SOME ACCESSIBILITY PROBLEMS OF EDUCATIONAL TECHNOLOGIES FOR PEOPLE WITH DISABILITIES

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Abstract

The World Wide Web has become an integral part of the everyday life of many people, and this also applies to the world of education. People with special educational needs need to have equal rights and opportunities to use the modern innovative educational technologies. However, people with disabilities in Bulgaria have a number of limitations and barriers to their training and it is interesting to consider some issues are available for educational technologies for people with disabilities.

The article examines some of the problems of acquiring knowledge about people with disabilities in Bulgaria. The most common digital barriers to disability are studied that make access to training difficult for them or made this training even impossible. Tools and methods for assessing access to educational services have been developed. For research purposes, an online survey and a digital repository have been created. More specifically, the state of web accessibility for people with disabilities and the using of innovative educational technologies at the Technical University of Gabrovo were studied. The collected data has been analysed and practical recommendations and guidelines for removing barriers to access to training for people with special educational needs have been given.

Keywords: Education, educational technologies, people with disabilities, accessibility.

1 INTRODUCTION

The World Wide Web is one of the main sources of information and services for all, including people with special educational needs (SEN). An extremely important issue is to study the digital accessibility of education and successful training approaches for student with SEN. Education is the foundation of a better future and opportunities for successful realization. What does the higher education system in Bulgaria offer for students with more specific educational needs? The people with special educational needs have a number of limitations and barriers to their use in their education. Some students cannot cope with learning materials that are not readable or not well structured for them. Do lecturers offer educational materials that are convenient for students with specific problems?

Interdisciplinary research approaches from several points of view are possible in this field. Depending on the surveyed points of view, respondents are divided into several target groups: lecturers, university students and teaching materials and environment. The education system and accessibility issues of higher education for all can be seen from following different perspectives:

- lecturers and accessibility of their lectures;
- students and opportunities for using and understanding the learning materials;
- Affordable conditions and environment offered by the educational establishment and firms providing teaching aids.

This article examines accessibility for people with disabilities from the point of view of teachers and the availability of accessible lecture materials. The purpose is to study and analyze the opinion of one of the countries in the learning process (technical and humanitarian teachers) by studying their awareness, preparation and readiness to work with students with SEN. Teachers in technical specialties are more technologically oriented and for them information and computer technology (ICT) is also a professional orientation. Humanitarian scientists who are less technologically oriented and ICT for them are a key means of successfully practicing the profession. It is therefore important to understand what respondents' attitudes to technology are, how well they feel prepared to teach electronic forms and training methods for people with SEN. The conduct of this study will help raise the interest, motivation and preparation of better lectures of teachers for pupils with SEN.
The following sections discuss studies on the awareness of the teaching community on the accessibility of education for people with disabilities at universities and the issues to be addressed on this topic in Bulgaria.

2 PROBLEMS AND METHODS OF STUDYING ACCESSIBILITY OF EDUCATIONAL SERVICES

To solve the problems and achieve the goals, we will present previous research and methods related to accessibility for people with disabilities.

2.1 Problems, barriers and previous investigations of accessibility for people with disabilities

Some of common barriers are sound mines, graphic images, video and audio, tables, the visual as the only way to convey Information, color contrast, keyboard, organization of the interface and content, labelling (inappropriate or missing association of form elements, links, buttons), documents (additional content is provided through documents in various PDF, ODF, DOC, RTF, and other file formats), etc.

The analysis in the article is based on the WCAG 2.1 (Web Content Accessibility Guidelines) set by the World Wide Web Consortium (W3C) [5],[12],[18]. WCAG 2.1 aims to protect people's right to receive information. The Horizons Foundation (https://horizonti.bg/), volunteers and experts from the Institute of Mathematics and Informatics have established a national web-based network for a citizens' initiative on Internet accessibility in the public sector (http://webaccess.horizonti.bg/). In this network are developed Handbook and Questionnaire on Internet Accessibility to the Content of Public Sites, which are useful made primarily for developers and administrators of public sites [4]. In previous studies of the authors are investigated a representative sample of 100 Bulgarian public sites (AA class) and as results recommendations were provided [2]. Sites [3], [9] and Web pages from “100 National Tourist Sites” [17] have also been tested.

The studies many authors show that web accessibility is not well known to developers of public sites and in many cases the requirements of WCAG 2.1 are not met, including and by universities. Research on university sites and assessment of access to educational services for people with disabilities in other countries are presented in [1], [6], [8], [9]. These and other studies around the world show significant problems in the digital accessibility of university curricula and websites [10] [11] [13] [14].

Some studies on the accessibility and characteristics of modern information and education technologies and platforms and their accessibility for people with special educational needs were made in [3], [8], [16].

For research purposes, appropriate digital data processing and analysis software is needed, structured in a certain way and introduced into the computer. A comparison of statistical and of data analysis packages and advices how to choose proper statistical software are given in [7], [15], [18-21]. The need for accessibility of products for people with visual deficits, which should be both consumers and developers and this impose additional restrictive conditions. Studies show that there is a wide variety of statistical software, but despite the many opportunities, the high cost of some products and the limitations for people with visual deficits narrow the choice. The most appropriate statistical programs for the purposes of current research (and the additional restrictive accessibility conditions for products with visual deficits) are the Excel software, its statistical modules and Google Sheets.

2.2 Goals and methodology for accessibility study for people with disabilities

The aim is to determine the level of awareness of lecturers for students with disabilities and their needs in the learning process.

The hypothesis is that most lecturers rarely meet disabled students, are not trained, and are unaware of the problems and are therefore not ready to meet the needs of these students.

Methodology: Using a poll with a pre-prepared one for all questions. The poll is anonymous and all respondents are placed in the same conditions and environment in complete confidentiality.

In order to achieve the objectives, the following tasks are set:
• Studies on the accessibility for people with disabilities (problems and barriers in universities and training courses);
• Development of concept and content of the study;
• Methods to explore awareness of accessibility of learning to people with disabilities to the teaching community at universities;
• Developing online research survey;
• Disseminating an online survey among specific respondents;
• Methods of collecting, processing and analyzing data (responses) in online archive;
• Analysis of the results obtained, evaluation and conclusions.

Additional conditions are provided in the developed methodology: the online application for research and the statistical survey software can be developed and used not only by people with normal vision, but also by people with visual deficit.

For the research purposes online tools and methods for assessing access to educational services have been used. An online poll and a digital repository have been created. The online poll is created of several sections with subsections and branching options (possibility of logical branch of the test depending on the responses). The steps in the test algorithm depend on the responses received in the previous section. There is a link between the questionnaire elements and the four main principles of accessibility.

Issues are grouped by teaching practice, organizational capacity for serving disabled students, available learning management systems, providing accessible learning materials and material formats, general knowledge about accessibility for people with disabilities. Depending on the type of expected answers, different functional elements of the survey format with one or many choices, free text, etc. are used. A methodology for storing an online cloud archive with answers has been used. The selected software offers the ability to analyze and compile the collected data in graphical charts or in tabular variants.

In the beginning a trial version was created and a number of tests and experiments were performed with 100% blind developers. The first version of development has been experimentally tested with lecturers on a training seminar of a project of Technical University of Gabrovo in March 2019 (a pilot poll with paper tests, partial sample). The difficulty was from the requirement that the creator or user of the test can to be not only person with normal vision, but also and by person with visual deficit. A partial sample analysis was performed to determine the link between the elements of the study and the basic principles of accessibility.

After the necessary details and the available capabilities were clarified, online version of the questionnaire was subsequently developed. The content includes questions about the general knowledge of accessibility for people with disabilities as well as about the availability of methods and materials for teaching. Multidisciplinary techniques are used to collect and analyze data collected in the cloud. Again, the online application should be available to both for people with normal vision and for visually impaired people. The latter condition is not always possible and in some cases the work was had to be done from a developer who sees.

Testing and assessment of accessibility knowledge for people with disabilities including blind users was carried out. From the assessment of participants with impaired vision, it was found that the prototype of the study was accessible to blind users. A partial sample analysis was performed to determine the link between the elements of the study and the basic principles of accessibility.

3 ONLINE SURVEY AND RESULTS ON ACCESSIBILITY TO EDUCATIONAL SERVICES FOR PEOPLE WITH SPECIAL EDUCATIONAL NEEDS

An anonymous online survey of pedagogues' awareness of the training of people with specific educational needs in the higher education system was conducted. In the result of this investigation was studied the accessibility of innovative educational technologies in Bulgaria with focusing on lecturers, their courses and their awareness. The methodology is an online study of the sampling of the teachers' community, randomly selected by various universities and institutes of the Bulgarian Academy of Sciences.
The survey method is a poll (questionnaire) conducted with complete anonymity within two months (March and April 2019). A total of 105 lecturers were surveyed (from the Technical University of Gabrovo, the Bulgarian Academy of Sciences and members of the Union of Scientists, Veliko Tarnovo Branch and etc.). The choice of the respondents is random - participants of scientific forums or teachers from Veliko Tarnovo and Gabrovo. The main part of the study was conducted on three scientific forums: a seminar on the project of Technical University - Gabrovo (8-10 March 2019, Potoka, Gabrovo), the March Conference of the Union of Scientists in Bulgaria, Veliko Tarnovo Branch March 2019, Veliko Tarnovo) and at the international conference KIN2019 of the Bulgarian Academy of Sciences and Partners (18-20 April 2019, Veliko Tarnovo).

A statistical questionnaire consisting of 32 questions was prepared for the purposes of the survey (prepared specifically for this purpose on the inquiry card). The survey uses sociological (questionnaire) and statistical methods for processing and presenting the results. A direct poll (online in Internet and paper variant) was used. Statistical and graphical analysis was used for statistical processing. The methods included in Google Tables / Excel statistics are used to collect and analyze the results. The answers to the survey questions were examined and statistically processed according to the competence of the respondents (humanities or technical sciences). Only correct polls are included in the statistics (finished to the end). The study is pilot and has no representative character for the country.

The awareness survey for accessibility teachers in the higher education system (about the general knowledge of accessibility for people with disabilities as well as about the availability of methods and materials for teaching) is on Internet address https://forms.gle/VWURKTL71Akk1PM58 (Fig. 1).

Figure 1. Awareness survey for accessibility teachers.

The results in this survey prove existence barriers for the elderly and / or people with disabilities who are trying to access the universities materials and educational content (Fig. 2, Fig. 3, Fig. 4).

Има колега със затруднение в някоя от следните категории?

<table>
<thead>
<tr>
<th>Category</th>
<th>Response</th>
</tr>
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<tbody>
<tr>
<td>Дигитално</td>
<td>-5 (35.7%)</td>
</tr>
<tr>
<td>Зрелена</td>
<td>8 (57.1%)</td>
</tr>
<tr>
<td>Слухова</td>
<td>-3 (21.4%)</td>
</tr>
<tr>
<td>Говорена</td>
<td>-1 (7.1%)</td>
</tr>
<tr>
<td>Канително</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Не познали ясно колега</td>
<td>-2 (14.3%)</td>
</tr>
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Figure 2. The results of awareness survey of accessibility teachers.
The survey results confirmed that more than 75% of respondents in all surveyed groups indicated that it is need further training on these issues. It turns out that a large number of teachers do not know what barriers are encountered from the pupils with special educational needs, their specific training needs, what assistive technologies they are used and how they can be included. It is necessary to change the teaching staff model and to add new responsibilities for socially significant problems, a new educational culture and awareness of the impact of educational practice on students with SEN.

The initial hypothesis that most teachers rarely encounter disabled students is confirmed. They are not trained and unaware of the problems of this social group and are therefore not ready to meet the needs of these students. So far, the authors have processed and analyzed data showing that the teachers need more knowledge of accessibility and that there is a need for further training on the subject. Conclusions were made by random sampling by the teaching community.

The collected data has been analyzed and practical recommendations and guidelines have been given to remove barriers to access to training for people with special educational needs.

The following recommendations can be made:

- Educational institutions should pursue a policy aimed at SEN students and additional teacher training to clarify the specific needs and barriers faced by SEN students.
- Solve the problem of the lack of accessible educational platforms, programs and teaching materials (where they are lacking) and which need to be provided by educational institutions.
- There must be a closer link between the accessibility of educational services and the quality of educational services in Bulgaria for students with SEN. Nowadays, all the necessary prerequisites and conditions for the training of SEN students are not provided. There are also insufficiently well-established criteria provided by educational institutions.
This study revealed important features and gaps in access to teaching materials at universities. The survey is anonymous and the data is used for research purposes only. The developed methodology can be adapted and implemented in different universities and schools.

4 CONCLUSIONS

The article explores the issues of awareness of the teaching community on the accessibility of education for people with disabilities in Bulgaria. The most common barriers faced by people with disabilities have been studied that make learning difficult for them or even impossible. The aim is to establish the level of awareness of teachers as well as their attitude towards accessibility for people with disabilities in the field of higher education to facilitate access to information for them and to achieve their educational inclusion.

Methods and approaches have been developed to assess the awareness of the teaching community on the accessibility of educational services. To explore the state of accessibility of the Internet for people with disabilities and the use of innovative educational technologies, an online survey and a digital repository of replies is created. The collected data are analyzed and conclusions are drawn on accessibility to training for people with special educational needs.

The poll is anonymous and all respondents are placed in the same conditions and environment in complete confidentiality. This allows expression of sincerity in sharing, the representativeness of conclusions, and the delineation of regularities in the study of the problem. The final conclusion is that the education system is not yet sufficiently adapted to everyone. It is much more difficult for people with disabilities to use. Teachers generally are reluctant to change their way of thinking and are not trained to work with people with special educational needs.

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REFERENCES


