Selected Paper of 8th World Conference on Psychology, Counseling and Guidance, (WCPCG-2017), 28-30 April 2017 Grand Park Lara Convention Center, Lara – Antalya, Turkey

New Modalities to Increase the Accessibility of Students with Visually Impaired to Education Using ICT

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Abstract

Educational, vocational, and social inclusion is one of the fundamental principles that ensure people with disabilities a chance to have as a normal life as possible. In turn, accessibility is one of the most important components of inclusion and could be defined as the right of people with disabilities to benefit of the same products and services as all other community members. According to government data from 2015, in Romania 752 931 were people with disabilities, 60 289 were children and 13.9% had various forms of visual impairment. For these people, any limitation in accessibility means isolation and discrimination. On the other hand, education and new technologies can increase the accessibility of people with visual impairment to quality products and services in society. Therefore, the purpose of this research was the identification of attitude and training level of teachers in the educational process accessibility for students with visual impairment using ICT. The sample consisted of 210 professors who teach in pre-academic learning system in Bihor, Romania and research tool - a questionnaire composed of 76 multiple choice items – it was administered online by the end of 2016. The results of the research show that, even if they want to support inclusion of people with visual impairment using ICT in teaching/learning, most teachers do not have professional skills in that field and do not know how to use educational software or to adapt a scholar curriculum for this category of students.

Keywords: accessibility; educational inclusion; new Technology;

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1.Introduction

From the perspective of inclusion, school is the space where each student should have equal educational opportunities.

All children, including those with special educational needs, have the right to take part in all activities included in the curriculum of mainstream schools. During school hours, teachers and experts should get directly involved in supporting by all manner of means the maximal integration of students with special educational needs. Thus, by a series of measures, schools should make efforts to meet students' all educational needs, without injuring their dignity and personality (Blandul & Bradea, 2016).

A specific category of people are the ones with low vision. We talk about the consequences on the mental lives and social development of the individual, this category of deficiencies has a strong influence on the quality and specificity of the relations, that the disabled person establishes with factors in the environment, according to the partial damage or total intake information from the visual analyzer, the main provider of information from the higher brain structures.

The main indicators used in assessing functional visual impairment are: visual acuity (a designate distance that our eye can perceive distinct objects); the vision field (is the space that the eye can perceive when it looks fixed at an object); light sensitivity (ability to differentiate certain intensities of light); contrast sensitivity (the ability to distinguish differences in intensity between excitation present simultaneously); chromatic sensitivity (the eye has the ability to perceive colors and achieve a colored view); and visual efficiency (designate processing capacity, integration and activation of visual stimuli at central level in relation to intellectual factors, motivational skills, etc.).

The appearance of the Braille alphabet in the nineteenth century opened to a limited number of blind people a path to a high level education and also opened their way to science. The appearance of typewriters in the twentieth century led to the increased volume of printed material in Braille, print speeds that allowed these typewriters. Until early 1900 reading texts written in Braille was the only access to reading these. But sound recordings, radio or records on various media helped the trend in terms of facilitating access to information for the general public: for the blind and other people with disabilities. A new stage of information accessibility for people with visual impairments is given by the appearance on the market of personal computers in the 60s, which marks a new revolutionary stage, but another approach for all users, regardless of social status, culture or disability (Kapperman & Sticken, 2000). Today, however, we mention a stunning development of Information and Communication Technology (ICT).

The appearance of Braille display devices, Braille embossers, screen reading software, image enlarging software, machines which appliances reproduced images, closed circuit television CCTV, scanners, applications of text recognition, the standard Daisy14, Storage media statistics and portables, etc., which, according to Kelly and Smith (2011), allowed the formation of an appropriate technological environment needs to be access by the user with visual impairments. However, today, this is the so-called assistive technologies or for access.

Generically speaking, access technologies are all those IT hardware and software solutions which enable users with sensory impairments and/or motor skills disorders to use information and communication technology (ICT). Therefore, the computer, with everything related to it, including the internet and the communication services associated with it, to compensate the limitations imposed by the disability and to enhance and improve school attainment, communication with the others,

independence and mobility, and have a higher degree of control upon the environment (Assistive Technology Act, 1994, 1998, 2004). These are hardware and software products which enable people with disabilities to access, interact with and use the computer at home, at work and at school.

These technologies have the following characteristics: they facilitate the access of people with disabilities to information which they could not access independently previously; foster the development of new skills which facilitate social and professional integration; help the performance of tasks relatively independently and at a pace close to that of a person with no disabilities; provide support for educational activities and for social interactions (Padure, 2013).

In Romania there are 103.207 people with visual disabilities (representing 13, 9% of all people with disabilities), of which 2.978 are children. It is good to see that, in Romania, the number of students with visual disabilities integrated in the mainstream education has been increasing over the years, which is the result of making information, courses accessible, but also of less stigma attached to these students. For the educational institutions, it is also a challenge to address and solve the various needs of children with disabilities so that they are provided with equal opportunities. In this way, teachers must be knowledgeable about service accessibility equipment and assistive devices for people with disabilities, to know how to use the technology support in the context of their use in educational programs individualized, to know the issues, barriers and benefits of using access technologies, ways of integrating assistive technology in the curriculum, and also possess the knowledge of educational assessment and recording progress in the use of access technologies in the education of persons with disabilities (Smith & Kelly, 2007).

1.1. The objectives

From the theoretical foundations of this research explained above, it can be seen that accessibility is a fundamental right of every person and also a basic condition to ensure people with disabilities appropriate services that the community provides to a decent life. Given the importance of this subject for pupils with SEN including the aim of this research was the identification of attitude and the training of teachers to the educational process made accessible for students with visual impairments through ICT. Specifically, the research objectives were: (1) assessing the competence of teachers in ICT access and use in rehabilitation and education of students with visual impairments; (2) analysis of teaching skills to design an ICT curriculum adapted based on the special needs of students with visual impairments, and (3) determining the competence of teachers to support school integration of students with visual impairments. We think that way will give a more complete picture of the availability of teachers to use technology in education, and thereby, increasing the quality of life of people with visual impairments.

2. Method

2.1. The sample

The sample of research consisted of 210 people (N = 210), all teachers from pre-university mainstream/inclusive schools in Bihor county, Romania. The sample was made up of the following categories: school stage – 48 (45.7%) primary school teachers and 57 (54.3%) secondary school teachers (including upper-secondary as well); gender – 29 (27.6%) males and 76 (72.4%) females; qualifications – 12 (11.4%) upper-secondary school graduates, 77 (73.3%) BA graduates, and 16 (15.2%) teachers with Master's or PhD degrees; school subjects taught – 60 (57.1%) teach subjects in

the fields of humanities and science, and 45 (42.9%) teach subjects related to technology. The simple random sampling procedure was used for choosing the people in the sample, which represents approximately 22% of the active teaching staff of Bihor County, Romania. This research has been conducted within a larger, European research, which had 1261 respondents from 12 countries, with a minimum sample requested from Romania of 100. The sample of 105 is representative only for Bihor County, Romania.

2.2. Instruments

The research instrument was a questionnaire consisting 76 multiple choice items altogether. In the first part (11 items) factual data about the subjects were requested, as well as data about how often they use ICT in their teaching activity. In the second part, made up of 65 scale-type items – 11 scales, with 0 meaning "Never/Not at all" and 10 "Very much/Very often" –, the respondents were asked to self-assess the extent to which they know and use ICT in special education, in general, as well as broken down for different categories of disabilities (intellectual, sensory, motor skills disorders etc.). In the following pictures, the mentioned scale (0-10) was presented from left (0) to the right (10). The questionnaire was prepared by educationalists from the Polytechnic Institute of Guarda, Portugal and was sent to the University of Oradea, Romania, to be administered in Romania with a view to support scientifically a European project, called „Teaching and Learning in Special Education using ICT" – TELESEICT, within the Erasmus + Programme, KA2 component. The qualitative analysis of data was performed by calculating the statistical frequency of the answers provided by the respondents.

3. Results

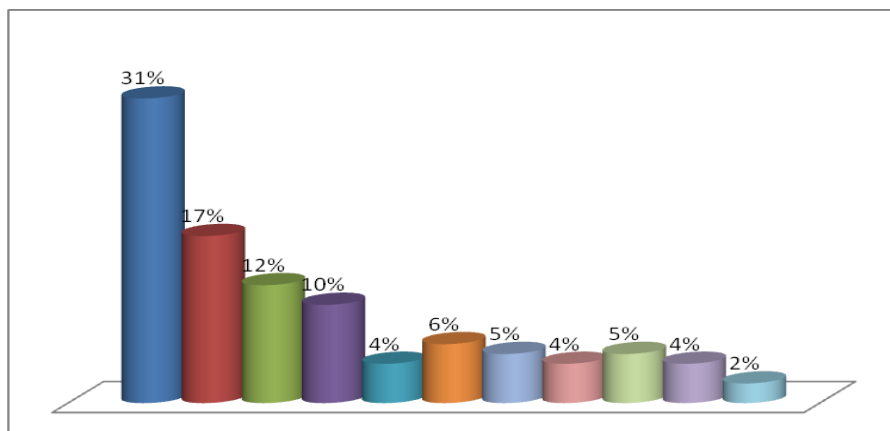The results are presented in the following figures and table.

Figure 1. The knowledge level of teachers on ICT possibilities for supporting students with visual deficiency

Table 1. The knowledge lever of teachers on the main components of ICT for pupils with visual deficient

Indicators	Score										
	0	1	2	3	4	5	6	7	8	9	10
Braille System (%)	47,6	11,4	4,8	6,7	3,8	9,5	2,9	5,7	2,9	1,9	2,9
Webpages with relevant content (%)	45,7	9,5	8,6	10,2	4,8	4,8	0	1,9	2,9	1	4,8
Educational Software (%)	59	9,5	7,6	6,7	3,8	4,8	0	3,8	3,8	1	0

The results obtained after the administration of the questionnaire are very interesting in this first indicator and express a polarizing of the responses around the lower range of the scale. Thus, 31% of respondents do not have any information on the ICT possibilities to support students with visual impairments, while another 40% have awarded scores between 1 and 3 on this item (Picture 1). The situation is even more worrying in the moment of ICT breakdown addressed to people with visual impairments into its component parts. Thus, 47.6% of those asked are not able at all to explain the operation and use of the read / write Braille systems, 45.9% have never accessed a site containing this specific type of disability, and 59% do not have any knowledge on educational software for pupils with visual problems (Table 1). Moreover, at this indicator, no subject has awarded the maximum score - 10. These results describe an obvious reality for Romania, namely that the recovery and education of visually impaired people is predominantly made through traditional strategies because of the insufficient knowledge about the programming mode and use of new technology, whether we mean to special education to then normal one. It is necessary, in parallel with equipping schools with modern teaching tools the training of those who will use them, insisting, where it needs on the ICT applications for special education.
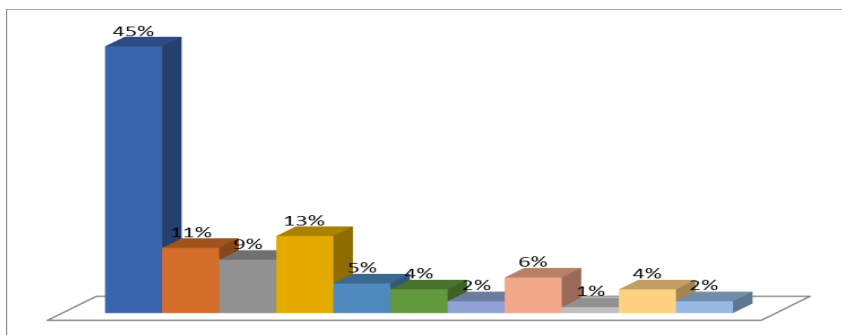

Figure 2.. Teachers' skills in designing a curriculum for students with visual deficiency
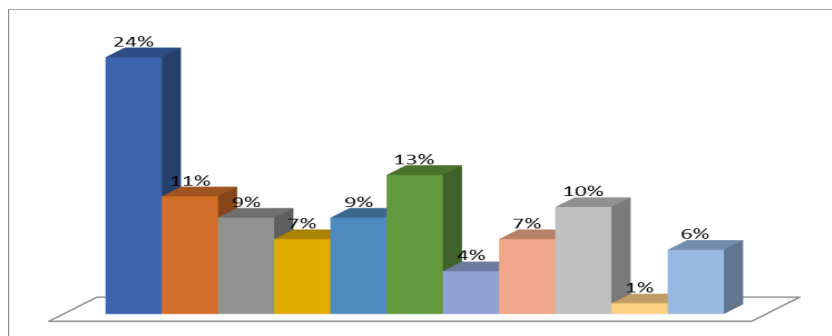
Figure 3. Teachers' skills on identifying educational materials for students with visual impairments

The results presented in figures 2 and 3 are related to those discussed in the preceding paragraph. Thus, if most respondents recognize their limitations in terms of ICT usage adapted for people with visual impairments, 45% accept that they have no skills in designing a curriculum adapted to students with such disabilities, while the other 32% have minimum skills in this way, self-assessed between 1 and 3 points (Picture 2). On the other hand, the distribution of values is much more balanced in terms of teachers' skills, self-identification of educational materials online for students with visual impairments. Thus, 24% attributed their minimum score for this problem, 13% give 5 points (half scale), and 10% - 8 points (upper scale) (Picture 3). The values obtained show that most teachers are doing well when it comes to download various educational materials, but have serious difficulties when they have to design a curriculum as a whole. The elaboration of such a product is more complex and requires a thinking of a whole, centered on objectives, by which is selected the informational content, the strategies of teaching / learning / assessment and the organized educational activities. The identification of the educational materials is only a small part of the whole, and designing a curriculum addressed in special education requires a series of teaching higher-order skills that not all teachers possess.
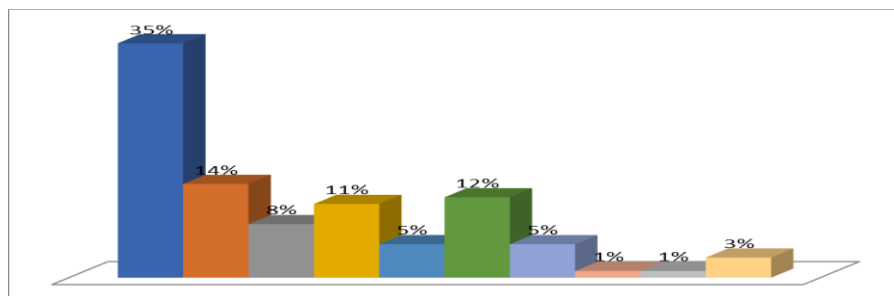
Figure 4. Teachers' skills on supporting school inclusion of students with visual impairments

The results shown in graph 4 illustrate that many of the investigated teachers (35%) feel prepared very little to support the integration of visually impaired students through ICT strategies. Only 3% of respondents believe that they have high-level skills in this direction. On the other hand, there are many visually impaired students studying in Romanian normal education, which could lead to think that their teachers use teaching other strategies than those based on ICT. The computer remains a difficult instrument to be accessed by people with visual impairments, precisely because its use relies

heavily on visual analyzer – the sensory channel vulnerable to them. In these circumstances, any pedagogical intervention for this group of people should be redesigned so as to involve other sensory modalities available that could compensate the vision problems.

4.Discussions and Conclusion

One of the most important topics to be discussed regarding the quantitative interpretation of research refers to the need of initial and continuing formation through ICT of teachers teaching special education/special integrated. The issue is extremely sensitive and was found on the agenda of the United Nations Standard Rules containing 21 Rules about the inclusion of people with disabilities. Of these, Rule. 19 refers to the training of the staff working with people with disabilities and stipulates that "The states are responsible for ensuring adequate training of staff at all levels involved in the design and development of programs for people with disabilities". Lines of action in implementing this Rule predict, on the one hand, that the staff involved has to get through training programs and continuing professional development in the field of special education, and on the other, the attraction of people with disabilities in the design and management of these programs (Mark et. al., 2007, 279). The teachers teaching in special education/special integrated should necessarily have undergraduate studies in this field or at least undergo a series of training courses in Special Education School. The curriculum of such a program is at the discretion of the education provider and may include elements of psychology about people with different types of disabilities, teaching methodology in case of these students, and elements on the protection of children in difficulty, basic notions regarding school inclusion/social disabled people, etc. It is also important that information on special education through new technologies to be included in the curriculum, either as distinct disciplines of study or as modules included in the content of other school subjects. One can appreciate that this will increase the training level of professionals involved in special education and, consequently, the quality of life of people with disabilities, the real beneficiaries of these training programs.

To overcome the problems of insufficient IT training of teachers teaching some students with disabilities, Polytechnic Institute of Guarda, Portugal, in partnership with 11 universities in 10 other European countries, implemented in the period 2016-2019 Teaching and Learning in Special Project using Information and Communication Technology education - TELESEICT (www.teleseict.eu - financed by the European Union Erasmus + KA2. The overall goal of the project is to increase the training level of teachers teaching special education / special integrated according to the use of multimedia technologies involved in education and recovery of students with various disabilities. The main project activities can be grouped into two categories. On one side would be those activities involving all partners: general meetings of project, organization of training courses in special education students from the 11 universities addressed those who opted for a teaching career, building an online platform containing educational materials for students with disabilities, organizing international conferences in the field, etc. On the other hand, there are those activities that involve the conclusion of local partnerships between universities grouped by geographic regions (such as the universities of Oradea, Olomouc and Tirana), which occasions are designed and developed a range of support materials that will later be taught to students on online platform, uploaded or published in scientific conferences. The final results, the most important of this project will be given to the awareness of the public of the benefits ICT training can have in the instruction of people with disabilities and the increasing of the chances that starting here, these people will integrate them more efficiently into the community they live.

By identifying these issues, we believe that social policy measures at national and institutional level should include specific objectives, targeted on these issues, being given that it is a necessity in our society to facilitate social inclusion of people with disabilities. In the educational policy formulation we must take into account, on the one hand, the elimination of negative attitudes towards people with visual impairments that persist even today, on the other hand the measures about the accessibility of these people to information, to study, and to communication. We believe that the support offered by the access technologies can lead to satisfy the educational, social, personal and psychological needs of an impaired person by offering alternative means of communication, information, networking, reported to the equalization of opportunities for inclusion, by reducing disparities occurred through the informational process.

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