

The Interaction Man-Computer and its Involvement in the Change of Paradigms of Education

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Abstract

The present article of reflection seeks to show how technology, especially the applications achieved through the HCI: Human Computer Interaction contributes to the strengthening of the teaching-learning process, to such an extent that some scholars even consider it as the emergence of a new pedagogy. Researchers in the field of HCI both observe the ways in which humans interact with computers and design technologies that let humans interact with computers in novel ways. As a field of research, human-computer interaction is situated at the intersection of computer science, behavioral sciences, design, media studies, and several other fields of study.

With this purpose, some of the technological advances that we find today are portrayed at the expense of education and the way in which a technological era arises in the education of our country.

Keywords: Human Computer Interaction, Education, Technology

Introduction

Technological advances have brought along with them different changes in the way we interact with the world. These changes also imply new ways of conceiving

the objects and processes that interweave around us. That is, processes such as buying a certain item can now be mediated by computers, without the need to go out on the street. This means that at the same time that our actions change, new cognitive structures are also established and these ones determine our way of facing the world.

Within this context, we must ask ourselves how these new technologies are also changing the way of conceiving learning, and how they can be used in order to strengthen this process of apprehension of our students.

In the same way, it is necessary to determine how this process of inclusion of technology in the classroom is being carried out in our country.

Theoretical Framework

Man vs. Computer Interaction

With the arrival of the technological period, much has been said about how computers have changed man's life. For the average people, especially for elderly people who did not have access to these technologies in their childhood and adolescence, this new trend is described as harmful and almost absurd. As it is considered that facilitates people's life in such a way that it does not allow to think and act independently making new generations unable to live without computers.

Then a similar situation to the one happened in the era of industrialization arises when people opposed to the changes contributed by the new technologies and considered the machines would displace the human being (Rieznik, 2001) [25]. As William Navarro (2011) [18] exemplifies it, many myths have emerged about the information society; it was negatively thought, for example, that the computer would replace the teacher, or extremely positively, "technology as a panacea that will solve all the problems in education" (Navarro, 2011, p. 154) [18]

However, rather than thinking of new information and communication technologies and associating them with a teenager "glued" to their cell phone all the time, it is important to stop and make a reflective analysis on how computers have improved the lives of many people.

Technological development has brought along important advances that help to improve the quality of our day-to-day life; i.e. the optimization of daily activities and the way how the individual relates to their environment through innovative applications and applications that were previously unimaginable in real life and only were intended in Julio Verne's literature.

Our everyday life has changed substantially, from the search for any information on the web, applications informing us the weather, GPS systems that

help us to locate ourselves, chips controlling health, safety applications to take care of our children no matter the distance... and the list goes on.

Now then, as stated by Moralejo, Sanz, & Pesado (2012) [16], if these technological developments contribute to carry out the daily life activities of any person, it is clearly contributing even more to improve the quality of life of people with disability, and eliminate the barriers of communication and accessibility as well.

In this context of contributing to the improvement of the quality of life, HCI: *Human Computer Interaction* from applied psychology rises. As the discipline responsible for the design, evaluation and implementation of computer systems aimed at making more efficient the interaction between man and computer, i.e. that it focuses on minimizing errors, increase user's satisfaction, reduce frustration and make each of the tasks more productive (Manchon, 2003) [14].

Within the needs highlighted by HCI is that of having interfaces that allow carrying out close to human interaction tasks. An interface is a device that allows you to connect two different systems: a man and a computer. Although an interface was thought to be a physical device in the past, it is currently considered that an interface is a system consisting of a series of processes, governed by rules and conventions that allow the communication between man and machine (Correa Alfaro, 2010) [6].

There are now interfaces of different types, including those of response to a visual signal, which perform actions like tracking body movement, face detection, glances tracing, among others, as well as interfaces that rely on the use of sounds as mechanism of entry. Among the most used applications are those of voice recognition and detection of sounds, those of sensors of movement and monitoring that make use of an input signal, in this case, motor, and multimodal interfaces that combine multiple modalities (Moralejo, Sanz, & Pesado, 2012) [16].

Different projects have been carried out with the use of these interfaces. For example, the Pictogram Room which uses pictograms superimposed on real objects, through augmented reality in order to help autistic people to see the connection with the real image. Also, NAVI project, for people with visual impairment, which processes images and translate them into verbal indications for the user. There are more advanced applications such as the ABI (Adaptive Brain Interface) project, which uses sensory substitution in order to pass commands to the computer via electrical pulses emitted by the brain. (Moralejo, Sanz, & Pesado, 2012) [16]

Some of these projects have been developed in Colombia. For instance, in the Antioquia School of Engineering, an interface brain-computer (ICC) was designed as an alternative to communication for people with serious motor disabilities such as those suffering from Amyotrophic Lateral Sclerosis, ALS

(Arboleda, Garcia, Posada, & Torres). This interface consists of a communication system that generates a stimulation of control from brain signals as sensorimotor rhythms and evoked potentials.

These examples show how interfaces proposed by the HCI contribute to improve the interaction of people with disabilities. Now then, these new technologies also have been widely implemented in education, so that they have helped to improve the teaching and learning processes, at the same time that have addressed a change of paradigm of education, as well as the role of the teacher inside the classroom.

Methodology

This reflection article has a qualitative, descriptive approach as it analyzes a social phenomenon and outlines the fundamental concepts allowing taking a stand on it. A documentary analysis method was used, which made use of different types of sources from theorists to news, showing us the focus of the interaction between man and computer applied to education.

Results

Computer-Education Interaction

The current educational context has been characterized by the growing inclusion of methodological trends linked to Information Technology-ICT, and this has allowed to show a higher apprehension by part of the students, who actively participate in the processes, since they show affinity with these new resources (Hernández Ortega, Pennesi Fruscio, Sobrino López, & Vásquez Gutierrez, 2012) [9].

Taking into account the above, there are those who even talk about the interaction between man and computer, which is increasingly recurrent in education, is creating a new way of understanding pedagogy. Some people even talk about new pedagogies or emerging pedagogies. Even, Jordi Adell & Linda Castañeda (2012) [1], dare to define these emerging pedagogies as a set of ideas and pedagogical methods that have a specific approach that has not been systematized yet. In the case that concerns us, these emerging pedagogies arise from the use of ICT in education. The final purpose of this use is to take advantage of the full potential it provides us, in the information it offers, and, in the possibilities of interaction and innovation; in the search to generate a new culture of learning. (Adell & Castañeda, 2012) [1].

However, others argue that the use of new technologies is not certainly a new pedagogy, but it is the use of the computer at the service of the existing pedagogies. In other words, technology is used to support the teaching process of the teacher, in methodological terms; ICTs become tools that enable a better apprehension by part of the students.

To create a "new pedagogy" or to develop "emerging pedagogies" because of the use of the computer, as a mediator of education, it is necessary to go beyond using it as a simple instrument or technique for the development of classes. It is necessary to transform the preexisting conceptions about the learning process.

Talking about emerging pedagogies requires a whole way to go, since it involves countless reflections about forms, methods and purposes. As Diego Leal explains: "New technology and new possibilities allow us to explore new techniques, which simultaneously can make new approaches to learning, while reviewing and adjusting the pursued goals." (Leal, 2012, page 46) [11].

For the moment, while the change of perspectives related to this new paradigm is generated, one of the main alternatives is to use ICT to attract students. That is to say that it is required to start to analyze the potential of use of these new technologies in education; which means that the didactic and methodological possibilities that they offer are explored. That a higher interest and level of commitment of the students can be generated in their teaching - learning processes (Estebanell, Ferrés Font, Cornellà Canals, & Codina Regàs, 2012) [7].

Although, as it is said before, this is a long way to go, together with the use of the new alternatives offered by ICT and HCI as a discipline, it is important that teachers begin to change traditionalist perspective and discover the new possibilities. Starting by knowing and learning how these alternatives work and how to get the most advantage of them at each level of education, some of these applications contribute to the teaching of vocabulary in children, while others, more advanced, are aimed at the teaching of programming at higher levels (Rodríguez, 2013) [26].

As stated by Hernández Ortega, Pennesi Fruscio, Sobrino López, & Vásquez Gutierrez (2012) [9], what yesterday could be considered science fiction today is a reality. This allows education to leave the current context to move to formulate new interactive experiences that generate true learning.

It has always been insisted that the best learning is generated in real practice contexts, what if are offered to students virtual realities that allow them to explore what they do not know. Travel to other countries, meet lost civilizations, interact with people from other places and times ... even, the interfaces created from the

HCI will allow our students to travel through space or inside the human body, to understand at first hand their functioning.

It is known that speaking to a student about an unknown reality or a very distant makes him lose interest and fail to establish connections with new knowledge; hence, these extrasensory experiences are a big importance for the teaching - learning process. That is to say that, as has always been stressed, a substantial improvement in the learning process occurs when the student's interests are impacted and get to achieve their active participation, and when the knowledge acquired is put into practice in relevant situations, directly related to their immediate real context. That is why the new technologies suggest a change in the perception of the current pedagogical approaches; since they allow including the design of new proposals that establish alternative methodologies and new didactic resources that facilitate the processes, simply by means of a computational application (Estebanell, Ferrés Font, Cornellà Canals, & Codina Regàs, 2012, page 142) [7].

The New York Natural History Museum has some of its exhibitions in virtual reality or AR - Augmented Reality. Visitors have the opportunity to interact with already extinct mammals or travel to Mars in a spaceship. Examples like a show that Augmented Reality must be implemented in education, since it is a valuable teaching tool to improve the understanding of reality. Likewise, it optimizes the teaching - learning process, since it motivates the student, thanks to the novelty of its possibilities (Reinoso Ortíz, 2012) [24].

As stated by Estebanell, Ferrés Font, Cornellà Canals, & Codina Regàs (2012) [7], in the field of education, the interaction with Augmented Reality allows a better assimilation of information, since it offers real references to students and this makes them more concrete and significant than the references with which we are accustomed to teach them.

The multisensory experience allows young people to be impacted, recognizing the importance of receiving knowledge in a practical and direct way, since it establishes the interaction of three levels: "the real level, the virtual level and its intrapersonal (cognitive) level" (Estebanell, Ferrés Font, Cornellà Canals, & Codina Regàs, 2012, page 146) [7].

Nowadays, these technologies have use in education in different applications, such as the "Course for the improvement of spatial capacity", which teaches technical drawing from 3D models, or "Anatomy in AR", which allows observing a human skeleton from different perspectives and make movements that allow to demonstrate its operation (Estebanell, Ferrés Font, Cornellà Canals, & Codina Regàs, 2012) [7].

In the same way, software such as Sound beginnings, allows children with Down syndrome to read and write, using sound and visual stimulation, since it allows them to select appropriate sounds, phonemes and words, and associates them with images (Muro, Santana, & García, 2012) [17].

It is undeniable that the new technologies used in education will generate changes not only technical and methodological, but conceptual about the way in which knowledge is acquired, that is to say that the use of these new technologies will change the pedagogical paradigm and the current concepts that we have about education.

Speaking at this time of new pedagogies can be a little risky, but there is no doubt that, in the future, education will definitely be different.

Back to reality

Now, returning to the context that concerns us, we will focus on the possibilities available to educators in our country to access and enable the change of perspective towards the education of the future.

For more than 10 years, the National Government has been implementing different programs allowing access to new technologies. However, all the efforts have managed to affect very little population and the quality of the services offered has not been the best.

If we think of programs such as "Computers for Education", led by the then First Lady, Nohra Puyana de Pastrana, we see that, although the objective was positive, the logistics did not work for this project had the alliance with private entities that donated dismissed computer equipments to the educational institutions of the country (Ministry of Education, 2001) [15]. Taking into account that these computers were dismissed by private companies, it was but logical that they were obsolete or in poor condition. Somehow, it was valid at that time to be a first approximation.

As Hernán Galvis stated in the report for UNICEF, due to the vertiginous technological advances, many of the State's acquisitions become obsolete for classroom use although the progress of these proposals (CPE, Computers for Education, and National Educational Network REN), evidences the efforts made by the national government in regard to equipping and improving communication conditions, (Gálvis Panqueva, 2014) [8].

Considering the importance of this subject matter, in 2009 the National Government created the Ministry of Information and Communication Technologies (Parra, Gómez, & Pintor, 2015) [20], which is in charge of leading the projects concerning this matter.

Since the creation of this Ministry, a series of programs have been implemented seeking to expand the coverage of technological services, especially those aimed at education. Similarly, international proposals have been developed, such as those of UNESCO and UNICEF, and other national ones such as COMPARTEL and Computers for Education aimed at supporting teachers in Colombian rural areas to use computers and the Internet (Cárdenas Puyo & Tovar, 2011) [5].

With this same purpose, Cauca University was given the task of leading a group of the Board of Directors of the Colombian Computer Society. Which aims to promote the design, development, evaluation and application of methods/techniques/tools for Human Computer Interaction (HCI) in Colombia with the participation of students, professionals and members of the Colombian Computer Society in general (MEN, 2013) [14].

Results Discussion

As previously stated above, despite the multiple efforts that are interwoven in our country to achieve the inclusion of HCI, there is a latent problem about the time these processes take to get to the classroom, so that normally the tools and applications that are acquired arrive in outdated versions to educational institutions. One of the most important reasons that contributes to this situation is the bureaucratic procedures that encompass the acquisition of equipment and other technologies for public education institutions. Normally, these purchasing processes are so slow that the technologies arrive outdated, if not obsolete to the classroom. This limits its use and application (Valencia Cobos & Camargo Ariza, 2013).

Another disadvantage faced by teachers for the application of ICT in the classroom is the little or no knowledge about these technologies. While some teachers have new technology mobile devices, not everyone knows the variety of applications they have. This was evidenced by a study carried out by the Universidad Del Norte along with other institutions interested in ICT in education.

The home, as a space with a higher level of technological access by the teachers surveyed, does not generate implicit and effective use of the different ICT resources available through the equipment is used for this purpose. (Hung, 2015) 10].

This evidences the need to train teachers in the tools offered by the computer as a means of interaction, not only about how to use different applications but also the role that these tools play in the teaching - learning process. The use of ICT in the classroom requires that teachers have prior knowledge of existing technologies

as well as a new pedagogical perspective that allows them to change the traditional learning environment and encourage a new way of acquiring knowledge, through inclusion of ICT, without neglecting collaborative learning (Parra, Gómez, & Pintor, 2015) [20].

Conclusions

- The human-computer interaction has tools of great methodological value for education that will grow over time, as it allows the population to be more and more affected.
- Thinking about emerging pedagogies requires an important reflection on the way in which education is conceived, as well as the commitment to mutate traditional methodological choices and actions.
- Our country has begun to move towards the inclusion of new technologies. However, the processes are slow and we need a higher level of commitment, both from the government and from teachers, who should pay more attention to the changes and the alternatives that these offer to improve their pedagogical work.

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