THE STATUS AND ROLE OF ICT IN THE EDUCATION OF STUDENTS WITH SPECIAL EDUCATIONAL NEEDS: A RESEARCH FROM BIHOR COUNTY, ROMANIA

Valentin Cosmin Blândul, Adela Bradea
University of Oradea, Romania
E-mail: bvali73@yahoo.com, adelabradea@yahoo.com

Abstract

ICT plays a very important role in education, as, on the one hand, it improves the educational attainment of students and, on the other hand, it contributes to a better communication between the education agents, while also speeding up students' personal development. By using educational software adjusted to the specific nature of different types of disabilities, the benefits of ICT can be very well exploited in special education too. The impact can be a significant one, both in the therapeutic process and in the educational one, and the literature in the area has recorded several examples of successes achieved by students with disabilities assisted by ICT. In Romania, however, few studies have been conducted so far to assess the way ICT is used by teachers in their work with students having different types of disabilities. For that reason, the main aim of the present research was to identify to what extent pre-university teachers are open and prepared to use ICT applications in special education. The sample consisted of 105 pre-university teachers from Bihor, Romania. The instrument used was a questionnaire having 76 multiple choice items, and the implementation period was January-March 2016. The results show that even though they are aware of the importance and have a positive attitude towards using ICT in special education, the majority of the teachers included in the study feel that they are ill-prepared and want to deepen their knowledge in this field during their continued professional training.
Key words: *ICT, special education, students with disabilities.*

Introduction

In recent years, ICT has become more and more important, being present in almost all aspects of our modern society. On the other hand, from the perspective of inclusion, school is the space where each student should have equal educational opportunities. The evolution of new technologies has generated changes at all levels of society and has had a deep influence on the activities implemented in schools, including those which concern the education and inclusion of people with disabilities. The use of information and communication technologies in education has led to significant changes in didactic principles, as well as teaching and learning strategies. In recent years, a particular attention has been given to the development of adaptations designed for users with special needs, and these adaptations are known as *access technologies*.

Problem of Research

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), that is, 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. 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.

Such products include: alternative input devices (alternative and adaptive keyboards, expanded keyboards, alternative and ergonomic mouse/pointing systems, head/mouth/tongue controlled input devices, Morse code input devices, touch screens, speech recognition software, speech-to-text converters, virtual keyboards, cursor enlarger software etc.), alternative output devices (output devices which enable visually impaired people to use and interact with the computer; they include Braille display devices, Braille embossers, screen reading software, image enlarger software etc.), accessible software (includes software applications adapted to children and adults with disabilities, operating systems with accessibility options, accessible web browsers etc.), as well as Universal Design – the concept of "universal design for learning" was first defined in the 1990s by the Centre for Applied Special Technology (CAST) and it encompasses all those didactic methods, means and strategies which enable students to acquire skills, knowledge and motivates them to take part in the learning process (Hallahan & Kauffman, 2006, p. 541). 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 (Popescu & Preda, 2015, p. 62-63).

Due to software compatibility, access technologies cannot be added to any computers, so schools should choose software packages which are compatible with the equipment they have. Virtual access is important – teachers and parents should know that there are several options to configure operating systems available in schools and at home, such as open source solutions. Options are easy to find on the Internet. For instance, Apple provides access technologies as standard options with its products without any extra costs. Thus, the iPhone, the iPad, the iPod and the OS X operating system include the image enlarger option and speech recognition , as well as a screen access technology for blind and visually impaired people (VoiceOver). Similar solutions can also be found on the devices which use the Android mobile operating system. In order to help people with cognitive and learning disabilities, each Mac computer includes an alternative, simplified interface, which offers rewards for discovery and learning. For those who face difficulties with using a mouse, each Mac computer includes Mouse Keys, Slow Keys and Sticky Keys, which adapt the computer to the users' needs and capacities (Santos & Teles, 2012).

In Romania, in recent years, a special attention has been given to integrating children with special educational needs (SEN) into mainstream education (although there are still special needs schools for these children, mainly for those with intellectual disabilities). However, not all teachers feel prepared to work efficiently with such children, to adapt their working strategies to each individual child. Since the outcome should be the same for all children, and since we talk about equal opportunities in education, equipping schools with these access technologies should be a priority. That, however, is not enough. There should also be teachers who are trained to use these technologies and who understand their role in providing information, in communication or within therapies with corrective-compensatory and formative roles.

8

Research Focus

School should focus primarily on students acquiring the knowledge of how to learn the strategies needed to solve problems in everyday life. This process should take place in a cooperative and solidary way, with the teaching and learning processes happening concurrently, with each child "learning how to learn", one from the other, without competition and arbitrary hierarchies, in a spirit of respect and tolerance towards others. All children 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, school should make efforts to meet students' all educational needs, without injuring their dignity and personality. In this respect, ICT, in conjunction with access technologies, becomes an indispensable tool for any field, and this fact has enabled, and will continue to enable, the access of all people with disabilities to education, information and vocational training. In order to achieve that, a new approach is required and/or adjustment to a new style of thinking and of behaviour, which will allow society to deal with changes.

Continuing the research of Owston and Wideman (1997), Hetzroni & Shrieber (2004), state that the results of a comparative longitudinal study involving two groups of primary school students with disabilities, one with and the other without access to access technologies, show that the students who had access to these technologies showed a significant improvement in their school performance. Furthermore, the research done by Zhang (2000), Waxman, Lin, Michko (2003), Glaeser (2015), Benton & Johnson (2015) show that access technologies provide students who have learning disabilities with the support they need to integrate in mainstream schools and to attend classes based on the general curriculum. They help students to convert tasks written in classic format to electronic format, allow the elaboration, organization and editing of writing tasks and last, but not least, motivate students to carry out tasks with pleasure.

It is good to see that in Romania the number of students with 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. It is the responsibility of each staff member of any school to know and to apply the legal provisions in force to facilitate access to mainstream education and, at the same, to identify the best didactical practices and strategies adapted to each student with disabilities (Gray & Morley, 2005). So, the main question of this research was whether the knowledge of pre-university teachers from Bihor, Romania, about the of use ICT in the education of students with SEN is in line with the requirements of a modern education.

Methodology of Research

General Background of Research

Summarising the things presented above, it can be said that ICT has a particularly important role in the therapy and education of students with SEN, as it contributes to the valorisation of their latent potentials, to a better interpersonal communication, to improved school attainment and, in general, to the development of a well-rounded personality (Benton and Johnson, 2015, p. 25). Thus, the aim of this study was to identify to what extent teachers are open and feel prepared to use the new technology in their everyday teaching work with SEN students. The objectives of the study were the following: (1) to identify teachers' attitude towards the usefulness of ICT in education, (2) to analyse teachers' abilities to use ICT in

special education, and (3) to assess the teachers' knowledge about various educational software designed for students with certain types of disabilities. The specific hypothesis of the study was: there are no significant statistical differences between the teachers' knowledge about the usefulness of ICT in special education and the school education stage (primary or secondary) they teach in.

Sample of Research

The sample of research consisted of 105 people (N=105), 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 of 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 country, with a minimum sample requested from Romania of 100. The sample of 105 is representative only for Bihor county, Romania.

Instrument and Procedure

The research instrument was a questionnaire consisting of 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.). The questionnaire was prepared by educationalists from the Polytechnic Institute of Guarda, Portugal – www.ipg.pt – 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.

Data Analysis

The qualitative analysis of data was performed by calculating the statistical frequency of the answers provided by the respondents. In addition, a comparative analysis of respondents' answers was also done based on the sub-categories they belonged to, that is, the school stage they teach in: primary schools (which is marked in the tables with "P"), and secondary schools (marked with "S"). For the validation of the specific hypothesis of the research, the chi square – χ^2 – coefficient was calculated for the differences between the teachers' experience in using ICT and the school stage they teach in.

Results of Research

The results are presented in the following tables. The first line of each table includes the points of the scale (0-10); N represents the number of respondents for each point of the scale, with the corresponding percentage of the total of answers next to it; P- primary schools; S -

10

secondary schools. In Tables 1 and 2 there are three lines, while in Table 3 four, with issues that are relevant for the indicators discussed in the following paragraphs.

Table 1. Teachers' attitude towards using ICT in education.

Scale	0 N	0 %	1 N	1 %	2 N	2 %	3 N	3 %	4 N	4 %	5 N	5 %	6 N	6 %	7 N	7 %	8 N	8 %	9 N	9 %	10 N	10 %
Use of audiovisual technologies in education																						
P	-	-	1	1	2	1.9	3	2.8	6	5.7	3	2.8	1	1	8	7.6	10	9.5	4	3.8	5	4.8
S	1	1	1	1	3	2.8	2	1.9	2	1.9	5	4.8	2	1.8	10	9.5	17	16.2	10	9.5	9	8.5
T	1	1	2	2	5	4.8	5	4.8	8	7.6	8	7.6	3	2.8	18	17.1	27	25.7	14	13.3	14	13.3
Use of the Internet in education																						
P	-	-	-	-	-	-	-	-	-	-	5	4.8	1	1	3	2.9	10	9.5	10	9.5	9	8.5
S	--	-	-	-	-	-	-	-	-	-	9	8.5	3	2.8	8	7.6	18	17.2	21	20	8	7.6
T	-	-	-	-	-	-	-	-	-	-	14	13.3	4	3.8	11	10.5	28	26.7	31	29.5	17	16.2
Usefulness of ICT in assisting students with SEN																						
P	-	-	1	1	-	-	-	-	-	-	5	4.8	1	1	5	4.8	8	7.6	10	9.5	18	17.1
S	-	-	1	1	2	1.9	1	1	1	1	10	9.5	1	1	9	8.5	15	14.3	7	6.6	10	9.5
T	-	-	2	1.9	2	1.9	1	1	1	1	15	14.3	2	1.9	14	13.3	23	21.9	17	16.2	28	27.6

Looking at Table 1, it can be seen that as far as the frequency of using audiovisual technologies in the teaching activity is concerned, most answers polarise around points 8 (25.7%) and 7 (17.1%), which means that modern teaching aids are often used by teachers in the classroom. The trend is the same with both primary school teachers and secondary ones, even if, in this case, polarisation is not that obvious around one single point. The concentration of answers is much clearer when the use of the Internet is concerned – 59 of the answers (52.6%) come under points 8 and 9 on a scale with 11 points. In this case, the distinction is given by the secondary school teachers, who are much more willing to use the resources offered by the Internet than their primary school colleagues. The same concentration towards the higher points of the scale can be noticed in the answers given to the question about the usefulness of ICT in special education, 28 (26.7%) of them take the top position of the scale, that is, 10. In this case, too, secondary school teachers seem to be more inclined to use ICT in the education of students with SEN. Thus, it can be said that teachers have a high degree of openness towards the use of ICT in education, looking at it as an integral part of a modern and quality education.

Table 2. Analysis of the teachers' capacity to use ICT in special education.

Score	0		1		2		3		4		5		6		7		8		9		10	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Knowledge about the usefulness of ICT in special education																						
P	10	9.5	3	2.8	3	2.9	2	1.9	4	3.8	6	5.6	4	3.8	3	2.8	3	2.8	6	5.7	4	3.8
S	6	5.7	4	5.8	8	7.6	5	4.8	7	6.7	9	8.7	4	3.8	5	4.8	7	6.7	-	-	-	-
T	16	15.2	8	7.6	11	10.5	7	6.7	11	10.5	15	14.3	8	7.6	8	7.6	10	9.5	6	5.7	4	3.8
Understanding of the specific aspects of educational software adjusted to the specific nature of different types of dis-																						
P	9	7.6	6	5.7	4	3.8	2	1.9	6	5.7	6	5.7	3	2.8	3	2.8	4	3.8	3	2.8	3	2.8
S	9	8m6	9	8.6	8	7.6	4	3.8	7	6.7	7	6.7	1	1	5	4.8	5	4.8	1	1	1	1
T	17	16.2	15	14.3	12	11.4	6	5.7	13	12.4	13	12.4	4	3.8	8	7.6	9	8.4	4	3.8	4	3.8
Knowledge about the design of educational software for students with disabilities																						
P	19	18.2	5	4.8	6	5.7	3	2.9	1	1	4	3.8	2	1.9	-	-	2	1.9	3	2.9	3	2.9
S	20	19.1	8	7.6	4	3.8	4	3.8	2	1.9	4	3.8	5	4.8	2	1.9	4	3.8	2	1.9	2	1.9
T	39	37.2	13	12.4	10	9.5	7	6.7	3	2.9	8	7.6	7	6.7	2	1.9	6	5.7	5	4.8	5	4.8

The opinions are strikingly different when the respondents answer to questions about the design and usefulness of ICT software for special education. Thus, most of the teachers admit to have poor knowledge about these issues, 16 of them (15.2%) chose point 0, and 15 (14.3) point 5 on a scale from 0 to 10. Those who seem to be least informed in this respect are the primary school teachers, whose most answers are at the low end of the scale – point 0. Similar answers were given to the questions about the teachers' capacities to recognise educational software adjusted to the needs of children with various disabilities, almost one third of the answers are at the low end of the scale – 0 and 1. There are no significant differences between the primary school and secondary school teachers' answers, each category is just as little informed about this issue as the other. On the other hand, the concentration of answers towards the lower end of the scale is obvious when the teachers' knowledge about the design of various software packages for students with SEN is concerned. Thus, 37.1% of the subjects have no knowledge at all in this regard, and the trend is the same for both categories of teachers included in the study. It can be concluded that, although they know its importance, most of the teachers interviewed have superficial knowledge about the design and use of ICT in the education of students with disabilities, which can deprive them from an important resource in their therapy and education.

Table 3. Analysis of the teachers' capacity to use ICT adjusted to the various categories of disabilities.

Score	0		1		2		3		4		5		6		7		8		9		10	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Knowledge about software for visually impaired students																						
P	30	28.5	3	2.8	5	4.8	2	1.9	2	1.9	3	2.9	-	-	1	1	3	2.9	-	-	-	-
S	32	30.5	7	6.7	3	2.8	5	4.8	2	1.9	2	1.9	-	-	3	2.9	1	1	1	1	-	-
T	62	59	8	7.6	10	9.5	8	7.6	7	6.7	4	3.8	5	4.8	-	-	4	3.8	4	3.8	1	1
Knowledge about software for mentally impaired students																						
P	17	16.2	5	4.8	6	5.7	3	2.8	1	1	6	5.7	2	1.9	2	1.9	4	3.8	-	-	2	1.9
S	20	19	10	9.5	6	5.7	5	4.8	4	3.8	4	3.8	4	3.8	1	1	1	1	1	1	1	1
T	37	35.2	15	14.3	12	11.4	8	7.6	5	4.8	10	9.5	6	5.7	3	2.9	5	4.8	1	1	3	2.9
Knowledge about software for students with hearing impairments																						
P	21	20	6	5.7	3	2.8	5	4.8	2	1.9	7	6.6	-	-	1	1	1	1	-	-	2	1.9
S	24	22.9	8	7.6	2	1.9	7	6.6	4	3.8	4	3.8	1	1	2	1.9	1	1	2	1.9	2	1.9
T	45	42.9	14	13.3	5	4.8	12	11.4	6	5.7	11	10.4	1	1	3	2.9	2	1.9	2	1.9	4	3.8
Knowledge about software for students with motor skills disorders																						
P	20	19	5	4.8	10	9.5	4	3.8	1	1	2	1.9	1	1	3	2.8	1	1	1	1	-	-
S	21	20	9	8.5	9	8.5	5	4.8	2	1.9	4	3.8	2	1.9	1	1	3	2.8	-	-	1	1
T	41	39	14	13.3	19	18.6	9	8.6	3	2.9	6	5.7	3	2.9	4	3.8	4	3.8	1	1	1	1

The general trend of answers is the same in the case of answers given by the respondents to the questions about the use of educational software designed for different types of disabilities. Thus, 62 of them (59%) do not know any software adjusted to the needs of students with visual impairments, 37 (35.2%) – software for students with mental impairments, 45 (42.9%) – software for students with hearing impairments, and 41 (39%) – software for students with motor skills disorders (Table 3). There were no significant differences between the answers given by the primary school and secondary school teachers. These results show that the knowledge teachers have about the role of ICT in special education is rather general and has an empirical character, which does not make possible its use in a particular situation, for a specific category of disability.

Table 4. The statistical differences between the teachers' knowledge about the use of ICT in special education and the school education stage they teach in.

Indicators	Teachers who teach in	
	Primary schools	Secondary schools
The difference between primary school and secondary school teachers regarding their knowledge about the use of ICT in special education	$\chi^2 = 10.21$	$\chi^2 = 11.48$
	$p<0.01$	$p<0.01$

The specific hypothesis of the research was that there are no significant statistical differences between the teachers' knowledge about the educational software packages for students with SEN and the school education stage they teach in. The results of the study

13

show that the teachers' answers were rather similar, regardless the school stage they teach in. The results in Table 4 confirm this assumption, that is, the statistical differences between the knowledge of teachers about the role of ICT in special education and the school education stage they teach in are at significance thresholds lower than 0.01 both for teachers from primary schools and for those from secondary ones. This shows that regardless the education stage, teachers are equally ill-informed about the specific aspects of educational software for students with SEN. This extremely interesting aspect is discussed in the following paragraphs.

Discussion

A first aspect which deserves a discussion is the one of the significant discrepancies between the use of ICT by teachers in mainstream education and in the special/inclusive one, on the one hand, and the teachers' intentions to use ICT in special education and their competences in this respect, on the other hand. The literature in the area has recorded several examples in which ICT was successfully used in the therapy and education of students with SEN. Thus, L. Glaeser (2015, pp. 1-5) points to the role of new technology in the recovery of students with ADHD and, especially, the educational software which can stimulate these students' ability to focus attention. In a study with a sample of 657 students between the ages of 11 and 15 years, Durrant & Hook & McNaney & Williams & Smith & Stockman & Olivier (2014, pp. 34-47) underline the role digital photographs play in helping children with behaviour problems to express their emotions, as well as in the interpersonal communication in inclusive classes. Zikl & Bartošová & Víšková & Havlíčková & Kučírková & Navrátilová & Zetková (2014, pp. 915-122) describe an educational software for dyslexia correction, which aims at increasing reading/writing speed and cutting down mistakes by using special fonts, of various types and colours, adjusted to the needs of these children. Finally, Alves & Schmidt & Carthcat & Hostins (2015, pp. 3081-3086) present the JAWS software for Windows, which, using a voice synthesizer, can read out texts for people with visual impairments. The international and Romanian psycho-pedagogical literature provides many other such examples, but, despite that, information on educational software for students with SEN do not always reach a large number of teachers. The results of the current study show that teachers are prepared to use ICT only in mainstream education, a field in which they benefit from both initial and continued professional training. Although they recognise its importance in special education, there are few teachers who have the resources and competences to use ICT in this field, the cases recorded in literature being a rarity. As more and more students with SEN are being integrated in mainstream education, it becomes of utmost importance that all teachers should be prepared to look at ICT as a fundamental resource in the therapy and education of these students.

Based on the things written above, it can be stated that it is of utmost importance that teachers should benefit from initial and continued training in the field of using ICT in special education (Nash & Norwich, 2010, pp. 1471-1480). Nevertheless, the acquisition of the ICT competences required in special education should take place in parallel with that of those other methodological and psycho-pedagogical competences teachers need. This fact is supported by the results of studies carried out in this field, which prove that the effective use of ICT in special education increases when the new technology is integrated with traditional teaching activities. For example, in order to increase the chances of integrating students with SEN in mainstream schools, N. Humphrey et. al. (2013, pp. 1210-1225) developed an educational intervention programme based on three components: involvement of parents in the teaching process, development of students' transferable competences and the use of educational software adjusted to the students' needs. The sample of the study carried out by Humphrey consisted of 4.758 students from 323 schools in England. The results showed that 72.5% of the students included in the programme improved significantly their school attainment and managed to

14

integrate properly in mainstream education. The results of the current study demonstrate that most of the respondents believe in the effective use of ICT in special education, even though they have poor knowledge in this respect. Thus, these teachers need professional training in this area, but this thing should be done along with their specialised, psycho-pedagogical and methodolological training so that they benefit from an overall vision on the way the teaching process should take place.

Conclusions and Recommendations

The results of the current research show that teachers are knowledgeable about the role played by new technology in education and that they understand the importance of ICT in education. However, there are very few teachers who are trained in using different educational software packages in their work with students who have disabilities. Although the literature in the area has recorded several success cases, it seems that such information needs time to reach Romania, while the economic conditions restrict the access of most teachers to such educational software, which may explain why such success are rather rare.

One of the possible limitations of the current study is given by the fairly small sample size, as well as by the fact that it was conducted online, and its results cannot be extrapolated nationally. Despite all that, it can be recommended that teachers become better informed about the opportunities of using ICT in special education, as well as that they receive a better professional training in this area. The former aspect requires more research on the reasons of why ICT is so little known and used in special education. As far as the latter aspect is concerned, the continued professional training programmes in the field of special psycho-pedagogy should include both the acquisition of specialist and methodological competences and of those connected with the use of the new technologies in the therapy and recovery of students with SEN. In this way, the conditions of a better quality special education would be created, having as main beneficiary the child in need.

In a world which witnesses such a significant technological progress and development in the neuropsychological, cognitive and constructivist approaches, to include the specific information sharing, communication and constructive-creative activities based on ICT, as well as access technologies, in therapies which aim to achieve correction-compensation and development is required in our country too. The training of "trainers" in the use of information access technologies by students with disabilities contributes to the optimisation of the psych-pedagogical methodology and of the methodology of corrective-compensatory therapies.

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Advised by Doina Maria Schipor, „Stefan cel Mare" University of Suceava, Suceava, Romania

Valentin Cosmin Blândul	Prof. PhD., University of Oradea, 1 University street, Oradea, 410087, Bihor, Romania E-mail: bvali73@yahoo.com Website: http://www.uoradea.ro/
Adela Bradea	Assoc. Prof. PhD., University of Oradea, 1 University street, Oradea, 410087, Bihor, Romania E-mail: adelabradea@yahoo.com Website: http://www.uoradea.ro/