ICT promoting the educational success of students with special educational needs (SEN)

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Abstract: This paper is based on the research carried out for a master's degree dissertation at Universidade Aberta, Portugal, and analyzes the relevance of the use of Information and Communication Technologies (ICT) in education, and the contribution they can give to the development of social and cognitive competences of students with special educational needs (SEN), by promoting their inclusion. This work took the form of a qualitative case study which focused on the universe of students with SEN attending the school under investigation. The participants were class tutors, ICT teachers and support service technicians and the methods of data collection were interviews, document analysis, non-participant direct observation and diaries. The conclusions show that ICT, being tools that promote motivation, autonomy, self - esteem and interaction, offer significant advantages for cognitive, physical, social and emotional development of students with SEN.

Keywords: Information Communication Technologies, Inclusion, Educational Success, School Library, Students with SEN, Portugal

1. Introduction

The Information Society has operated profound changes in the social and economic structure of the countries, but it has also created a new paradigm of education. If literacy once meant knowing how to read and write, «being literate today means working with the computer and mastering the tools of global communication» (Pereira, 2009, p. 1, [our translation]).

The use of ICT forced changes in curriculum management, in teaching and learning methodologies and goals, in the adoption of ICT-based educational resources, and in the pedagogical relationship between teacher and student but it has also enhanced a change in the level of knowledge. Silva (2006) cited by Candeias & Silva (2008, p. 142[our translation]) states that «For the education system and its agents the great challenge is to understand the arrival of the time of technologies [...] to establish itself as a true learning community.»

Education is, today, inseparable from inclusion, equal opportunities, equity. According to Correia (1999, p.9 [our translation]), «There is at least one in ten children who, during his/her school years, need specific support that takes into account his/her needs and interests». It is, therefore, urgent to pay particular attention to a group of pupils that daily struggle for inclusion.

It was our intention to understand the existing deficiencies in the investigated school, both in terms of teacher training and in terms of the specific tools and resources available, which can guarantee a complete learning development of students with SEN. Thus, we designed an investigation that took the form of a case study, in a qualitative approach, with which we sought to deepen our

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knowledge about the object of study.
In the development of our academic work, it became imperative to undertake a thorough literature review that would guide and conduct the research. According to Cardoso (2010), «the process of untying the threads that constitute the web, identifying concepts, themes, topics or guiding questions is a precious help and constitutes a great starting point» (p.20[our translation]).
Given the evolution of Special Education (SE) and the changes in education and in society with the advent of the Information Society, the following main research question emerged: How can ICT impact on the development of socio-cognitive competences of students with SEN, promoting their inclusion, expanding a partnership work with the school library and the rest of the community?
This paper aims to present some aspects of an investigation in education, developed in a secondary school in the Lisbon Metropolitan Area, which analyzed the impact of the use of ICT in promoting educational success and inclusion of students with SEN, the role that the School Library can play in supporting pupils with SEN at school, developing a support and partnership work with other educational agents.

2. Literature review

ICT in the Education of students with SEN
The advent of the knowledge and information society has not only caused significant social changes but has also operated important changes in education. The school and the process of teaching and learning are driven by social changes and it emerges the need to empower the individual with new skills in the field of a new type of literacy: the digital literacy.

> «The family of 21st Century "survival literacies" includes six categories: (1) the Basic or Core functional literacy fluencies (competencies) of reading, writing, oralcy and numeracy; (2) Computer Literacy; (3) Media Literacy; (4) Distance Education and E-Learning; (5) Cultural Literacy; and (6) Information Literacy.» (UNESCO, 2007, p. 3)

In Portugal, computer science was linked to pedagogy in the 1970s. So, over the years, we have seen the introduction of computers in education, the integration of ICT in the school curricula and important changes in educational policy. The technological modernization of schools opens up a range of options but requires differentiated restructuring. The MINERVA project appealed for the use of technologies and trained teachers in the area of digital technologies. New projects followed with the aim of re-qualifying the Portuguese people and recovering the social and economic backwardness of the country. In 2007, the Technological Plan for Education (TPE) was released, which intended to equip the schools with technology and aimed at transforming the strategies, resources and tools to be used. In this regard, Barros (2008) underlines,

> «The modernization of schools equipping them with the latest technological means is one of the main goals of the Technological Plan of Education, with the aim of putting Portugal among the five most advanced European countries in this field, by 2010, contributing to the increase of the success of the pupils. "(p.31, original)

This plan had three fundamental axes: knowledge, technology and innovation, key areas for all sectors of society. From all the changes that occurred,

information literacy assumes particular importance for the school. Along with the changes comes a new type of student, the "digital native", born in the technological age and for whom the computer is the pencil of some years ago.
At school, the technological revolution potentiates changes in teaching that are mainly due to the fact that these tools are differentiated, motivating and appealing resources enabling innovative pedagogies.

> «It is proven that ICT is an added value for the education of the majority of students in regular school with or without SEN, efforts being made, nationwide, to equip all schools and students with computers and broadband Internet connections so that everyone has the resources available for a proficient teaching and learning process.» (Ribeiro, Moreira e Almeida, 2009, p.39 [our translation])

The obstacles that have arisen are related with the lack of teachers' training whom, according to McKenzie (2001), are "Digital Immigrants" and fear the use of tools they do not master in front of the "Digital Natives" students'. From the perspective of Bortolozzo, Cantini and Alcantara (2006),

> "The current training of the teacher does not prepare him/her for a culture that uses technologies as a means of producing knowledge, making its use difficult and even provoking the resistance of some (teachers) who fear to learn and make use of technologies" (p.1585)

However, their integration in education has caused changes in the education system and forced the school to face and respond to new challenges. The use of these tools, although essential for all students, opens a unique window of opportunity in the education of students with SEN, looking for a new direction in the integration of these students, with new teaching and learning methodologies, different ways of interacting with the teacher and with their pairs. The potential use of these tools contributes to minimizing disabilities, maximizing the participation of these students in the tasks done by the class, in the development of common work and promoting their inclusion. There is a lot of planning to be done by the teacher in articulation with the SE team, but studies prove how beneficial its use is. This new paradigm obliges the school to adapt and to seek, according to its universe of students with SEN, to equip itself with the necessary technologies, even in articulation with the ICT Resource Centres. In regular schools, such as the school targeted by this study, this specific type of technology has not yet been needed.
Today, the use of ICT in the teaching and learning process of students with SEN is of crucial importance as a means to enhance motivation, development of competences and socio-cognitive skills, enhancing an effective inclusive school.

> «Personalized learning requires attention to the unique needs of all students of all abilities, acknowledging that each have different learning styles including students with mild, moderate or severe disabilities. The use of technology in education plays a particularly vital role by enabling flexible curriculum development and assisting students with disabilities to participate as equals in the learning experience. It also helps to prepare them for life-long learning, recreation and work outside of school.» (Accessible ICTs and Personalized Learning for Students with Disabilities: A Dialogue among Educators, Industry, Government and

Civil Society, UNESCO, 2011)

All along the research, we have reflected on the importance of using technologies as an enabler of inclusion, but also as an essential element in the preparation of these students for their life in society, for the job market, for adult life, by fostering lifelong learning throughout life. ICTs are links between school and work life, essential for all, indispensable for citizens with limitations and / or disabilities, "For most people technology makes things easier. For people with disabilities, however, technology makes things possible.", (Radabaugh, 1988).
Efforts must be made to ensure that school can be a differentiating pole in the education and cognitive development and learning of these students, strengthening peer cooperation, fostering partnership and collaboration with the SL and all the educational community (EC).

The School Library and the Special Education Team: collaborate to include

As the paradigm in education changes, the role of the SL becomes relevant and, after years of playing a passive role, it becomes an active agent of education playing, today, a central role at school as the linking element with the classroom, curriculum support, reading promotion, developing literacy, learning skills and critical thinking needed to access, evaluate and use information. For Santos, Monteiro and Carqueja (2012),

> «The school library has evolved into a resource centre where a plurality of sources of information coexist, a space open to knowledge, offering diversified services to users» (page 63 [our translantion])

Today's SL has some specific characteristics linked, above all, to the new paradigms of information, where the digital reigns as a source of research, communication and acquisition of knowledge. The library of the 21st century, in Das's (2007) vision is:

> «... the school library is more than a room with books and services: it is a function at school. To perform this function, the school library needs to use all the new technologies and anticipate new educational concepts, such as e-learning and m-learning. The school library is not only a centre of learning and knowledge for students, but it is also for teachers, non-teaching staff, management structures and possibly for parents. This is the portal - physical and virtual - for all features and services. The new function of the school library can be described as a "school library without frontiers," since it provides permanent access from any point. It can be implemented in different ways and, therefore, guarantees customized solutions for schools, at an individual level, innovative applications in NICT and in educational concepts. » (Newsletter RBE Nº 3, s / p)

The increasing inclusion of students with SEN in regular schools demands that answers might be sought to provide this population with a variety of skills that may enhance their inclusion through technological means. The SL and the teacher librarian, as links between the SE and the EC, can play a key role throughout the process. The SL can, with its resources and equipment, be a differentiating space in the school for all students, but in particular for students with SEN. Using Web 2.0 tools it can enhance the acquisition of competences, develop skills, minimize discrimination and promote inclusion. According to

Pires (2013) the SL can be assumed as

> «[…] a privileged space for the development of learning skills and literacy and as a guarantee of equal opportunities» (Pires, 2013, p.65, [our translation]).

Working in collaboration with the EC and with the SE team, being a democratic space per excellence, it can promote equity, support strategies to overcome difficulties or lessen disabilities. The IASL Political Declaration on School Libraries (1993,) states that «the spaces must functionally fit the design of the school's general architecture, be located near natural centres of greater circulation and be easily accessible to all users, including disabled people ».

The SL should follow the national and international guidelines so that it can support the teaching and learning process and consolidate its role at school and must also address multiple factors to ensure the effectiveness of its action. This resource provides a greater predisposition for the accomplishment of tasks, since the activities carried out in its space are, most of the time, free from evaluation. Therefore, having no fear of failing, students with SEN can abstract themselves and, in a motivating and participative way, can develop individual or group activities, assist their peers in projects contributing to collective work and, at the same time, consolidate their inclusion. In IFLA / UNESCO School Library Manifesto (1999, p.1), is stated that SL must make its services available on equal basis, including specific services and materials.

Particular attention must be given to the SL framework in what its location, facilities, ethical standards of service, equipment at its disposal are concerned. In the document «IFLA / UNESCO Guidelines for School Libraries» (2002, p. 14), it is stated that «all users should be treated equally, regardless of their competence or personal history». With regard to the design of the equipment, it must correspond «to the special needs of the school population in the least restrictive way» and must also adjust «to changes in library programs, school curriculum management as well as technological innovations, video, electronic, multimedia)» (idem, p. 8). The same document highlights the SL's role as a «gateway to today's society» and should therefore «provide access to all types of equipment, electronic, computer and audiovisual» (p. 8), including specific IT equipment needed for a wide range of disabilities.

While promoting an inclusive school, the SL action should be transverse to all areas of knowledge. However, this can only be achieved with collaborative work.

3. Methodology

The field work took place at a school in the Lisbon Metropolitan Area, on the south bank of the river Tagus. Imbued with the spirit of change, we wished to deepen the knowledge about the use of ICT in education by linking it to the problem of students with SEN, in the school under investigation. Throughout the research, we have been studying the impact that ICT may have on the development of socio-cognitive skills of students with SEN, enhancing their inclusion, increasing a partnership with SE and the rest of the EC.

For this purpose, we have designed an investigation that took the form of a case study, which was approached according to the qualitative method which, according to Bell (2008, p.22) «[…] is especially suitable for isolated researchers».

Data collection took place during the academic year 2014/2015. We have used different data collection instruments, among which we can highlight the

interviews with ICT teachers, class tutors (CT), support service technicians such as Psychology and Guidance technicians (PGT), Social Intervention Office (GIO) and Special Education (SE). In addition, we have done non-participant direct observation, document analysis and diaries in order to triangulate and validate the information. The study population consisted of 14 teachers of both genders who, at the time, belonged to the school teaching staff or to its technical services.

4. Data analysis

We structured an interview that was divided into four dimensions. The data collected in the first dimension - 'Personal Data', allowed us to characterize our sample: the participants enrolled in this study had an average age of 49 years, the length of teaching work was between ten to 34 years, they were mostly graduates, all with continuing ICT training and seven of them even said they had had initial ICT training.

Through the data collected in the second dimension - 'ICT in learning', we were able to have a general perspective on the level of relevance that the use of ICT in education has for teachers. We came to the conclusion that all the teachers interviewed considered the use of ICT quite relevant, representing a source of motivation and stimulation, quite appealing and facilitating the learning process, the research, and the access to content, making the classroom more active and well-attended. The relevance of the use of ICT is, thus, reflected in the teacher-student relationship. We found out that 85.7% (n=12) systematically used the computer in their daily practice. The use of the computer for professional purposes is connected to the classroom work, support to classes, viewing of audiovisual resources and access to digital platforms. The resources referred to are mainly comprehensive ones. Included in this core there are specific software, non-discriminated software or human resources management, Word, Excel, PowerPoint, interactive whiteboards, among others.

The third dimension - 'ICT and the pedagogical practice of students with SEN', provided the answers to the theme under study. From the answers obtained, we found out that 98.2% (n=13) of teachers considered that the advantages of using these tools with students with SEN were quite significant, standing out, from among the most used resources, the computer, PPT , Word, but also the Moodle platform, the Internet and interactive whiteboards. From the advantages presented by teachers, we emphasize motivation, autonomy, self-esteem and interaction for being appealing resources, promoting a more interactive way of learning and by making the participation in the tasks easier as they stimulate learning, interaction with peers and minimize disabilities.

Regarding to the importance of the role of the SL, all teachers considered it relevant to the teaching and learning process, given its unique characteristics of facilities, resources and work team. It is therefore essential to strengthen ties of collaboration with the SL in supporting the curriculum, overcoming students' difficulties, enhancing learning and leisure. That is why it becomes so imperative to have well equipped school libraries. We have also analysed the suggestions of the interviewed teachers. These suggestions were divided into three areas: 'Tutelage and Management Bodies'; 'Resources/Tools'; 'Teachers' Training'. We have been told that there is the need for better equipment in schools, better conditions for the use of ICTs, modernization of the existing equipment, acquisition of skills' games, dissemination of knowledge and, above all, urgency in teachers' training in the area of SEN.

From the information gathered in the fourth dimension 'Optional data', which

focused specifically on the class committee and in the openness that its elements, we have noticed that the majority of the teachers are receptive to the use ICT tools.

The research has also included a group of thirty-four pupils with SEN, attending the investigated school, aged between 13 and 15, inserted in several levels of education and presenting a wide range of problems.

While doing non-participant observation, we paid particular attention to the work carried out by two students, both in the context of studying English as a foreign language (FL). One of them had left unfinished FL English modules and the other was doing his professional internship. The students presented the same type of problem, a cognitive deficit, and attended the final year (12^{th}) of the Multimedia Professional Course. In both cases, the use of technologies presented itself as an added value to the achievement of the objectives. In the first case, it allowed the student to accomplish successfully the unfinished English modules by using the computer to access the Internet, the Moodle platform, an online dictionary, do some information search, minimizing difficulties felt at the FL level. In the second case, the use of ICT was necessarily a working tool, since that student needed to use technologies to finish all the activities, such as recording content, changing digital media supports, organizing and listing materials, scanning and using specific programs.

From the observations done, we have concluded that students with SEN are very receptive to working with digital tools.

In collaboration with the SE teacher, the data gathered from students with SEN, allowed us to conclude that, from the students who provided information (n=33), 78,2% (n=26) had a computer at home but only 72% (n=24) could access the Internet from their homes. The technologies were, for 87.9% (n=29) of students, used for both study and leisure being, the Internet (91%), Word (72,7%) and PowerPoint (51,5%) the most used resources. Fourteen students also referred the use of digital games. When at school, 74,2% (n=23) of the students favoured the SL space to have access to technologies and to do group work (66,7%) and research (51,9%). When analyzing the data, we were able to conclude that 81,8% (n=27) of the students were going to the SL very often.

We have also had the opportunity to observe, in the SL, a set of five students with SEN who systematically attended the SL, for using its technological resources, do some research, prepare individual and group work, read, use online platforms or simply attend support classes. We have observed that, as for the rest of the students, the motivation resulting from the use of the technologies represents an enormous benefit for the accomplishment of their tasks.

We would like to highlight the information collected among teachers which validates the benefits that technology lends to the teaching and learning of the students with SEN. It should be mentioned that a student who has always presented difficulties in communication and interaction during the three years he attended the Electrical Installations Professional Course, and by his own initiative, exposed himself during a Road Show presentation, explaining the work developed by his class at school. According to the teacher, this change of attitude has only been possible due to the importance that audiovisual media has in facilitating learning, particularly for students with SEN.

5. Conclusions

At the end of the investigation and according to the objectives we had

previously established, we were able to obtain results that answer the research question, increasing our knowledge about the subject under study.

The place that students with SEN occupy in school and in society has been recognized by all involved in this study. Aware of this fact, and aware of the legislation that stands by this kind of students (DL nº3 / 2008) we know that the inclusion and educational success of these students in regular education has been difficult to put in practice.

Nowadays, we have some tools, resources and applications that can help students with learning difficulties and contribute to their educational success and inclusion.

By the end of this research, we were able to change some of our perceptions about the kind of knowledge that teachers have on the subject under study, and the type of work they develop with students with SEN. We were also able to evaluate the relevance that teachers give to the technological resources, and to the role of the SL in promoting educational success, in the development of multiple competences and in the inclusion process.

Our main concern is now focused on the lack of training and support that teachers face in regular education, when the universe of students does not presuppose the use (and support) of specialized support units (multi-disabilities or deaf-blindness) or units of structured teaching (autism).

Right from the start, we have been confronted with a great uncertainty about how to manage the learning process of students within the same class, when it includes, in its midst, not only heterogeneous students called 'normal', but also students with SEN, since the latter can show, as we mentioned earlier, a wide range of problems or incapacities. Managing the learning process with such diverse audiences is a constant concern and requires, from the teacher, specialized knowledge and adequate training. The degree of difficulty of this task is proportional to the level of education. This point sends us back to the lack of knowledge and training some teachers show, whose wide experience in teaching is not reflected in the training to work with students with diverse etiologies, and highlights the need for further studies.

We intended to understand the relevance that teachers attributed to the use of ICT in the teaching and learning process of students with SEN, how they understood the contribution that the SL can give throughout the process, how they viewed the collaborative work among the several elements of the EC and, this way, contributed to structure a fairer and more inclusive school.

Based on our research objectives, we analyzed the pedagogical advantages that the use of ICT offers for the learning process of these students, collecting information on the contribution that the technological tools can give to the development of the socio-cognitive competences of students with SEN. We did not neglect to ask the teachers about their knowledge on assistive technologies (AT), and about the specific tools and resources available at school that could contribute to the development of the students' learning process. We have also wanted to identify key issues in terms of both technological resources and teacher training in this specific area.

We came to the conclusion that teachers are generally prepared to face new digital challenges, recognize the relevance of these tools for the teaching and learning process, and use them systematically and on a daily basis. They are aware that, since our students are 'digital natives' and 'multitasking', dependent on technologies, as we could verify through data gathered during the investigation, living in the multimedia age, only by using these digital tools we will be able to promote an innovative, motivating and appealing teaching work that could serve the interests and needs of the new generation of students

preparing them for the job market. They also recognize that ICT is (if properly used) a strong and important contribution to the socio-cognitive development, inclusion and preparation for the working life of SEN students. We have also been able to assess the importance that teachers pay to the SL's role as an active agent of education.

According to the data collected, we could realize that all the interviewed teachers consider SL play a fundamental role and give a crucial contribution to the process of teaching, learning and inclusion of these students, as recommended in the IFLA / UNESCO School Library Manifesto (1999). By not placing any architectural barriers to the students with SEN that compose the universe of students in the school, the space of the SL becomes, according to the teachers and technicians, a place of inclusion per excellence. The SL allows pupils with SEN to develop individual or group work under the same conditions as their peers. As a place of free access, it does not reveal to the surrounding environment, what kind of student is using its resources. Like this, students with SEN in the SL are diluted among the other students.

The SL also contributes to the social and economic levelling of students, giving students with or without SEN good working conditions, access to differentiated resources (books, computers, Internet and so on). The investment in the promotion of the SL facilities should not be forgotten so that it could be even more attended and, based on a higher demand, could be better equipped, with specific resources/equipments for students with SEN, could update existing resources, could acquire new resources for the other students, without forgetting the privileged role that the SL can play in the training of teachers. The SL is, according to the teachers interviewed, a place of study, reflection, of learning how to be in a group, respect for the other, compliance with rules, which leads to personal fulfilment promoting autonomy.

In order to fulfil its mission, the SL must, in the opinion of all the participants in the research, develop a collaborative work with other teachers to conduct, guide, support learning, promote personalized or individualized support to the students, especially those with SEN. To do so, SL must use Web 2.0 tools (Santos, Monteiro and Carqueja, 2012). For the participants in this study, SL should be seen as: a facilitating space for learning, promoting knowledge, contributing to the educational success, motivation, self-esteem and autonomy of these students, following the assumptions of IFLA / UNESCO (1999).

According to the data we have gathered, and in response to our research question, we can conclude that teachers believe that SL, given their characteristics, resources and specialized support team can, in fact, contribute to the promotion of educational success and inclusion of students with SEN.

Underlying the new paradigm of the School and SL of the 21st century is, however, the need for training in the most diverse areas, namely in the area of technologies, SEN and ICT related to special needs so that its use could make a difference in the lives of the students with SEN.

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