RESEARCH ARTICLE

Information and Communication Technology in Primary School Students within the Framework of Inclusive Education at a Special Basic Education Center

Tecnología de la Información y Comunicación en estudiantes del nivel primario en el marco de la educación inclusiva en un Centro de Educación Básica Especial

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Summary

This research aims to know the impact of information and communication technologies (ICT), as an innovative mechanism applied in curricular teaching experiences, for the development of cognitive and socio-emotional skills of students aged between 08 to 13 years from primary school who had disabilities to speak or move within the context of a Special Basic Education Center (CEBE). It was a qualitative, substantive research. The *Plaphoons* (free software created for special education needs) technological tool was used. The analysis of the contents of the intentions, perceptions, observation, and data registration was carried out through the triangulation of data and categorization of contents for issuing results. It was concluded that the use of this ICT enhanced the abilities of these students, confirming cognitive improvements for learning the topics of mathematical logic, communication and social sciences. It was also found that this tool allows a better and greater development of their social skills.

Keywords: ICT; Inclusive Education; Cognitive; Socio-emotional.

Resumen

Esta investigación tiene como objetivo conocer el impacto de las tecnologías de la información y la comunicación (TIC), como mecanismo innovador aplicado en experiencias curriculares docentes, para el desarrollo de habilidades cognitivas y socio emocionales de estudiantes entre 08 a 13 años del nivel primaria que presentaron discapacidad para hablar o moverse dentro del contexto de un Centros de Educación Básica Especial (CEBE). Fue una investigación cualitativa, sustantiva. Se usó la herramienta tecnológica *Plaphoons* (software libre creado para necesidades educativas especiales). Se realizó el análisis de contenidos de las intenciones, percepciones, observación, registro de datos mediante la triangulación de datos y categorización de contenidos para la emisión de resultados. Se concluyó que el uso de esta TIC potenció las capacidades de esos estudiantes, constatando mejoras cognitivas para el aprendizaje de los tópicos de lógico matemática, comunicación y ciencias sociales. Asimismo, se constató que esta herramienta permite un mejor y mayor desarrollo de sus habilidades sociales.

Palabras clave: TIC; Educación inclusiva; cognitivas; socioemocionales.

Introduction

According to UNESCO (2008), based on the Salamanca Statement in 1994, "schools must admit all children, regardless of their physical, intellectual, social, emotional, linguistic or any other conditions. They must accept disabled and gifted children, as well as children who live on the streets and work, children from remote or nomadic populations, children from language, ethnic or cultural minorities, and children from other disadvantaged or marginalized groups or areas." (p.3).

According to Echeita and Ainscow (2011), "school is responsible not only for children progress, but also for accounting for their achievements." (p.30) This statement has allowed the integration experience evaluation in Peru to be increasingly positive in the sense of encouraging schools to open their doors and overcome teachers' distrust to deal with the student diversity (Reátegui *et al*, 2015). To date, significant progress and improvements have been registered in the integrated children's socialization processes, which is a general benefit for those who, without having any disability, have learning difficulties (Cueto, Rojas, Dammert and Felipe, 2018). Likewise, a reduction of prevailing prejudices at school and an improvement of ways and culture of coexistence (Boggio, 2018) have been registered and there have been promising experiences on teaching to students through ICT (Jiménez, Serrano & Prendes, 2017; Centeno & Santillán, 2016; Cortés, 2015; Víquez, 2014). Nonetheless, there is still a lack of clarity in the learning

achievements really obtained by students included mainly in Peru (Oyarce, 2016; Reátegui *et al.*, 2015).

In that order of ideas, the fact that a student with special educational needs (SEN) learns differentially does not prevent teachers from teaching him/her in the best possible way and school from implementing favorable adjustments that allow the full development of his/her potential.

So, the ICT adoption from entities may be conceived not as an important challenge, but as an important opportunity for Central American countries, due to their applications on the capacity of this sector to create greater job and wealth opportunities and, like this, fight poverty in these countries" (Monge, Alfaro and Alfaro, 2005 p.20).

Based on the publication of the Supreme Decree N° 026-2003-ED, the Ministry of Education in Peru is implementing plans and projects that guarantee not only the execution of actions on education, but also the provision of an inclusive education. This decree turns out to be inspiring to carry out this transformation process, framed by the continuous social changes generated by many technological innovations and the dizzying growth of information and communication technologies. This serves as the basis for regional projects that allow including special education centers in the regular basic education, emphasizing the new name: "Special Basic Education Center" (CEBE, by its initials in Spanish) and the Early Intervention Program (PRITE, by its initials in Spanish). The positive aspect of this transformation is that it has already begun in different Peruvian cities. However, the socio-cultural fragmentation and centralism restrict covering social gaps even after 15 years the policy was issued by the ministry of education, opting for local efforts that give more strength and attention from society, by serving as sources of positive experience and subsequent spreading to the most remote geographical areas of the interior of the country.

In this perspective, the use of information and communication technologies turns it into not only a fundamental tool for better understanding of academic interaction in basic education, but also into an opportunity to deal with disability situations contributing to improving students' learning conditions within the classrooms. That way, this study proposal is to know the impact of information and communication technologies (ICT), as an innovative mechanism in their application to the teachers' curriculum experiences and in the development of cognitive and socio-emotional skills in the context of a CEBE. This could be used as a model for other educational institutions that make new commitments focused on this type of students, planning new alternatives of hope for social integration and equal opportunities through timely participation of everybody; which is achieved by means of an innovative, progressive and inclusive education.

Inclusive Education

According to Castillo, Sosa, Rapallini, Blanc and Lepratte (2013), it is defined as "an answer of philosophical, political, economic, social, cultural and pedagogical approach that aims at valuing and accepting students' differences inside school." (p. 486) With this definition, it is necessary to redesign the strategies of teaching practices, proposing pedagogical innovations as "alternatives to construct: responses to educational needs for people with learning barriers, their participation in different contexts, promotion of multiple literacies and constructive learning." (Zappalá, Köppel, & Suchodolski, 2011) Additionally, with the intention of specifying, in keeping with what was previously mentioned, 'inclusive education' would subsume the concept of 'special education', since –according to Castillo, Sosa., Rapallini., Blanc., and Lepratte, *l.* (2013)– the latter is defined as "a category of the education system aimed at assuring the universal right to education of those people with temporary or permanent disabilities in all levels" (pp. 486-87).

UNESCO – UNICEF validates the inclusion of special education in the definition (2001), when they indicated that the meaning of inclusive education is deeper than that of integration. In order to specify, its concept has a different assumption because it is connected with the same nature of regular basic education and school meaning. It describes a model of school where there

are not "entry requirements" or any other selection procedure. According to this education approach, "the structure, operation and pedagogical proposal of schools must be substantially modified in order to meet the educational needs of each and every one of the boys and girls, so that everybody succeeds in learning and participates under the same conditions." (García, 2016, p. 5).

It is worth adding, as stated by UNESCO (2008), that "the objective of inclusion is to give right answers to the wide range of learning needs in both formal and informal education environments rather than a marginal issue that is about how to integrate certain students into conventional teaching. It represents an approach that analyzes how to transform education systems and other learning environments in order to respond to the diversity of students" (p.8).

The Use of ICT in Inclusive Education

We live in a society that is immersed in technological development, where the advance of ICTs has changed our way of life, having an impact on many areas of knowledge. In the area of education, ICTs have shown that they can be a great support since they boost the integration of groups with special needs (people with intellectual, sensory and motor impairments, among others). Monge, Alfaro and Alfaro (2005) brought up the adoption of ICTs as an opportunity that would contribute to improving disabled students' learning, endorsed by the implementation of plans and improvements from the Peruvian Government through the Ministry of Education.

A connection that puts together the principles of education by developing new knowledge and the pedagogy (convergence of knowledge) with the use of ICTs in the education system has currently been established. This means a quite attractive opening in the learning process of boys/girls and teenagers, and a teaching opportunity for the teachers themselves. Like this, the use of ICTs, in addition to becoming social dynamics, "helps to implement coverage, improve quality of education and get higher level achievements in decentralization, democracy and equality." (S.D. N° 067-2001-ED) This way, it is promoted in education that ICTs become tools and not a goal of the teaching and learning processes, given that they transform these processes to support and foster a model focused on students who require reasonable adjustments according to their special educational needs.

Adding to the previous statement, Bretel (2006) pointed out that "the education system may be radically different as long as it is believed that disability is a hindrance, putting aside that ICTs are not only a means of global deluge, but also they convert it into an educational task." (p. 9) This idea is complementary with Somekh's proposal (as set forth in Parra, 2014, p. 23) when she said that ICTs "must be included, with the involvement of teachers on pedagogy, in teaching and learning processes. Like this, Internet is the platform responsible for multicultural meeting of all time".

Categories of Analysis

The first aspect taken into consideration was the relevance –for students and teachers– defined as actions created in virtual platform for the teaching-learning process oriented toward primary school children according to the corresponding subjects, scheduled in the educational thematic units.

A second aspect to be taken into account was the study applicability. That entailed several visits conducted to the Special Basic Education Center, as well as installing a program and modules (applications) in which the student will manage to associate a series of characteristics of the subjects, typical of the official education system, with the peculiar characteristics of the student population toward which it was directed.

The third aspect to be considered was the innovation as a project and proposal of educational management. In effect, the experiences carried out in other countries have served as an input to prepare the work plan using ICTs for disabled people. This is an alternative used and experienced in classroom many times, since every innovation process allows adjusting the contents of learning, dynamics and/or characteristics according to each one of the special needs that each student has, seeking to take care of his/her disability. Likewise, the communication proposal has been considered to be original, given that ICTs presently allows teachers to work in an innovative, creative and didactic way.

As a last aspect, the plan has been stipulated to generate significant learnings in each student of the Special Basic Education Center. In that regard, an educational software was created. Such program was installed in the laboratory computers, so that each student had a computer; the teacher was posing questions to each student in order for each one of them to answer and/or identify significant elements.

Method

The study belonged to a qualitative research. It was possible to identify the findings through the action research; the analysis of contents of intentions, perceptions, observation, and data registration was later conducted by means of the data triangulation and content categorization.

Characterization of Subjects

The project implementation required eight people, from 08 to 13 years old, who showed clear disability to talk or move and were part of the educational community of the Special Basic Education Center "Corazón de Jesús" from the province of Jaén, Cajamarca. The purpose of the project was to capture the students' reactions by using technologies in different pedagogical areas as part of their regular basic education subjects. To this effect, it was necessary to prepare computer programs (software) and apply them in some areas under the teachers' direction.

Tool Used

The *Plaphoons* software (Plaphoons v: 939.) was used, which is a communication system for physically disabled people (program that belongs to the *Projecte Fressa*). It was possible to adapt it to computers and tablets through diverse applications (SpaecePLAPHOONS v:116.; AndroidPlaphoons v: 78; RataPlaphoons v: 76; Kanghooru v: 117; Keyboard controller; Page turner; Mouse Joystick; Mouse keyboard converter; Stereo microphone converter to mouse or keyboard; JClicFressa v: 106; Mouse; Text to MP3; El Xerraire v: 38; Web browser spoken and/or controlled by scanning; Reading books for blind people; Globus 3 v: 142; Sound recognition engine; Taules 2; Phoneme recognition; Vowel recognition, among others). It is a very useful tool for those people to acquire reading and writing skills. It has an operating system as in any other word processor (Microsoft Word) but at the same time as a control system for different Internet search engines (Google Chrome, Internet Explorer and Mozilla Firefox).

Results

The impact of using ICT on the Primary-Level Special Basic Education

By using ICTs in teaching, the student had the opportunity to strengthen their communication and intellectual skills and develop their competences and abilities. Upon installing the program, it was easy for the student to select by clicking any of the windows displayed by the program, which allow him/her to explore new fields of pedagogical action. Due to students' interaction with the computer, it was noticed that their familiarity with ICTs increased; it allows the teacher to use different pedagogical strategies for his/her subject teaching and learning process.

It was shown that the student in front of the computer also used his/her critical thinking and his/her syllabic gesticulation. By looking at the images, they identified virtual reality scenes, giving as well their own answers; nevertheless, the inference made when logging on to the virtual world contrasted the study presuppositions: the lack of interest in learning with ICTs. On the contrary, a greater interest was observed. The enthusiasm extended too much; this is why, it was necessary to select in pairs and give 20 minutes to each student, optimizing the time of class session. Consequently, exploring this new field of learning has brought benefits; on the one hand, the discovery of a world different from the one they live every day (with educational materials), thus turning the educational process into a pedagogical achievement and, on the other hand, the expectation of increasing the knowledge in itself.

Other aspect exposed in this category was that it allowed representing his/her own world. Representing the world in which a mildly or moderately disabled child lives may be similar or equal to the world where a normal child lives. Nonetheless, this tool has allowed delving deeper into the children's view on their physical reality. In light of that, it was noticed that many children studying at the evaluated CEBE do not have computers at home; however, it was confirmed that they went to Internet cafés and are able to browse. Some of them (the physically disabled older ones) have Facebook, a social network, interacting in real time, resulting in a new social identity through the computing world. In consequence, representing their own world is to get autonomy and social independence.

The Use of ICT in Cognitive Skills

To this effect, results according to the following analysis criteria were considered:

Teaching and learning methods: They were related to the teaching methodology, allowing this way redefining the educational learning, explaining and proposing scientific approaches for educational problems and teaching change, student's education in all educational levels and pedagogical training applied to the evaluated CEBE's teacher. *Plaphoons* software has a module or subprogram called *SpaecePLAPHOONS* that allows controlling other programs or software and strengthens the closeness between technology and education. In view of this, children who participated in the study discovered unseen educational aspects like building blocks (jigsaw puzzles, applications previously downloaded from Internet – Tangram) by controlling the foot mouse and looking at the screen.

In the mathematical logic cognitive area: The logical-mathematical reasoning was taken into account from the use of ICTs. When evaluating children's participation, it was shown that children with physical and motor disabilities did not have difficulties in understanding and solving mathematical problems; however, it is more difficult for those children with mild intellectual disability to solve problems. The manipulation of geometric shapes is one of their favorite activities.

In the communication area: It was demonstrated that children managed to identify colors, shapes and syllabic language, as well as understand oral texts, first listen the text and then understand the lesson, and do the homework. They express themselves orally or with gestures or sign language for deaf students, understand written texts that may be translated by people in charge and apply what they learned in the computer. It was easier to develop reading comprehension activities in this area, since texts came with audiobooks and stories downloaded from Internet.

The Use of ICT in Scio-Emotional Skills

The study gathered several elements that fed back into the activities of students and teachers. The subcategories shown in these findings were:

In the social sciences area: The application of social sciences as encyclopedias and history videos was considered from the use of ICTs. Like this, it may be observed that they constructed historical representations based on interpretations provided in classes.

Social skills: It was possible to show skills like self-control of students, which allowed respecting their turn, patience for problem solving facilitating the achievement of solving stages on their own and support to their classmates. Solidarity between students and teachers was shown. Rules of coexistence and regulations for computer laboratory were established.

Discussion

Nowadays, the use of ICTs has been consolidated as a fundamental element, inherent in human development, and of course education has not escaped it. An endless number of possibilities for educational performance is explored, expanding more and more to other areas, thus making knowledge global. "Its universalization is vital, reaching the fields of special education; its impact is not only focused on providing information, but also on becoming a channel of communication, cognitive tool and knowledge processing." (Prieto et al, 2011, p. 95) In this regard, the use of ICTs in the CEBE has been consolidated as an alternative for knowledge transfer, and process such knowledge in primary school children; becoming an innovative option in contrast with the traditional and exclusive old school (Juárez, Comboni & Garnique, 2010; Castro., Castañeda., Ossa., Blanco, & Castillo, 2017; López & Valenzuela, 2015).

With regard to this, the use of ICTs has motivated students to achieve cognitive skills, interact with their peers and acquire habits during teaching and learning methods. According to the findings, it was revealed that some teachers allowed this virtual interaction, but there were also teachers who, in contrast, did not explore this tool because they did not know how to use it; nevertheless, it did not mean that they were reluctant to include children with special educational needs (Castro *et al.,* 2017, p. 106).

Regarding the experience of the mathematical logic and communication cognitive areas, the skillful performance of boys and girls with motor disabilities was demonstrated for text comprehension and/or math problem solving and communication speech, even though there were some children with difficulties in their oral expressions (López and Valenzuela, 2015, p. 45). On the other hand, the action of boys and girls with intellectual disabilities was different as they showed greater difficulties, since they do not have a sufficient level of cognitive processes (Gutiérrez, 2014); because the more complex the problems, the higher the requirement for students to understand and for teachers to teach. This finding agrees with problem-solving skills, which involves logical thinking and verbal utterance detected in many cases at an early age (Espinoza, Marco, & Ygual, 2018).

In relation to the use of this tool in socio-emotional skills, the most relevant findings were similar to those of the other areas, with the difference that social representations were constructed in social sciences (Weisz, 2017).

Furthermore, it was evidenced that social skills set rules of coexistence and regulations for the computer laboratory among children, which serves as a support to improve their communication and social interaction (Martínez & Fernández, 2015).

As a consequence, it has been possible to link the relevance of findings with the proposals of diverse authors that, somehow or other, are focused on the person with special educational needs and not on the one becoming a social obstacle, with a legislation that still have gaps to educationally include this population (Padilla, 2011).

The use of this tool opens a promising space to strengthen cognitive areas in basic education students with vocal and motor disabilities who showed cognitive improvements for the

learning of mathematical logic, communication and social sciences subjects. It was also demonstrated that learning to use the *Plaphoons* (software) tool allowed a better and greater development of social skills of the students evaluated, making social interaction easier for them through virtual networks within the educational institution and within their family environments.

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