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Impaired Visual Perception and Selected Aspects of e-Accessibility at Universities and Colleges

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Abstract

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The aim of this paper is to present the key findings regarding e-accessibility of resources at universities and colleges in the context of international rules and legal standards, applicable in the Czech Republic and Slovakia. The key assumption in this research study is the pre-existence of a structured electronic platform for individual public, state and private universities and colleges and individuals with different types and degrees of visual impairment. The proposed research method presents a quantitative and qualitative analysis of the digital elements in 2014 and 2015 conducted at 106 public, state and private universities and colleges. In total, we have analysed more than 5,300 digital documents regarding their suitability and accessibility for an individual with visual impairment. We found out that the level of accessibility at universities in the Czech Republic and Slovakia has remained unsatisfactory over a long term and contradicts the basic e-accessibility principles set forth in Act No. 81/2006 Coll., Decree No. 55/2015, Regulation No. 458/2012 Coll. and international rules stated in, WCAG 2.0.

Keywords: e-Accessibility; e-Inclusion; visual impairment.

1. Introduction

In the context of ever-growing information content in the digital environment of universities, the issue of electronic information accessibility is one of the critical current topics, which deserves increased attention. For individuals with some form of visual impairment, the electronic environment of information resources at a university determines the broad spectrum of activities that they can engage in, relating to their studies.

The key aspect, in this context, is the level of accessibility of the electronic platform, used by the visually impaired students for studying. A significant risk lies in the digital barriers preventing the

individual with visual impairment from perceiving and subsequently processing the electronic content for his / her own knowledge enhancement. However, e-accessibility at universities for visually impaired individuals cannot just be reduced to the field of quantifiable digital barriers.

An integral part of the issue has to do with the competency of these visually impaired students in the use of assistive technologies (Hersh & Johnson, 2008), the quality of these technologies, and the system of university support measures put in place for these students (Regec, 2015).

What also cannot be neglected, in this context, is the scope of conventions, agreements, and legal standards that have been framed both at the national and international levels, which clearly exclude any sort of discrimination of any individual due to disability of any kind.

2. E-accessibility in the International Context

In terms of regulations and rules for electronic information accessibility, year 1999 was the key one, when the W3 Consortium (World Wide Web Consortium) approved the document titled "*Web Content Accessibility Guidelines*" in its first version, identified as WCAG 1.0. The WCAG 1.0 document presents the 14 main rules for website e-accessibility. The list of these rules was prepared by the WAI Working Group (Web Accessibility Initiative), which is a part of the international W3 Consortium. Checkpoints have been added to the rules, aimed at verifying the aspect of fulfilment of an individual's priorities. The checkpoints are classified in three priority levels based on the severity of impact on e-accessibility for the user with visual impairment.

For the USA as well as for the EU countries, the document *WCAG 1.0* itself became a significant pillar in defining the mandatory accessibility requirements. One of the projects funded by the European Commission within the confines of the *Telematics Applications Research and Development Programme* in 1994-1998 was titled *Web Accessibility Initiative*, currently being developed as part of the global W3 Consortium. Another significant project supported by the European Commission is the *WebAccessibility Initiative - Design for All* (WAI-DA). One of the key tasks of the WAI-DA project was to increase of participation of European organizations in implementing the web environment accessibility rules, applicable to all the EU countries.

The European Commission has supported and continues to support the implementation of such projects focusing on e-accessibility. We would like to mention the following noteworthy projects here:

- *Incorporating Requirements of People with Special Needs or Impairments to Internet-based Systems and Services* (IRIS);
- *Virtual Signing: Capture, Animation, Storage and Transmission* (ViSiCAST);
- *World Wide Augmentative and Alternative Communication* (WWAAC);
- *Measuring Progress of e-Accessibility in Europe: Assessment of the Status of e-Accessibility in Europe* (MeAC).

In 2001, the European Commission issued an action plan titled "eEurope 2002: *Accessibility of Public Web Sites and their Content"* (hereinafter referred to as *eEurope 2002*) containing a detailed description of the tasks to be initiated for electronic accessibility for visually impaired with the objective of eliminating discrimination within digital processes. The European Commission has invited

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all the European Union member countries to be actively involved in the build up of a barrier-free information society.

With respect to the issue of websites, the *eEurope 2002* action plan states that the recommendations for member states do not apply only to the national level public websites, but also to those at the regional level. According to the *eEurope 2002* action plan, 2003, which was to be called the *European Year of People with Disabilities*, should have been a year when the accessibility rules were implemented by private websites as well. The *eEurope 2002* action plan was then followed by the *eEurope 2005* action plan, presented to the European Council in Seville in 2002 and supported by the resolution of the Council of Ministers in 2003.

One of the most comprehensive reports concerning website accessibility in the individual European Union countries was submitted to the European Community in 2007, titled *Assessment of the Status of e-Accessibility in Europe*, as a part of the extensive MeAC study. Regec (2009) states that the system of work as well as the methodology of assessment of website accessibility within the MeAC proposal is not sufficient and valid. The outputs presented are not directly linked to the practical aspects of the accessibility issue.

The author quoted above further states that it is not correct to present any conclusions based on automatic control exclusively, due to insufficient reliability of the results. The goal of the strategies defined was to subsequently implement measures providing 100% accessibility to the web environment of public institutions across the EU. In this context, Fig. 1.provides the findings regarding accessibility of the public websites in the European Union in 2006, including its unfulfilled plan until 2010.

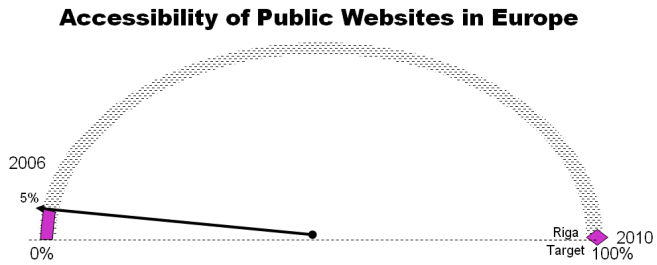

Fig. 1. Representation of the accessibility of public institutions' websites before 2006 in the EU, according to the MeAC study and the unfulfilled objective of the European Commission until 2010 (according to Cullen et al. In Regec, 2010)

2.1 Current Aspects of e-Accessibility

At present, a new version of the website accessibility rules has come into place, identified as *WCAG 2.0* (Web Content Accessibility Guidelines 2.0), which was approved in 2008 and has, since then, replaced the *WCAG 1.0* rules of 1999.

The new rules have been approved, reflecting the significant changes having essential impact on the practical level of accessibility (development of user agents, including assistive technologies, reassessment of the value of individual priorities within the WCAG 1.0 rules and others). The new concept of rules has been developed based on four basic principles, containing 12 basic rules.

In addition to the aforementioned principles and rules, the WCAG 2.0 document also defines the so-called "success criteria" and the techniques aimed at better verification, intelligibility, and implementation of criteria.

The success criteria, based on compliance, are further classified into three accessibility levels:

- A (the lowest);
- AA;
- AAA (the highest).

EU, in compliance with the requirements of the *European Disability Forum* and *European Blind Union* institutions, has been making an effort over a long term to attain a state, when all EU public websites would fully comply with the *WCAG 2.0* requirements, at least at the AA level.

In addition to the *WCAG 2.0* document, it is also necessary to cite the document titled *Accessibility Rich Internet Application* (WAI-ARIA), which describes the technical implementation of accessible solutions for dynamic web applications. The document has been formulated by a working group within the WAI Consortium, W3. In 2014, the first version of this document was adopted, titled WAI-ARIA 1.0. Subsequently, in 2016, the working version comprising adjustments to several technical specifications was published, titled *WAI-ARIA 1.1* (https://www.w3.org/TR/wai-aria-1.1/).

An important document for the developers of assistive technologies, web browsers and digital media players is titled *User Agent Accessibility Guidelines* (UAAG), published in the approved 1.0 version, in 2002. At present, the new 2.0 version is about to be approved, published in its working version form, late in 2015 (https://www.w3.org/TR/UAAG20/).

Another document for web developers describing the concept of tools for the creation of accessible electronic environment in a broad range of aspects is titled *Authoring Tool Accessibility Guidelines* (ATAG). The first version thereof, identified as 1.0, was approved in 2000. The ATAG 2.0 document, the same as UAAG 2.0, was developed as a follow-up to *WCAG 2.0*. The currently valid standard at the *W3C Recommendation* stage is identified as *ATAG 2.0* and was officially published in the second half of 2015 (https://www.w3.org/TR/ATAG20/).

3. Legal Basis of e-Accessibility in the Czech Republic

Fulfilment of the national plan for equal opportunities for citizens with health impairments included stipulation of the conditions for publishing information on public administration in an accessible form. This was carried out in the form of rules, compiled in accordance with Act No. 365/2000 Coll., on public administration information systems and based on the change of other selected laws, with the last amendment to the Act amended by Act No. 81/2006 Coll. Information pertaining to the issue of accessibility from the perspective of individuals with visual impairment is specifically stipulated in the legal rules (public notice) as well as in the relevant guidelines. The quoted public notice No. 64/2008 Coll. currently includes 33 mandatory and conditionally mandatory rules (the original number being 37), divided into six logical units:

1) Website content must be accessible and readable.
2) Interface of the website is flexibly controlled by its user.

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3) Information must be easy to comprehend and transparent.
4) Control and manoeuvre of the website must be clear and easy to comprehend.
5) The code must be technically competent and structured.
6) Website accessibility should be explicitly stated.

Individual rules were created according to Blind Friendly Web materials "*Documentation of websites accessibility principles for users with severe visual impairment*" and the set of rules in Web Content Accessibility Guidelines 1.0 from 1999, as well as new aspects concerning accessibility from Web Content Accessibility Guidelines 2.0 (Finková, Regec & Růžičková, 2012).

In accordance with § 21 Section 1, Act No. 111/1998 on Higher Education Institutions and the amendment and supplement to some other Acts (The Higher Education Act), a public higher education institution is obliged to make any possible provisions to ensure equal opportunities for study at the higher education institution" (under letter e). The code, however, does not specify the extent of these provisions nor does it touch upon the detailed circumstances to be attended to in the electronic environment. In this context, it is important to also point out § 62, which states that a student has the right to "*use equipment and information technology required to study in a degree program in accordance with the rules established by the university*." (Section 1, letter g). Moreover, Act No. 198/2009 on Equal Treatment and Legal Protection Against Discrimination (Anti-discrimination Act) in § 2 states that "*direct discrimination is understood as a means of such conduct, including omissions thereof, where one person is treated less favourably, than another person is, used to be treated or would be treated in a comparable situation because of race, ethnicity, nationality, gender, sexual orientation, age, disability, religion, faith or belief*" (Section 3). In addition to the above, we must note that legal framework still does not guarantee that the level of e-Accessibility at universities in the Czech Republic is, or will become satisfactory in the future.

4. Legal Basis of e-Accessibility in the Slovak Republic

The first enactment that determined compulsory requirements for accessibility in Slovakia was the Act No. 275/2006 Coll. on Public Administration Information Systems. Edict No. 1706/M-2006 defined requirements for e-accessibility of public administration resources. As compulsory requirements for accessibility, we listed selected Web Content Accessibility Guidelines 1.0 and Blind Friendly Web 2.3 guidelines. Currently in force is the Edict No 55/2014 Coll. on standards for public administration information systems, which lists compulsory requirements under § 14 on "Accessibility of Websites".

The biggest issue with current legislation for digital accessibility from the visually impaired persons' point of view is the defined scope of enacted documents mentioned above. Act No. 275/2006 Coll. on Public Administration Information Systems does not apply to the electronic environment of the universities, while it does apply to primary and secondary schools. As of today, no public university is subjected to these rules, which quite specifically describes requirements for accessibility of information.

Despite what we have stated above regarding the legislation directly dealing with accessibility of information systems, it is incorrect to assume that universities can ignore digital barriers they have

created or that they can choose to address only selected issues at their own free will. Legislation protecting individuals against discrimination in the form of Act no. 365/2004 Coll. on Equal Treatment in Certain Areas and Protection Against Discrimination (Antidiscrimination Act) states in § 2a, that "*discrimination due to disability shall also mean the discrimination due to a previous health impediment or the discrimination of a person in the event in which based on external signs of a person, it would be possible to presume that the person has a disability*" (Section 11).

Adding to this, the Act no. 131/2002 Coll. on Universities clearly states in § 100 that universities should provide "the support for students and for applicants with special needs". In this context, it is important to understand not only the term "accessibility", but also on what defines a student with "special needs".

Regulation of the Ministry of Education, Science, Research and Sport of SR n. 458/2012 coll. of Laws on minimal rights of students with special needs is specific about requirements of the students with visual impairment, dividing them into two main groups: blind students and visually impaired students, however, only for the purpose of physical orientation on the premises.

Selected minimum requirements of the students with special needs (visually impaired and blind category) are listed below:

- *Barrier-free, unassisted access to the information related to the study.*
- *Barrier-free work with academic information systems.*
- *Barrier-free access to the information and materials provided by the academic library.* (Regulation No. 458/2012 Coll.)

The *barrier-free access* shall mean access to the information related to the study without outside assistance, with the use of assistive technologies only.

The previous statement implies that the electronic environment of universities must not contain digital barriers for the visually impaired and blind students and that every serious breach of accessibility can be interpreted as a violation of applicable legal standards (Regec, V. & Regec, M., 2014).

5. Research Methodology

Our research was based on the method of analysing the electronic environment of universities and colleges in terms of assessing both the quantitative and qualitative elements and components of these digital documents.

For evaluation, as the basic source of information, we used the website and other electronic documents of the universities and colleges. In total, during 2014 and 2015, we assessed the e-Accessibility at 106 electronic platforms of public, state and private universities in the Czech Republic and Slovakia. For each university platform, we analysed at least 50 electronic documents separately. The total number of analysed electronic documents at universities in the Czech Republic and Slovakia amounted to more than 5,300.

The accessibility analysis was performed by using 15 assistive technologies, online tools, internet web browsers, the so-called extensions for web browsers and the programme intended for evaluating

accessibility of contrasts for text information. As an example, we provide the programme titled Colour Contrast Analyser (CCA), which evaluates whether the combinations of foreground colours (font, etc.) and the background colours, are in sufficient mutual contrast.

For analysing the accessibility of university electronic documents, we used an adjusted system of website accessibility assessment. This assessment system was created, verified and published under the Slovak conditions in 2008. The accessibility rating methodology used in our research presents a specific method of calculating the accessibility rating of a website, quantifying the individual conclusions from the manual control form. Rating of accessibility represents conformity of the website, expressed in percentage, with wording of the rated rules. Highest rating of accessibility is marked with the value of 100%, which represents complete fulfilment of all valued aspects of individual rules and complete provision of website environment accessibility.

6.Key Findings

Based on the overall results for 2014 and 2015, we state that none of the university platforms complied with the requirements for a fully accessible electronic environment.

In 2015, our analyses arrived at a surprising finding that the electronic platforms at only four universities comply with the areas assessed with a score of more than 90%, (pursuant to the Decree No. 55/2015, Act No. 81/2006 Coll. as well as the WCAG 2.0 rules). Among these four universities, 3 are private colleges from the Czech Republic and one is a public college from Slovakia (Table 1).

Table 1. Universities with e-Accessibility rating 90% and more

Title	Address	Rating
International Baptist Theological Study Centre Amsterdam	http://www.ibts.eu/	93.1%
Architectural Institute in Prague	http://www.archip.eu/	92.2%
AKCENT College	http://akcentcollege.cz/	91.2%
Academy of Fine Arts and Design in Bratislava	http://www.vsvu.sk/	91.2%

In this respect, it is particularly serious to note that according to our research, none of the public or state Czech universities achieved the e-Accessibility rating score of 90% or higher. Similarly, in the Slovak Republic, none of the state universities achieved the aforementioned rating level.

On the contrary, we detected website electronic environment with extremely unsatisfactory accessibility at 43 universities, which therefore scored a very low accessibility level.

In 2015, medians of e-Accessibility ratings at the Czech and Slovak universities fell in the range of “low” accessibility level. These findings may be evaluated as clearly unfavourable and contradictory with the rules and regulations set forth in Act No. 81/2006 Coll., Decree No. 55/2015 and the international WCAG 2.0. The lowest result was achieved by using the arithmetic average (accessibility rating value of 79.5%), which bordered with very low accessibility. The least unfavourable finding (with a resulting value of 84.4%) was assessed for the e-Accessibility rating modus.

Upon further comparison of the resulting median values between the Czech and Slovak universities and colleges, we found out that an average university in the Czech Republic has a “low” e-

Accessibility level rating and on the other hand, an average university in Slovakia falls under the "very low" level interval (arithmetic mean of 77.3; median of 78.4%).

7. Conclusions

Impairment or full loss of visual perception of an individual constitutes a significant deterrent, affecting the process of gathering information and knowledge in electronic form. From the position of visually impaired individuals, the provision of accessibility of assistive technologies and correct adaptation of the electronic content for such assistive technologies is very essential. Effective accessibility to university electronic content affects not only the level of involvement of students with visual impairment in their tertiary education, but also determines their level of participation in the digital society. These are the impacts relating to the option of participation of such persons on digital markets (COM/2012/0721) in individual resorts as a part of the action plans, set forth for the Czech Republic and Slovakia. These plans are based on the strategic vision that the state will equip all of its citizens equally with such components that enable them to assert themselves in the information society and specifically, to utilise to the fullest potential, the offerings of open education throughout life.

In the context of validity of legal standards, national strategies, and international agreements, no discrimination is admissible whatsoever, due to health impairment, including impairment of visual perception. The declared goal of modern educational platform comprises the support for equal opportunities and universal design, accessible to all users alike. In this respect, we may state that the level of accessibility of electronic platforms of universities in the Czech Republic and Slovakia has remained unsatisfactory over the long term and is very much in contradiction to the basic e-Accessibility principles set forth in the Act No. 81/2006 Coll., Decree No. 55/2015, Regulation No. 458/2012 Coll. and the international rules, WCAG 2.0.

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