

La implicación de las TIC en la educación: Alcances, Limitaciones y Prospectiva

The role of ICT in education: Applications, Limitations, and Future Trends

A implicação das TIC na educação: Escopo, Limitações e Prospectiva

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Resumen

La metamorfosis que tiene el actual manejo, transformación, construcción y difusión del conocimiento se ha alterado por las Tecnologías de la Información y Comunicación (TIC), algunos autores críticos plantean que en la actualidad los individuos se convierten en simples contenidos más que en verdaderos elementos de valor, en realidad solo somos un conjunto de datos, individuos dependientes de la tecnología incapaces de pensar o comportarse por sí solos, situación que al parecer se refleja en el ámbito educativo. Por lo anterior, el siguiente escrito es una recopilación documental que tuvo como objetivo exhibir las formas en que estas herramientas se han implicado en el ámbito educativo modificándolo, alterándolo o quizá transformándolo. Desde hace varias décadas se encuentra en la literatura científica y en distintas fuentes una enorme cantidad de documentos o reportes de investigación que se enfocan en el abordaje de esta temática, desde diversos marcos epistémicos y posturas metodológicas, por lo que en esta ocasión, se expone una recopilación de puntos clave que muestran los alcances, limitaciones y la prospectiva que significan las TIC en la educación. Para la realización de este trabajo se eligió como descriptores de categorías los términos: tecnologías en la educación, palabras clave como alcances, limitaciones y prospectiva. Se trabajó con información del periodo de tiempo entre el año 2010 y 2017, los resultados de la recopilación exhiben la manera en que la visión de las TIC en la educación ha cambiado,

desde su utilidad como medio, herramienta de conectividad, de aprendizaje, empoderamiento, entre otros; hasta proyectarlas como elementos asociados a la cotidianeidad imposibles de separar de las acciones humanas convirtiéndose en parte sustancial de la forma de vida de quienes conviven en los contextos educativos.

Palabras clave: TIC, educación, alcances, limitaciones, prospectiva.

Abstract

Information and Communication Technologies (ICT) have significantly altered the way knowledge is currently managed, processed, structured, and disseminated. Some critics suggest that individuals have become part of this content and are no longer of real value by themselves – that we are data-driven and technology-dependent, unable to think for ourselves or act on our own, a situation that is perhaps reflected in the field of education. The following is a selection of studies aimed at showing the ways in which ICT has modified, altered, and, perhaps, transformed the field of education. Scientific literature and other sources have produced an enormous amount of documents and research about this topic over several decades, reflecting a variety of perspectives and methodologies. To analyze the applications, limitations, and future trends for ICT in education, several key points were compiled. For this paper, terms and keywords like the following were chosen as category descriptors: technology in education, applications, limitations, and future trends. We then worked with the information from the period between 2010 and 2017. The overall results show how the perception of ICT in education has changed; what was once seen as a tool for connectivity, learning, and empowerment, has become something inseparable from the daily life and activities of those in educational environments.

Keywords: ICT, education, reach, limitations, prospective.

Resumo

A metamorfose que tem a gestão, transformação, construção e disseminação do conhecimento atual foi alterada pelas Tecnologias de Informação e Comunicação (TIC), alguns autores críticos sugerem que, hoje em dia, os indivíduos se tornam conteúdos simples e não elementos reais de valor, na realidade, somos apenas um conjunto de dados, indivíduos dependentes de tecnologia incapaz de pensar ou comportar-se por si mesmos, uma situação que aparentemente se reflete no ambiente educacional. Portanto, o seguinte documento é uma compilação documental que objetivou mostrar as maneiras pelas quais essas ferramentas estão envolvidas no campo educacional modificando-a, alterando-a ou talvez transformando-a. Durante várias décadas, tem sido na literatura científica e em diferentes fontes uma grande quantidade de documentos ou relatórios de pesquisa que se concentram na abordagem deste tópico, de diferentes quadros epistemológicos e posições metodológicas, por isso desta vez, está exposto uma compilação de pontos-chave que mostram o escopo, as limitações e o potencial significado das TIC na educação. Para realizar este trabalho, os seguintes termos foram escolhidos como descritores de categoria: tecnologias na educação, palavras-chave como escopo, limitações e perspectivas. Trabalhamos com informações sobre o período entre 2010 e 2017, os resultados da coleção mostram como a visão das TIC na educação mudou, desde sua utilidade como meio, ferramenta de conectividade, aprendizado, capacitação, entre outros; para projetá-los como elementos associados à vida cotidiana que são impossíveis de se separar das ações humanas, tornando-se uma parte substancial do modo de vida daqueles que coexistem em contextos educacionais.

Palavras-chave: TIC, educação, escopo, limitações, prospectivo.

Fecha Recepción: Noviembre 2016

Fecha Aceptación: Mayo 2017

Introduction

The ways of life that are currently experienced are incomparable with those lived a few decades ago and an undeniable fact is that these are based on information and communication technologies (ICT) that are present in a large part of the areas in which human beings are developed, which has meant restructuring in the organization of the economy, politics, society, culture, education, among other areas.

The incorporation of ICT has meant that for educational spaces these are no longer an option, and the efforts of countries and institutions are directed to the generation and implementation of initiatives that involve the maximum use of technologies in training processes (Severin , 2010).

The emergence and development of the Internet represented the multiplication of possibilities in access to information, commercial transactions, training spaces, and the restructuring of activities that most humans perform. According to data of We are Social (Agency of marketing and communication on line 2.0) (Sánchez, 2014), the number of Internet users in the world at that time amounted to 2 thousand 484 million 915 thousand 152 inhabitants, representing 35% of the total world population. The registry of its main uses reported: visits to social networks, viewing news, downloading files, communication, access to information, employment data, support for education, information and marketing of products, among others.

For 2017, the ITU World Connectivity Committee (2017) presents statistics globally, highlighting that the average age of users is between 15 and 24 years. Out of 104 countries that participated in the study, more than 80% of its population is online. In developed countries, 94% of individuals use the Internet and are young people between the ages of 15 and 24, compared with 67% of people in underdeveloped countries and only 30% of countries with little development. Only of the 830 million young people online, 320 million (39%) are in China and India. According to this study, young people who use the Internet represent one in four of the individuals who use the network worldwide (ITU, 2017).

For the specific case of Mexico, the National Institute of Statistics and Geography (INEGI) in its report of May 15, 2017 presented the following data:

- In the second quarter of 2016, 59.5% of the population of six years or more in the country declared themselves to be Internet users.
- 68.5% of Mexican netizens are under 35 years old. 47.0% of households in the country have an Internet connection. The use of the Internet is associated with the level of studies; the more studies the greater the use of the network.
- The Internet is mainly used as a means of communication, for obtaining information in general and for the consumption of audiovisual content.
- Cell phone users represent 73.6% of the population of six years or more, and three of every four users have a smartphone (Smartphone) (INEGI, 2017).

In this sense, the use of ICT is increasingly widespread both by the appearance of new devices and the reduction of associated costs.

Access to this technology is predominant among young people in the country. If, as indicated, just over half of the population of six years or more declared themselves as an Internet user, among individuals aged 12 to 24, the proportions are higher than 80 percent, that is, among young people the use of the Internet is common.

Considering five-year age groups, certain aspects can be highlighted. While slightly more than half (53.1%) of children between 6 and 11 years of age reported using the Internet with some regularity, among adolescents between 12 and 17 years of age the proportion reaches 85.5%, a proportion similar to that observed for individuals between 18 and 24 years old (85.0%). Even for the age group of 25 to 34 years, three out of every four individuals reported using the Internet (74.3%) (INEGI, 2017).

In the knowledge era, access to the Internet is significantly associated with the level of education. Of the population that has higher education (undergraduate or graduate), nine out of ten have incorporated the use of the Internet in their usual activities; four out of five of those who have studies at the high school level (high school or equivalent) also do so, and at a basic level (primary or secondary) they are a little less than half (48.7%).

For education support activities, the percentage is just over half (51.8%), although it should be borne in mind that a significant proportion of the population under study is no longer in school attendance (71.1%). (INEGI, 2017).

In this context of booming Internet use worldwide and nationally, in the educational environment it was identified that technological evolution had had a convergence between television, Internet, mobile devices and videogames generating training scenarios called universal learning (Fernández, 2010) seeking that the teaching-learning processes are not left behind, subjecting them to an accelerated adaptation to the advances, implying the application of adequate training methodologies in which the balance between the information, the knowledge, the communication was foreseen and the production of the same knowledge.

Today's societies are what they are because of the growing technological prominence that exists, however, we must not lose sight of the fact that ICTs are not the solution to all problems and that they are tools that allow us to exploit different routes and actions to experiment, on all in the educational field, where the focus is on the challenges of developing skills and abilities that are susceptible to computerization such as creativity or social intelligence (Cobo, 2016).

It is before these elements that the present document outlines in a generalized way the implication of ICT in education and how different authors have reported, addressed or projected their uses or applicability in education.

The methodology used for the development was documentary, leading to a process based on the search, recovery, analysis, criticism and interpretation of data, so that the heuristic and hermeneutical phases are reflected in the work developed.

ICT in education: Scopes

Dussel y Quevedo (2010) They talked about the rich experiences in the introduction of ICT in teaching-learning processes, saying that most of the time, these training programs were pushed by strong social and economic pressure for technology to be included in education.

Also, Laviña (2010) emphasized the importance that Spanish and Latin American universities gave to the dissemination in full implementation of ICT in all areas and activities of the university, such was the case of the research, teaching and management processes , promoting knowledge networks, learning and research resources and telematic services as elements that became common in university communities.

The Horizont report (2010) written by García, et al (2010) projected the scope of the technologies in the educational field from the following positions:

- The processes of production and dissemination of content are facilitated in multiple formats, multiplying the amount of exploitable resources online, implying a change in the perception, valuation and production of knowledge.
- Technologies deeply affect the ways of working, collaborating, communicating and moving forward, new gaps are opened and others are reduced, leading to new potential scenarios of inequality.
- Technology is not only a means of training for students, but it also becomes a means of communication and relationship, as well as a ubiquitous and transparent part of their lives.
- The mistrust that teachers and institutions feel towards the use of ICTs is progressively lost, as more and more teachers begin to use different technological resources in their educational practices.
- The way of visualizing learning environments changed, opening up interdisciplinarity and virtual collaboration, blurring the boundaries between both worlds.
- The technologies that are used are increasingly based on the cloud and the idea of technological centralization tends to disappear. Data storage, how they are shared, access to applications moves from personal computers to a structure mounted in the cloud.

Claro (2010) in its publication entitled Impact of ICT on student learning. State of the art, after an analysis made to the literature until that date concluded that there was still no positive evidence on the impact of technologies on learning, since many of the times the results presented in the research products were contradictory and obtained in too specific circumstances, so generalizations could not be made. The author raised the importance of considering three dimensions when conducting research on the impact of technologies and these had to do with: the relationship between the type of ICT use and learning outcomes in the subjects; Another dimension refers to the educational and pedagogical conditions in which ICTs are used and, finally, the role played by the social characteristics (cultural capital, social capital and economic capital) and individual (gender, cognitive capacity and attitudes) of the student in its appropriation and use of technologies.

On the other hand, in 2011 and 2012, publications appeared that spoke of theories such as connectivism, which sought to address the incidence of web 2.0 in the teaching-learning process from a post-constructivist posture (Sobrino-Morrás, 2011; , 2011, Gutiérrez, 2012, Siemens, 2012).

A topic more associated with the scope of ICT in the educational field has been the one referred to the digital competences developed by the students, in this sense Arras, Torres, and García-Valcárcel (2011) stated based on a quantitative study, that The students' perception of ICT management is overvalued in order to face the integration of technological tools in learning processes. Somehow these are integrated mostly in a social sense and only as a consultation, they are little used in the collaboration, construction and exhibition of knowledge that coincides with Adell (2011).

Another observed scope was the growing possibility of interaction between those who participated in online training environments where, the greater the presence of ICT, the interaction increased, the foregoing was reported by Flores and De Arco (2012).

For the year 2013 Reig and Vilchez (2013) presented the book called Young people in the hyperconnectivity era: trends, clues and looks, text where the perspective of the authors with respect to the scope of technology, reflected in the presence and manipulation of smart phones, highlighting the possibility of permanent connection to social networks, being

potential elements of the sociability of human beings, mobilizing their cognitive development, process of individualization and moral development.

The massification of education is present thanks to the expansion and facilities allowed by the WEB 2.0 giving way to the Massive Open Courses (MOOC, for its acronym in English), this fact allowed a considerable number of people to access knowledge without need to be part of an institution with which it had to coincide in space and time. This type of courses allowed greater inclusion to training and disciplinary specialization according to the interests of those who participate in them.

As it has been described in the previous paragraphs, the scope that ICT represents for education are capitalized, identified from the infrastructure that they imply, the theory or theories from which it is researched, the competences that have involved in the development of students and teachers or the learning environments that make it possible, however, it is also necessary to be aware that technologies are not the solution to all the needs or problems that arise in the educational context and that there are still many ways to go.

Limitations

Many are the discourses that have been extended affirming about the profound changes that ICT have meant for the educational field, however, these changes have not been as immediate, automatic or beneficial as we have been led to believe, since the study of Gutiérrez , Palacios, and Torrego (2010) reported the apathy of the students, their few skills or digital skills, the neutrality before the innovation that was presented to them, the lack of methodological innovation that gave adequate use to the technologies and not only meant the panacea that would alleviate all the ills that were presented to education at that time. These authors indicated that the University of the 21st century would not be achieved by adapting new technologies to the old educational paradigms, but by contributing to education the authentic meaning of communication as transformation and change, to access the shared knowledge society (Gutiérrez, Palacios , and Torrego, 2010).

On the other hand Villanueva and De la Luz Casas (2010) affirmed that the presence of technological supports that allowed the fast sending of the information and the exponential

capacity of reproduction of this was not guarantee that the learning would take place, much less that it would be generated new knowledge, so they suggested the need to design activities that promote the development of digital skills.

The limitations regarding ICT in education were also visualized from the digital literacy capacity of higher level students, according to Adell (2011) university students are digitally literate according to pursue their own purposes: leisure, free time or social relationships, however, if this capacity is associated with the mastery of techniques, procedures, processes or technologies to learn, or the creation of knowledge, then it should be questioned.

The regional analysis of the Horizon Report of the NMC (Horizon, 2013) presented a series of ten significant challenges for the adoption of technologies in education that for their descriptions for the purposes of this document have been taken as limiting:

1. Little creation of flexible education models.
2. There seem to be few academics who are using meaningful technologies for learning and teaching, and for organizing their research.
3. There is a delay of appropriate evaluation metrics regarding the emergence of new school forms of authorship, publication and research.
4. Deficient continuous training in the didactic use of ICT and stimulation of collective innovation.
5. There is still not enough data in teacher training where it is believed that digital literacy continues to increase its importance as a key competence in any discipline and profession.
6. Little strengthening in infrastructure to improve Internet coverage, free access in public spaces and provide free or low-cost equipment for educational purposes.
7. Organizations are not established to promote innovation in teaching.
8. Promotion of mixed learning, face-to-face and mediated by ICT.
9. Little encouragement to the formation of educational-social-cultural communities.
10. The educational processes and practices themselves limit the adoption of new technologies (Horizon, 2013).

To say of Mominó and Sigáles (2016) in the educational field is where it should be more evident the set of technological-social transformations since in this context is where human beings are produced and socialized. However, the promise of networked computing technologies is far from having been fulfilled to the planned extent. This is due to the fact that among the technological skills of the so-called digital natives, obsolete educational practice, organizational principles, obsolete cultures of teaching and the inherent difficulties in the creation of new learning are interposed (Mominó y Sigáles, 2016).

Part of the limitations that have been described can be summarized in the following points:

- Technological or instrumental equipment does not ensure, nor is it sufficient to advance in the most substantive changes in the formation of individuals of the new generations.
- Likewise, it can not be thought that an educational system lacking in technology would be successful, on the contrary, we would be referring to a disconnected system.
- To incorporate technology it is necessary to identify the habits that cause problems and that derive from the contextual and cultural conditions that demand more time and cognitive complexity than the simple fact of providing infrastructure.

Prospective

The technologies in education open diverse doors and at the same time they represent an enormous amount of challenges, the idea is that through these can be created knowledge that is extended in a substantive and flexible way, operationalized according to the context in which it is immersed, relating to adaptation, modification, negotiation, export, combine, edit, criticize, expand, in short; a series of concepts that are transferred to the non-linearity of learning that arises from the use of these, giving opening to the revision of learning, to correction, deconstruction, etc. (Cobo, 2016).

Applications, infrastructure and individuals coexist in a world permeated with virtuality and technology that requires that learning transcends the simple curricular use of devices,

recognizing the processes of knowledge creation that are also generated beyond formal contexts.

Every day concepts are developed that try to explain or direct the penetration of technologies in education, they talk about the curing of content, personalized learning environments, gamification as a process of application of logic and game dynamics to things that in principle are not, among others.

For example: the gamification says that its potential according to the report Horizon (2011) will reach its peak in 2020, the central objective of this technique is to motivate, entertain and generate knowledge through game rules that involve learning actions in virtual worlds or other environments that allow the creation of knowledge.

The impact of technology on education is such that a series of internationally comparable and relevant indicators must be established from the educational policy, in order to contribute to the establishment of reference criteria for monitoring the integration and access initiatives of these tools (UNESCO, 2013).

As a result of technological evolution, students are also required to develop new cognitive skills related to the management of the abundance of data available in the so-called information society: data filtering capabilities, statistical thinking, analysis and visualization of information , flexible thinking and even a training to have the ability to disconnect.

Conclusions

As already described, the literature offers us a wealth of information from which the scope, limitations and future of education can be inferred and the implication of technologies in it. In this sense, it is important to note that the evolution of technology is not the same pace and speed as that of education, it is well known that the latter is still delayed and that there are multiple factors that hinder its progress, not to mention the pair, but at least faster and more significant.

As a consequence of the foregoing, the knowledge society demands more and more individuals with better and highly developed complex capacities. However, the so-called millennial students that are supposed to correspond to these demands, are still far from what is proposed in the discourse, since their capacities do not reach to size the contribution of new environments with increasingly sophisticated resources for collaboration, representation and shared generation of knowledge.

Although the technologies can be seen as an opportunity to respond to the demands of training increasingly broad and diversified, should also institutionally and individually provide innovative and sustainable solutions that provide quality alternatives in critical aspects for the education system.

The rhetoric that has been handled over the years in terms of the scope, limitations and prospective of ICT in education has not changed much, it continues to incur the discourses of what should be and not how to do it, most of reports handle information related to infrastructure, connectivity capacity, use of social networks, ages of individuals accessing ICTs and uses, however, it is necessary to delve into research that gives an empirical account of the scope, limitations and prospective of technologies in education.

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