Information Technology as a Support to Education

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Abstract - The right to education is guaranteed to all persons by the international system of human rights based on the Universal Declaration of Human Rights, a document that was adopted by the international community seeking better and humane future after the two world wars.

To secure the right to education for blind and visually impaired persons, the Department of Information Sciences of the Faculty of Philosophy in Mostar, together with the Faculty Library, has launched a project for the adaptation of teaching materials for blind and visually impaired persons.

The question is how to tailor the teaching materials and literature needed for learning blind and visually impaired persons as well as selection of the proper method for adaptation. Through the pilot project we have tried to find out what is happening with the information the listener receives by signals through the audio channel and whether the information is better perceived when the signal is human speech rather than artificially synthesized sound on the computer.

Methodology: The audio recording of the teaching units has been made from several teaching courses, after which the recordings were edited for reproduction. That was the first test set.

The second test set was a textual teaching material adapted for sound reproduction on a computer using computer speech synthesis software.

The purpose of the research was to find the optimal solution for adapting teaching materials to blind and visually impaired in order to provide such persons with the same opportunities as persons without such impairments.

Key words - information processing, teaching materials, technology in education

I. INTRODUCTION

Contemporary education demands changes of knowledge and skills acquired in the new educational environment. Changes in education and lesson presentation can be noticed in changes of the materials and mediums on which the learning material is prepared. Education is also different by technology usage, intermediation of lesson content applied to the capabilities and features of students, and teacher’s skills of teaching and technology usage in class.

Everyone has a right to education due to the international system of human rights which arose from General human rights declaration, a document with which, at the end of two world wars, the international community decided to work on the better and more humane future.

Exercising that right gives everyone a chance to develop their capabilities and gain intellectual, spiritual and social independence by acquiring knowledge, skills, values and attitudes.

On state level, there is no reliable data about the number of people with disabilities included in higher education, it can be safely assumed that this number is low. At the same time, the rights to education of the students with disabilities are guaranteed by series of legal acts and specific rule books of institutions.

Convention about the rights of disabled people which clarifies what the realization of human rights means in the context of disabilities, defines disability like this: “(...) Disabled persons include those who have long-term physical, mental, intellectual or sensory damage, which, paired with different obstacles, can prevent their full and efficient involvement in society of equal basis with the others.”

Despite the fact that laws and rule books do not state the forms and ways of offering adjustments to the students with disabilities, continuous work is performed on design of help with inclusion, on equal rights. Bosnia and Herzegovina ratified the Convention in the March of 2010 and obligated the Ministry of human rights and refugees for its implementation. Council for people with disabilities, founded by Council of ministers of BiH and consisted of representatives of different levels of government and non-government organizations oversees their work. In realizing this right, the signatory states are required to:

a) Persons with disabilities cannot be excluded from the general education system based on their disabilities.

b) Reasonably adjust to the individual needs,

c) Within the general educational system, provide necessary help to people with disabilities to ease their effective education.

d) Offering effective and individualized means of support in the environments that contribute the most to the academic and social development, in harmony with the goal of total inclusion”.(...)
When talking about the right to education under equal rights, the first question directed to the faculties is always about the type of adjustments and the type of support they offered regarding the disabilities of students. Sometimes adjustments can be offered, but they are not individualized enough which means that specific obstacles a certain student runs into were not dealt with. It is very important to listen to these students because they are the ones who know best about the way they learn and function. In some cases, students, despite the corresponding adjustments, fail to meet the academic standards, but that can happen to any other student without these disabilities. A special problem can be the attitude of certain professors to free these students of certain obligations or to lower the criteria instead of finding the alternative way that the student can fulfill regarding his possibilities.

To realise and consummate their rights, people with special needs, especially the blind and visually impaired, need the possibility of adaptation to realize their rights. In this context, right to education demands adjustability.

Adjustability implies that education is flexible, meaning that it can be adjusted to different needs of different students, instead of students adjusting to the school, which is, sadly, a common situation in practice.

To ensure the right to education to the blind and visually impaired persons, the department of Information Sciences of the Faculty of Humanities and Social sciences of the University of Mostar, working with the faculty library, has started the project of preparation of learning materials for the blind and visually impaired persons.

To the Faculty, as an educational institution, this project was especially interesting for more reasons. The first one was to learn how to act in a specific case regarding the preparation of learning materials. The second interest rose from the realisation that additional knowledge and skills were essential for preparation of these learning materials, which indicated the need of education of teachers in order to apply this new educational technology. Faculty of Humanities and Social Sciences educates teachers of various profiles and one of the tasks of the Department of Information sciences is to educate teachers who will, through their assignments in school, work on inclusion and education on technology usage. From this project rose the question of methodics of information and IT education or what we call the literature of the new age which is essential in the new educational environment. In this context arose the question of curriculum of the very Department of Information sciences and what should be included in the program. This was supposed to give birth to the recommendation to the faculty in the sense of improvement and defining the Office and work with people with disabilities.

II. ADJUSTMENTS IN EDUCATION

In contrast to the classical paradigm of educational system which is centered around educational issues, new directions are born through Declaration of educational rights under equal conditions, job market that implies usage of ICT. This definitely implies changes to the educational system. Today's market of all educational profiles expects the improvement of all existing competences, and, parallel to that, acquiring new ones. Information, IT and digital competence imposed themselves as one of the essential contemporary competences that contemporary students and future employees, must learn to successfully compete during job search. Since large emphasis has been put on digital competence which has its center in IT education, big changes are happening in the whole classical education paradigm which needs to be modernized in the form of its ICT and digital version. Regarding this, big changes, conditioned by widespread digital revolution, are happening in the educational content of all profiles of teachers, especially in the educational contents in the area of IT teachers education. Contents are being modernized according to the demands of the job market. Digital revolution greatly influences the features of contemporary students who completely belong to the digital generations. According to changes these students are a part of, their teachers should change too and also adjust their teaching to this new generations of students. All these changes are conditioned by modernized educational technology whose cornerstone of educational activity is realized through available technologies and e-learning systems.

Changes influencing the classical educational process are in its digital version, especially visible in the contemplations of presenting the educational contents to students, which manifest themselves based on the usage of teaching methods appropriate to the e-environment. The other stimulus is the Declaration of rights to education which stimulated the inclusion of people with disabilities to the education system where the search for the adaptation of learning methods and teaching emphasised the interest which is directed towards creation of new teaching methods and ICT usage in class for realisation of right to education and improvement of access to the educational materials and the adjustment of educational materials for learning.

The phenomenon of learning, in a particular lesson, is based on three tasks of teaching; material, functional and educational. Material task refers to the need of a student to acquire certain facts in a lesson. Based on the acquired facts, generalizations are based, but also new facts are based on generalizations. Functional task of class diverts the attention to the development of intellectual, expressive, sensory and practical abilities, while through the moral task of education, physical, work, moral and aesthetic values are attempted to be developed [11]. These three tasks will not differ on any of the educational levels, they will only be accentuated differently based on the educational level. The tasks are, in contemporary lesson, expressed in the form of the goal of educational process which is described through the results of learning which are, based on the Bloom taxonomy of learning, classified in three domains. Since we are talking about higher education, we took the taxonomy of the cognitive area which develops cognitive abilities through acquiring different levels of knowledge which are classified in six
stages; factual knowledge, understanding, application, analysis, synthesis and evaluation [4].

In the very process of education, firstly connected with the student, it is important to emphasize the process of teaching which is firstly connected with the teacher [9]. The teacher, during the lesson, helps the student with the acquisition of knowledge, on the higher level of education it is expected that the student explores and acquires knowledge based on the source. Since these sources are learning materials in the form that needs adjustment to be used by blind persons, the idea of research was to find an answer on the question of adapting the learning materials and literature necessary for the learning of blind and visually impaired people and which method to choose for that adaptation. Through the pilot project we tried to find out what happens to the information the listener receives by signaling sound through the audio channel and whether the perceived information is better when the signal is in form of human speech or artificial sound created on a computer.

Educational content needed adjustment since in the very process of teaching the participants are the participants of the didactic triangle; the teacher, the student and the educational content.

Audio file of lessons from several classes was made, and the recordings were adapted for reproduction. This was the first test group.

The second test group were the educational contents in textual form adapted for sound reproduction on a computer by using a computer speech synthesis program. There were no overlaps between the test groups.

The amount of perceived information was measured for both test sets and comparisons were made. The results we got and working on this research opened up questions we wanted to discuss in this paper. This is the question of education of teachers and of usage of ICT in education. The question of adaptation of learning materials, but also the education of future teachers for the creation of these materials and teaching others to use them through technology in education led us to the question of what can we do as a faculty.

By expanding the basic didactic triangle, to which two more elements were added (intention and conviction), the process of teaching can be observed from five perspectives; transmission, development, apprenticeship, nurturing and the perspective of social reform. The transmission perspective is, as the name says, focused on transmission. This perspective of teaching firstly focuses on the teacher who needs to be well versed with the educational content so he could, as its sender, transmit it to his students who are in the role of recipients. The development perspective is focused on the development of the student’s knowledge which the teacher entices by using a multitude of examples that serve for using the students acquired knowledge as a basis for acquiring new knowledge. Apprenticeship perspective refers to the usage of practical assignments the teacher has adapted to certain students, with the goal of realizing the development of the student that is getting more and more independent. Nurturing perspective is kept by the teachers who teach their students that they will certainly succeed based on the effort they put in. The last perspective is of the social reform that is used by the teachers who want to prepare their students for the inclusion into the existing society in order to improve it with their actions [12].

To prepare teachers for communication in education in digital surroundings means to prepare them for using communication in the form of communication model published by an American mathematician Claude Elwood Shannon in 1948. Shannon’s communication model from 1948 consists of five parts. The first part is the source of information from which the whole or partial message starts. The message can be of different types, it can consist of words, music or images. So if one, for example, articulates a sentence vocally, the source of that sentence (information) is ones brain. The second part is the sender. The senders role is coding the message that is coded into a signal. In the previously stated example, the sender would be the human voice. The coded message travels by the third part of this communication model, and that is the communication channel. Coded message travels by the communication channel from the sender to the receiver. Since we are talking about articulated sentence, the communication channel it travels by is the air. The fourth part of this model is the recipient who, based on the received signal, decodes the received message. Articulated sentence is received by recipients ears. The last, fifth, part of this communication channel is the destination i.e. the person or a thing the message is meant for. In this case, it is the recipients brain. Another, the sixth, added element that disturbs the uniformity of the message is referred to as the source of the noise in the communication channel [13].

Teaching methods involve the teacher and the student during the whole educational process in all its constituent stages. This is why it is talked about teaching methods because they pertain to the teacher, and learning methods pertaining to the student [3].

There are changes present that, in a digital education environment, demand higher education curriculum changes, demanding from the educational system to be modernized by using ICT in education process and improve digital competences of the teachers [8].

The teachers role is changed in a sense that the teachers now teach the members of the Digital generation who are different students than those of previous generations.

We recognize changes that need to be implemented into the teacher’s calling as a teachers role in a frame of e-education in which it is possible to realize a quality level of education if the teacher knows the features of the second generation of Digital students, the technology and new media. The first condition that is required is education of teachers and access to technology. Besides the need to provide the technology, the teachers need to be provided appropriate education about the technology itself, and one of the ways to achieve that is that the colleagues that know more about the technology teach their colleagues who know less. But the systematic education needs to start through formal education. Here is
the role of the faculty. Through the change in the teacher's curriculum, but also through the change of the curriculum of education of the teachers of IT, the faculty can entice the use of IT in education. Relating to this, digital competence becomes the part of every class which means that all teachers should be educated for the use of IT in their educational process. For the beginning it can be a common class for all of the teaching majors.

The second part of the questions, which were opened to us during the research of ways of adapting the teaching materials and the questions which are connected to the right of education for everyone and especially the right to education to people with disabilities, is how, as service providers, provide the support that should be determined according to the specifics and the individual problems of students with disabilities which would include information given to the teaching staff.

What we, by researching literature and the examples of different universities and study programmes, saw, was the existence of the Office for students with disabilities on the Faculty.

III. CONCLUSION

Through the project that started with the goal of adaptation of the education materials to the blind and visually impaired people on the Faculty of Humanities and Social Sciences, questions that we tried to systematically answer in this paper in an attempt to secure equal rights to education with the usage of ICT singled themselves out. Through the research we made students and teachers aware that it is needed to be educated about the characteristics of people with disabilities, education in applying ICT in education, preparation of teachers for usage of technology in digital surroundings. We started with solving one problem, but in solving it, we got a lot of segments aware of technology usage in education and education of people with disabilities. It was shown that a lot of things were legally defined, but the practice and realization is far from what was legally said. The idea that we should try to do, as much as we can in our own surroundings, leaning on what is enabled and what we can, actually falls under the Faculty mission.

The first question to the Faculty is always of the adaptations and the type of support it secures regarding the disabilities of students. Sometimes adjustment can be offered, but they are not individualized enough which means that specific obstacles a certain student runs into were not answered. It is very important to listen to these students because they are the ones who know best about the way they learn and function. In some cases, students, despite the corresponding adjustments, fail to meet the academic standards, but that can happen to any other student without these disabilities. A special problem can be the attitude of certain professors to free these students of certain obligations or to lower the criteria instead of finding the alternative way that the student can fulfill regarding his possibilities. All of these questions can be answered by the Office for people with disabilities which would be based on a volunteered basis and would consist of students, teachers and a lawyer.

Still, this problem can only be solved in the long-term by introducing extra classes on the faculties that will prepare the future teaching staff for work with students with disabilities and/or special needs. Libraries also contribute to education of the blind and visually impaired people. This presents a possibility that through student practice the learning materials can be digitized and prepared for learning by using technology and computer speech synthesis software or recording the materials and making audio files of lesson units and literature, and in this way enable the right to higher education, and in doing so, the right to use a series of adjustments and resources meant for them.

This means special services or regulations do not need to be made, but within the existing ones, it is needed to additionally clarify how some rights or services can realize people that are different than the average, so, with respect to all forms of human dissimilarities, disability being only a part of it. In such situations we question each individual case, and establish individual the circumstances.

The greatest problem we see in the system of education in Bosnia and Herzegovina is the lack of systematic support. Under systematic support, we mean consistent offer of support services through allocation of sufficient financial resources to the educational facilities in order to improve accessibility, technical apparatus, learning assistance, staff in the Offices for students with disabilities, digital textbooks, colleague support and formalization of procedures to offer and support with the continued education of the teaching staff.

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