphics requires

preparation, practice and, above all, understanding of the relation between three-dimensional objects and drawings, and of the spatial relations between objects. What seems obvious to a sighted person may be impossible or very difficult to understand for a person blind since birth. A vertical line drawn next to two parallel horizontal lines turned out to be a faithful representation of a bus as it was perceived by a totally blind child: one line for the step, one for the vertical pole she held on to and one for the seat. It is easy to imagine the problems the child would have with identifying and understanding the various parts of a typical "sighted" representation of the vehicle. But it is also easy to imagine that the child would probably fail in a test in which the task was to describe the vehicle shown in the drawing. The fundamental rule for testing students with a visual impairment is that the tests must reflect and assess their knowledge and not their ability to deal with particular formats of the tests which they may not have come across before.

In addition to training offered to totally blind students in recognition and interpretation of "traditional' tactile graphics produced with one of the available methods and technologies, the University Centre for Adaptations of Educational Materials designs and produces tactile audio-graphics – raised diagrams and maps enriched with voice description and/or sound effects which give totally blind students stress free, independent access to all types of graphics required by the subjects they study. While such materials, requiring specialist technology may not yet be standard, their effectiveness and positive feedback from students with a visual impairment suggest that such solution deserve attention of university Special Need Centres.

Evaluating Solutions to Process, View and Listen Mathematical Formula within an Accessible Context

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Introduction

Project "Recursos docentes accesibles" – accessible teaching documents – is an action within the Teaching Improvement and Innovation Program at University of Barcelona, whose broad objective is providing templates for the creation of most widespread teaching documents, and easy procedures to create alternative versions of them. Those alternative versions will include changes in color, fonts or other presentational attributes and also conversions to different digital formats, thus promoting inclusive education in the university by the integration of alternative formats in everyday contents.

Within the mathematics context, this broad objective imposes specific requirements for mathematical notation/formulae. Most text processors process mathematical notation/formulae through a proprietary codification system or, even, through graphical formats procedures, so they are not suitable for assistive technologies like screen readers or screen magnifiers. This situation imposes a severe barrier for blind and low vision students when using learning resources within mathematics area. People with dyslexia or ADHD could also benefit from screen readers or changes in presentation when reading mathematical notation/formulae in order to understand them better –even when, for those groups, this solution is not essential.

Taking those precedents in mind, the project team decided, as a specific objective for accessibility on mathematical learning resources, to test the feasibility of various options for the creation of documents with mathematical notation/formulae and their conversion to MathML, the world's most accessible format for mathematics.

Methodology

A testbed was designed with two main components:

- A selection of 139 different formulae, with a good coverage of symbols and expressions, based on the formulas offered by LibreOffice Math 3.3.2, which distinguishes 11 different sets of formulae.

- A selection of three text processors with specific capabilities for processing mathematical notation: MS Word 2007 (12.0.6661.5000) SP3 MSO (12.0.6662.5000) and LibreOffice Math 3.3.2, for office documents; and Latex MiKTeX 2.9 TeXnicCentre 1.0, for Latex documents. The selection was based on the results of a survey on the tools commonly used by faculty members in the Department of Mathematics of University of Barcelona.

All the formulae were processed within the editors, in order to obtain evidences of capability and quality on viewing them and listening to them. In the case of MS Word 2007, formulae were tested both on a regular version of the editor and an empowered version with MathType 6.0c. by Design Science, a formula editor that allows the creation of mathematical notation for inclusion in desktop and web applications.

Once all the formulae were processed with the three editors, results were converted into MathML, in order to view and listen to them on different internet browsers. All converted formulas were tested on Firefox (on Windows), Opera (on Windows) and Safari (on MAC), which have native support for MathML. After this first test, LibreOffice was discarded as an option. Further tests were done with MS Word and LaTex on IE with MathPlayer plugin.

The test was performed during November 2012, when presentational results were gathered and, in the case of MathPlayer, also results of listening. The evaluation of results involved two different indicators: quality of displays for user visualization and quality of reading for user audition. For the first indicator, values were: not acceptable display; acceptable display; and best display. For the second indicator, values were: MathPlayer doesn't read the formula; MathPlayer reads the formula partially; MathPlayer reads the formula correctly. In this second indicator, the listening was carried out by choosing Spanish language and "reading for the blind" setup option.

Results

Results show that MS Word empowered with MathType is the best solution in terms of number of symbols correctly interpreted, quality of displays for visualization and quality of readings for audition -even when 6 over the 139 formulae were not supported.

MSWord+MathType provides better displays than LibreOffice, although some symbols in LibreOffice were not covered by the first mentioned tools. By default LaTex exports formulas in a nonstandard typography which hinders understanding in viewing and in Mathplayer listening, but this can be corrected in the conversion process.

As for browsers, visualization on IE empowered with MathType is the best solution although Firefox alone gives better results in comparison with any other browser without plugins.

Further works

3

Test results will allow us to deliver evidence-based advice to the University professors (and, specially, to the Department of Mathematics) on best options for accessible mathematical formulas within teaching resources. Also, we will advise blind or low vision students about the best options for optimum viewing and listening resources containing mathematical formulas. In addition, some models devoted to mathematical formulae will be included in the catalog of accessible materials for teachers within the University and advices on how to convert Latex formulas and how to create formulas with MathType will be disseminated.

Accessible Dynamic QTI-Questions

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1 Preamble

Learning Management Systems (LMS) are used for supporting teaching in schools and universities and are getting more important. These LMS offer many advantages for learners and teachers. Learners can access teaching material time- and location-independent. Afterwards they can test their learning success. Therefor the LMS supports different kind of answer-techniques, e.g. single and multiple choice, ordering elements by Drag'n'Drop. some of these technique use visual interaction like Drag'n'Drop and pairing elements which may cause barriers for users with special needs.

In addition the teachers will be relieved. There exist some editors for creating tests and the LMS checks the completed tests and evaluates the answers automatically.

Different standards and programs exist for creating online tests. Current standards for the description of content of learning are Sharable Content Object Reference Model (SCORM) and IMS Question & Test Interoperability (QTI). Besides commercial systems also OpenSource-LMS are available. Their accessbility and usability is important when selecting a LMS . This has considerable impact for impaired and non-impaired users.

2 LMS

In which way a LMS is used depends on the teacher. A study of the Saxonian Online Platform for academical Teaching and Learning (OPAL)[1] shows that most often used activity was downloading content like lectures and excerises. For improving the usage of collaborative functions like bulletin board, shared calendars and online tests our team had evaluated this system with visual impaired persons and worked together with the provider for the realization of our recommendations in later updates.

Our team is also running a LMS called Moodle[2]. The advantages of Moodle are:

- OpenSource
- tested with visual impaired and blind users (see (PRESCHER])

1 more information https://bildungsportal.sachsen.de/opal/dmz/

2 https://moodle.org/

- modified for enhancing the accessibility
- blind and visual impaired students use our LMS

We offer our students[3] tests for their exam preparation and bulletin boards for news, discussions and questions. Both, online tests and bulletin boards are used during the terms and for testing the knowledge of different topics.

2.1 QTI

QTI is a standard format for the representation of assessment content and results. QTI offers different interactions for answering a question (see IMS Global Learning Consortium). These interactions are single-Choice and Multiple-Choice (simple), input fields (textbased) and Drag'n'Drop or order/sort elements (graphical).

The QTI standard supports additional information like description of pictures in its specification. Furthermore there is no definition in which way the assessment content will be rendered and presented to its user. But often HTML and JavaScript is used for this. And this is the main problem, because the interactive responses are not accessible for assistive technologies.

2.2 Accessible interactive Responses

Different studies show that interactive response can be accessible, if they fulfill current guidelines and specification like Web Content Accessibility Guideline 2.0 (WCAG 2.0), Web Accessibility Initiative – Accessible Rich Internet Applications (WAI-ARIA) and HTML5. Responses like Drag'n'Drop and sort elements can be accessible. Therefore just HTML5, ARIA, CSS and JavaScript is required.

In our current project it is the main goal to enhance the accessibility of such interactive response. Based on QTI, HTML5, CSS and WAI-ARIA different kind of interactions are developed and tested with blind and visually impaired users. Blind users were asked what kind of interaction they prefer when asked to sort a list of multiple items. The result are two kind of interaction: select'n'move and select'n'paste. Select'n'move is performed by selecting/grabbing an element and moving it via the arrows keys. Select'n'paste after is performed by selecting an element and moving the focus. With second selection the selected element is pasted at the focussed position. Both techniques were tested with blind users successfully.

Another concept of accessible Drag'n'Drop is using a popup menu for selecting the drop target (see [HEIMER]). In the same way the users can adjust the ordering of the dropped elements by select'n'move or select'n'paste. Additional information about the visual changes after moving/pasting a element will present

3 A pilot study has shown that mouse-based quizz techniques as described above can be mastered by blind students. Results will be reported in the full paper.

in an hidden live-region. We modify an existing QTI-Player by adding these accessible features and make the interactions accessible for assistive technologies.

3 Conslusion

By using technologies like HTML5, CSS and JavaScript dynamic web pages and particular Drag'n'Drop accessible for assistive technology. All three proposed accessible interaction techniques are subject to preferences of an individual user.

References

Heimer, Andrea. *Usability assistiver Technologien in dynamischen Webinhalten*. Diplomarbeit, TU Dresden: Dresden, 2001.

Prescher, Denise. *Nichtvisuelle Benutzungsoberflächen im E-Learning*. Großer Beleg, TU Dresden: Dresden, 2008.

IMS Global Learning Consortium. *IMS Question and Test Interoperability Assessment Test, Section, and Item Information Model*. Available in URL http://www.imsglobal.org/specifications.html.

Automated Process to Create XML Based Non-Fiction Books from Scratch Making them Accessible for Blind Students on Devices like Tablets

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3

Introduction

There are different ways to make fiction and non-fiction books accessible, whether as braille, large print or DAISY audio books. For this structured sources are needed. Structuring a document manually consumes much time.

This document introduces a production software tool kit developed at the German Central Library for the Blind (DZB) in Leipzig. It aims to support structuring complex books both automatically and manually. The goal is to cover 95 % of recognition fully automatically leaving the rest for manual improvement. Other aims are accessible tools, OCR improvement, easy editing, media specific labelling, generation of different media and embedment into work flows.

As an example the tools allow to produce HTML pages that can be presented on tablet computers and used in lessons. It is possible to create a fast and comfortable access to non-fiction books at the level of modern means of communication.

Automated structuring

After image preparation and creation of segments using graphical methods they are described by it's formal properties, like colour, indentation, location, text content etc. Furthermore texts are recognized using standard OCR software. The properties are the base for tagging the segments with substantial meanings like *section title* or *page number*. The process is designed to work fully automatically on a server which we call core. The output of the core is a highly structured electronic document which is called LeibniX package. It contains a LeibniXML file holding the structured document as well as figure files for large print, source references etc.

Manual post processing using LEdit

LEdit focuses on editing and improving the LeibniX package. The LeibniXML file is quite complex. To advance the usability to the user the presentation is done using a special notation called Leibnix which is quite similar to Latex notation. For example all attributes are hidden. A Leibnix element can have two different notations. They can be restricted to a special media like braille.

\cmd[content]	\begin{cmd} Longer content. \end{cmd}	\braille:cmd[Content restricted to braille.]

As an example: while one LeibniXML file has a size of 1,3 MByte the corresponding Leibnix only needs 250 kByte.

LEdit provides a set of primitives on elements and texts: copy, paste, create, raise or lower global titles, mapping, etc. During editing primitives can be combined to more complex working steps which are the base for the editing workflows.

There are a lot of tools supporting the editor. A document view shows the position and content type, a figure, a source view showing the original book pages and a selection allowing super local corrections. Different views like the HTML output and a hint screen can be easily extended by an LEdit administrator when writing and adding a cmd or XSLT script. Macros are supported by exporting the XML document and reloading the modified one. The document can be exported to formats such as DAISY, HBS (Braille) or others.

Current status

The project is still in development. Usability tests and presentations to different German media producers have shown that the concepts are sustainable. The software is planned to be finished until the end of 2012. Next steps will be the takeover into production, different extensions and improvements. A second usability test will be made in 2013. Planned extensions are interfaces like Daisy 4 export and making LEdit a production tool that can be effectively used by blind and partially sighted people.

Application Leibniz for tablet computers

The tools developed by Leibniz will help to produce non-fiction books for visually impaired people in different media formats. Focuses are adapting the tools with respect to special needs as well as changing requirements. The underlying architecture is designed to be very robust and adaptable to those developments.

The bbs nürnberg, a school and competence-system for pupils and young adults with low vision and blindness in Bavaria/Germany started 2011 a new project which uses tablet computers like the iPad for vocational training.

Uninformed people could have the impression that the iPad cannot be used without sight, but the integrated software "VoiceOver" generates a direct Bluetooth connection to different Braille devices. Also it designs the screen especially for people with low vision (contrasts, font size…)

After half a year of use the iPad proved to provide access to books and information in a fast and very impressive way. The teachers started to give their information via e-books by placing them in the "kiosk". With it the books can be quickly accessed. Therefore the pupils use the iPads like a book – carrying it always with them.

3

Here is the very interesting connection between "Leibniz" and the bbs nürnberg. There exists a very big gap to have access to text books on vocational training like office communications which is educated at bbs nürnberg. By using Leibniz tools this gap can be closed in a fast, secure and easy way.

Section 4

Compensation Tools for the Specific Learning Disorders and Other Types of Diversity in Tertiary Education

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The section focuses on:

- Typology of specific learning disabilities and other types of neurodiversity, testing and measuring of these among adults.
- Compensation strategies, their practicing and approach to persons with a compensatory disability.
- Individual accommodation of testing environment and technological compensatory devices.
- Differences in work with a screen reader, voice output and electronic formats between persons with specific learning disorders and the visually impaired.
- Electronic libraries and their usability by persons with specific learning disorders, digitization and standards for conversion among formats.
- Copyright issues related to universal design of documents for persons with specific learning disorders.

Dyslexia Friendly Education

Kate Saunders

British Dyslexia Association, The United Kingdom

Dr. Kate Saunders is the Chief Executive of the British Dyslexia Association. Kate has over 20 years of experience in the field of dyslexia and special educational needs, having worked as a Senior Specific Learning Difficulties/Dyslexia Advisory Teacher, Special Educational Needs Coordinator, chartered psychologist and lecturer. Kate has a Ph.D. in Education and is co-author of *How Dyslexics Learn*, published by PATOSS.

The British Dyslexia Association (BDA) campaigns for a dyslexia friendly society where barriers to dyslexic people do not exist. The BDA works to ensure that ALL people with dyslexia fulfil their potential. To achieve this we need to create change, set standards and support and enable people. It is the voice of dyslexic people; it listens to their views, represents their agendas and presses for long lasting sustainable change.

Information on Accessibility and Assistive Technologies – The eAccess+ and ETNA Projects Fostering Inclusion for People with Disabilities

Klaus Miesenberger

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In this paper, we present the work carried out in two EU funded projects (eAccess+ and ETNA) that both aim to overcome barriers keeping PwD also from (higher) education through research, collection and provision of information on (e)Accessibility and Assistive Technologies and how this information / database will be able to facilitate and foster everyday work of and for PwD, their supporters and support centres.

Project eAccess+

eAccess+ is partially funded under the ICT Policy Support Programme (ICT PSP) as part of the Competitiveness and Innovation Framework Programme by the European Community EU SEVENTH FRAMEWORK PROGRAMME ICT PSP third call for proposals 2009: CIP-ICT-PSP-2009-3, Project Number: 250568 eAccess+ is driven by (25 core members), coming from all over Europe. It is their core task to involve all stakeholder groups at national level and to expand the network by a group of so called "(Associated Partners)".

The project eAccess+ aims at establishing and systematically developing a co-operative platform for co-ordinating, supporting and improving the implementation of eAccessibility throughout Europe. By involving all stakeholder groups it will analyse the state of the art and in particular the obstacles or missing links hindering a boarder uptake of eAccessibility. The network will first identify and consult all relevant stakeholder groups, analyse and discuss with them the state of the art, support stakeholders in working on key issues to foster eAccessibility and disseminate experiences and knowledge all over Europe. Finally a roadmap should help to find appropriate future actions to support eAccessibility.

eAccess+ is driven by 25 core members, coming from all over Europe. It is their core task to involve all stakeholder groups at national level and to expand the network by a group of Associated Partners.

Out of the wide range of topics related to eAccessibility eAccess+ will focus particularly on fostering the implementation of:

- Web accessibility
- Accessible convergent communications and accessible digital audio-visual systems

- Self-service terminals (SSTs) and devices for banking and financial services, public transport, tourism and cultural heritage, e-government.

Project ETNA (European Thematic Network on Assistive Information Technologies)

The project ETNA is a thematic network funded by the European Union, within the framework of the ICT PSP Programme. Over a period of 3 years, it will establish a European Web Portal able to provide a unified access to information on European ICT assistive products, on related organisations, services, and to allow access to repositories of freeware, open source software products and tools useful for e-accessibility.

Such a Portal will initially stem from the already-existing website of the European Assistive Technology Information Network (EASTIN), the most comprehensive European information service on AT.

Our network

We are 23 leading Organizations, each with acknowledged commitment in the ICT AT area at national or international level, scattered across 13 European Countries. We work in collaboration with ATIS4All (Assistive Technologies and Inclusive Solutions for All) project, another Thematic Network belonging to the same cluster.

The project leader is the Biomedical Technology Department of Don Gnocchi Foundation, the largest private non-profit provider of care and rehabilitation services for people with disabilities and elderly people in Italy.

Our goals

Providing transparent and easily available information on AT and accessibility products and services offered across Europe, thus empowering citizens with a disability in relation to the knowledge and the choice of assistive technologies

Initiating an interdisciplinary and trans-national community of expertise involving academics, industrialists, professionals in health care and education, end-users, researchers and developers, with a great potential to improve exchange of knowledge, ideas and thus boosting the development of assistive solutions at various levels (including open source software products)

Promoting a unified AT and accessibility market helping companies - especially SMEs, who dominate in this area – to benefit from huge market potential

Key events at each step will be technical workshops with representatives of all partners, monthly webinars (interactive seminars delivered on-line) and steady interaction between stakeholders through the virtual community established by the ATIS4All Network.

A Case Study of Applying Card-sorting as an Initial Step in the Design of the LITERACY – Portal for People with Dyslexia

Kamila Balharová, Dominik Hagelkruys, Ján Struhár

University of Vienna

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There is an increasing awareness of the fact that early user involvement in the development of web-based applications is a key success factor. The human-centered design process suggests a number of useful interventions that guide the process of including users. One of them is the card-sorting technique.

In this paper we aim to share our experiences in applying card-sorting in an early phase of developing a web-portal for supporting users with reading difficulties, most prominently dyslexia. The paper characterizes the card-sorting technique and describes the preparation, design decisions, data collection, data analysis and results we achieved while applying the technique with a sample of dyslexic users. Moreover, the meaning of the results is discussed along with the special learning and adaptations necessary for applying card-sorting with users with special needs. Readers will also get acquainted with the EU-Project LITERACY that forms the context of the study.

Introduction of Czech Assessment Battery for Students with Dyslexia in Tertiary Education

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The aim of the paper will be to introduce fundamental principles of a new assessment battery for students with dyslexia in tertiary education. There is an assessment battery for adolescents and adults in the Czech Republic. However, this battery has proved to be rather insufficient in the course of assessment of students in tertiary education. The international project ExpIn thus included an adaptation of the battery as one of its goals. The new battery has already been piloted and is prepared for further standardisations. The paper will present the theoretical background of the battery adaptation and the outcomes of the pilot stage.

Workshops and Seminars

Braille Mathematics and Music: Advanced Technologies for Education

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PART 1 – Math and Lambda: the blind students experience

The LAMBDA system is a software application designed to facilitate blind students in making mathematics at school. The main features of the system include:

- a 8-dot Braille code that blind that extends the national 6-dot Braille codes. This code was designed to be easy to learn and read;
- an interaction paradigm, based on the linearization of the mathematical notation, designed to navigate and process mathematical expressions through speech synthesizer and/or Braille display;
- graphical rendering of the mathematical expressions. This feature aims to support communication between blind students and sighted people (e.g. school-mates, teachers, assistants, etc.).
- printing of the document including text and mathematical expressions.

In recent years the system has been adopted by many Italian schools (primary schools, secondary schools and by some students at university).

This speech examines how the LAMBDA system is used by blind students in primary schools, secondary schools and early years of university. The analysis concerns the use of LAMBDA both by students and teachers.

PART 2 – MaxTract: for converting PDF Scientific Document into more accessible formats

PART 3 – FBK for inclusion: Portal for teaching mathematic to blind students

This speech introduces the portal learninglambda.veia.it. This portal aims at collecting and disseminating resources about the LAMBDA system. There are many resources for those who approach LAMBDA for the first time, there are examples on the main branches of mathematics (algebra, calculus, etc.), solution strategies, advice on how to write, use, and troubleshoot various types of operations, expressions and problems in an effective way and making full use of the many

features of the program. This collection of resources has been realized thanks to the help of Spanish Prof. José Enrique Fernández del Campo and Prof. Luciana Formenti and the support of the Fondazione Bruno Kessler of Trento in Italy.

PART 4 – MUS4VIP: a new music didactical methodology, capable of exploiting the new software, in a context of integrated education

Music literacy, although of crucial importance for the general development of the blind person, is suffering a dramatic decay, owing to several factors, such as lack of trained teachers, high production costs of Braille music scores, demotivation deriving from traditional format of Braille scores, which are cryptic and not self-evident, as it is the case of normal scores. The proposed solution, based on a new XML format and related software, removes two main negative factors, firstly, transforming the digital Braille score into a friendly environment, with stable, clear and customizable reference points, and, secondly, opening new perspectives in the domain of bi-directional communication between blind and sighted peer, at all levels: scores, class communication, digital communication, in view of new perspective in e-learning and job opportunities.

Technological Innovations in Sign Language Publishing

Melissa Malzkuhn

Digital Innovation & Media Strategies Manager, Visual Language and Visual Learning, and Co-Executive Editor of Deaf Studies Digital Journal, Gallaudet University, United States of America

Technological advances in video-based websites and applications have made integral breakthroughs for sign language publishing within the Universal Learning Design framework in representation, expression, and engagement.

The *Deaf Studies Digital Journal* is the world's only peer-reviewed publication in sign language. To date, *Deaf Studies Digital Journal* ("DSDJ") has over 100 contributors from around the globe, from researchers to visual artists and poets, opening new possibilities and avenues in advancing linguistic respect and equality through self-representation. The design approach to the Journal supports the national sign language and International Sign, as well as an unprecedented level of transparency in presenting data. The process of sign language publishing in academic discourse has led to new standards, which in turn, defines the innovative design of the Journal in expressing ideas and concepts in a visual language.

Another technological innovation in sign language publishing is the launch of a research-in-translation resource, an app ("The Baobab") for the iPad, from the Science of Learning Center on Visual Language and Visual Learning at Gallaudet University. "The Baobab" is an interactive and bilingual ASL/English storybook app designed for deaf children and visual learners, who are early and emerging readers, through emphasizing visual engagement. The user interface allows easy access to vocabulary words in both text and video, set by the design principles based on research findings. This talk will discuss the developmental process in translating research findings into an educational resource, including the design approach to the user interface and gesture controls. Through early user testing stages, the hybridity of video and text has shown to facilitate vocabulary and story comprehension, which suggests that the touch-screen design is more intuitive in learning. The model is applicable and it points the way to infusing academic discourse on the tertiary level with technology.

This talk will introduce and demonstrate the *Deaf Studies Digital Journal* website, and "The Baobab", the Storybook App by highlighting specific works and design approaches.

Related websites: http://dsdj.gallaudet.edu and www.vl2storybookapps.com

Card-sorting as an Initial Step in the Design of the LITERACY – Portal for People with Dyslexia

Kamila Balharová, Dominik Hagelkruys, Ján Struhár

University of Vienna

There is an increasing awareness of the fact that early user involvement in the development of web-based applications is a key success factor. The human-centered design process suggests a number of useful interventions that guide the process of including users. One of them is the card-sorting technique.

Participants of our workshop will get briefly acquainted with the EU-Project LITERACY and the process of human-centered design. Then the card-sorting technique will be explained and the participants will try it themselves in the role of an education professional, thus contributing significantly to the design process in the project. A block of questions, discussion and feedback collection will close the workshop. All parts of the workshop will be done in a participant-centered and interactive way.

Practical aspects of Seznam.cz Accessibility

[Czech language only]

Lukáš Marvan

Seznam.cz, Czech Republic

The head of the Seznam.cz's UX department, Lukáš Marvan, would in his workshop like to talk about the philosophy behind the efforts Seznam.cz takes in making its services accessible. He will also dive into solutions for some of the problems you might experience when making your web sites both accessible and usable.

How HTML5 and WAI-ARIA Can Improve Virtual Space of Universities – Practical Examples

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Introduction

W

The Web is changed. From the space of plain text with links, pictures and simple forms it became **multimedia and highly interactive space**, in which we can find all types of content and operate it in many ways.

Websites are increasingly using more advanced and complex user interface controls and it is more and more complicated to make them accessible by standard means, which are offered by current technologies.

HTML5 and WAI-ARIA guidelines bring a lot of new ways and means how to create websites more accessible also for users with special needs. Although both of them are work in progress, it´s already possible to use some new functionality they bring to improve accessibility of websites.

Universities nowadays publish a lot of information by means of HTML and related technologies (CSS, Javascript, etc.). It includes their websites, study materials, registration forms or online tests. Although by these means it is possible to create an accessible HTML document, due to their limitations it is quite often necessary to use some workaround to ensure accessibility. Well known (and widely spread) is for example hidden headings method, which is used for describing and labelling navigational and other parts of the web page. Notwithstanding these methods are commonly used, they are not very often used systematically and because of it they may cause some difficulties to users. In case of headings it could be a broken hierarchy or bad usage of heading elements in general.

What are HTML5 and WAI-ARIA?

HTML5 is the new standard for HTML. The previous version, HTML4, was created in 1999 and it is insufficient for actual needs and preferences of users.

WAI-ARIA, which was established as stand-alone standard, but now is also a part of HTML5, provides a framework for adding attributes to identify features for user interaction, how they relate to each other, and their current state. WAI-ARIA describes new navigation techniques to mark regions and common Web structures as menus, primary content, secondary content, banner information, and other types of Web structures.

WAI-ARIA was created to **bridge the gap** between rich applications and users with special needs by introducing additional metadata (through HTML element attributes) that assistive technologies can use to reason about a control or DOM element. These attributes, like "role", "aria-haspopup", "aria-selected" and others provide vital information to screen readers, which can then be used to provide a richer level of interaction with website for visitors with special needs.

Practical examples

In this workshop, by way of practical examples, I would like to show some new features which these standards have and how they can help to increase the accessibility of universities websites. For example **describing regions of the HTML document by WAI-ARIA landmarks** allows describing not only the particular spots on the webpage, but the whole areas. Big advantage of this approach is that user knows, where the beginning and where the end of the concrete region are.

HTML5 and WAI-ARIA bring similar methods also for improvement of defining text alternatives to the visual objects (pictures, photos, charts, etc.) or for better accessibility of tables and forms.

Conclusion

Although HTML5 is not yet an official standard and no browsers have full HTML5 support, all major browsers (Safari, Chrome, Firefox, Opera, Internet Explorer) continue to add new HTML5 features to their latest versions. The same – or maybe even better – situation is in support of WAI-ARIA. This standard is widely supported in all major browsers and can be now easily used to improve quality of published content. There is absolutely no reason not to do it and you can only profit from using WAI-ARIA on your website.

References

WAI-ARIA Overview: http://www.w3.org/WAI/intro/aria.php

HTML5 Introduction – w3schools.com: http://www.w3schools.com/html/html5_intro.asp

Přístupnost HTML5 (in Czech only): http://www.zdrojak.cz/serialy/pristupnost-html5/

HTML5 Accessibility: http://html5accessibility.com/

Producing Structured Documents for Blind People

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This workshop is related to the presentation "Automated Process to Create XML Based Non-Fiction Books from Scratch Making them Accessible for Blind Students on Devices like Tablets"

Content will be:

- Presentation of the structuring tool LEdit
- Working with tablets when Blind
- Using HTML based highly structured documents on tablets
- There will tablets and notebooks for testing

Seminar on Innovation of the Czech Assessment Battery for Students with Dyslexia

[Czech language only]

There is an assessment battery for adolescents and adults in the Czech Republic. However, this battery has proved to be rather insufficient in the course of assessment of students in tertiary education.

The international project ExpIn thus included an adaptation of the battery as one of its goals. The new battery has already been piloted and is prepared for further standardisations. The seminar will present the outcomes of the pilot stage and will offer the opportunity to share existing experiences.

Service for University Students with Hearing Impairments in the Czech Republic

Panel discussion organized by students specializing in *Czech Language in the Communication of the Deaf* from the Faculty of Arts (Charles University, Prague) in cooperation with the Teiresias Centre (Masaryk University, Brno).

Main topics to be discussed

- Typology of services provided to students with hearing impairments and their parameters.
- Financing possibilities.
- Rules of communication with both teachers and students.
- Difficulties and problems.

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Collection of Abstracts

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Please note that the texts have not been proofread or edited by a native speaker.