

**USE OF INFORMATION
TECHNOLOGIES AND
COMMUNICATIONS
(ICTS) IN UNIVERSITY
RESEARCH CULTURE**

USO DE TECNOLOGIAS DE
INFORMAÇÃO E COMUNICAÇÃO
(TICS) NA CULTURA DE PESQUISA
UNIVERSITÁRIA

USO DE LAS TECNOLOGÍAS DE LA
INFORMACIÓN Y LAS
COMUNICACIONES (TIC) EN LA
CULTURA DE INVESTIGACIÓN
UNIVERSITARIA

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ABSTRACT

This article shows the influence and value that Colombian universities have had on the use of ICTs and how by this, research is fundamental in academy has been

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an indifferent factor given by traditional elements and in an administrative and cultural nature. In contrast to that, ICTs reveal how an ideal connector between researches results; it is emphasized as the essence of the academy, and the reality of the country that demands solutions that only universities are capable to do. There is shown the problems and the unknown questions that don't allow the fluidity of research dynamics, ICTs, innovation and solution of real problems.

KEYWORDS: ICTs; University; Research; Education.

RESUMO

Este artigo mostra a influência e o valor que as universidades colombianas tiveram no uso das TICs e como, por isso, a pesquisa é fundamental na academia tem sido um fator indiferente dado pelos elementos tradicionais e de natureza administrativa e cultural. Em contraste com isso, as TICs revelam como um conector ideal entre os resultados das pesquisas; é enfatizada como a essência da academia e a realidade do país que exige soluções que somente as universidades são capazes de fazer. São mostrados os problemas e as questões desconhecidas que não permitem a fluidez da dinâmica de pesquisa, as TICs, a inovação e a solução de problemas reais.

PALAVRAS-CHAVE: TIC; Universidade; Pesquisa; Educação

RESUMEN

Este artículo muestra la influencia y el valor que las universidades colombianas han tenido sobre el uso de las TIC y cómo esto es fundamental, la investigación en la academia ha sido un factor indiferente dado por elementos tradicionales y de naturaleza administrativa y cultural. En contraste con eso, las TIC revelan cómo resulta un conector ideal entre investigaciones; Se destaca como la esencia de la academia y la realidad del país que exige soluciones que solo las universidades son capaces de hacer. Se muestran los problemas y las preguntas desconocidas que no permiten la fluidez de las dinámicas de investigación, las TIC, la innovación y la solución de problemas reales.



ISSN nº 2447-4266

Vol. 5, n. 2, Abr-Jun. 2019

DOI: <http://dx.doi.org/10.20873/uft.2447-4266.2019v5n2p60>

PALABRAS CLAVE: TIC; Universidad; Investigación; Educación.

Recebido em: 02.01.2019. Aceito em: 15.03.2019. Publicado em: 01.04.2019.

Introduction

The use of information technologies and communications has massively increased in all life contexts. It has ceased to be a tool for business innovation going into fields that benefit processes in which knowledge is shared. It brings with them a cultural revolution that is transforming societies. Additional to this, at the research field is a tool that contributes to collaborative work, knowledge development and disclosure (Underwood, 2009; Ávila-Fajardo & Riascos-Erazo, 2011).

The new reality of institutions of higher education is framed in the information access on real time without temporary and space distances, virtual interaction that allows *"a new social interaction model"* for being used and applied in the development of objectives, methodologies and course contents, learning processes, such as the permanent development of knowledge (Colina, 2007).

With no doubts, the facilities for communication and access to sources of reference, allows to expand the capacity to create new collaborative work skills where the research should be highlighted, a fundamental and essential edge in academy. Therefore, it is to be assumed that ICTs are constituted in an incorporated tool to research process to potentiate them and achieve a better social and academic impact.

ICTs at University

Technologic tools must be applied for allow students to communicate and exchange ideas, build knowledge in a progressive way, solve problems, improve their oral and written argumentation skills and create non linguistic representations of what they have learned. This approach of technology uses help

teachers to measure de comprehension level of students and also support learners to lead their own learning.

ICTs are constituted as suitable tools for develop of a dynamic and conscious apprenticeship where academic processes start from own interests, objectives, needs and students motivations. The backgrounds provided by the ICTs encourage self learning, a trend that breaks with traditional education (Silva-Peña, *et al.*, 2006).

Being a dynamic tool allows flexible learning processes with access to knowledge and pertinent solutions. ICTs represent a way for development of a new education in the development of strategies and tools. It should be noted that one of the main focuses on the proper use of the Internet, virtual reality, online communication spaces and software design (Camorlinga, Mendoza & Maldonado, 2008 mentioned by Friné y Alonso, 2009).

“Virtual networks are environments full of communication, with information flows without borders, with great capacity for processing information, produce and processing differential knowledge, supported on the use of Internet and ICTs tools” (Velasquez, 2008 p. 4).

Salinas (2004) indicated the universities challenge to produce new interaction spaces between teachers and students easily made by ICTs that contribute to knowledge construction. Its incorporation involves a structural and paradigmatic change in the way that the academic dynamics are carry out, besides the infrastructure, basis resources and community practices.

The distance modality constitute an opening of scenarios where it allows and facilitates to the student its organization, planning and responsibility, besides to create relations with others in a virtual environment. This kind of dynamic interaction, contributes to the joint between theory and practice, build by tutors,

work and community practice those who promote the apprenticeship through three interrelated platforms: pedagogy, media and mediators (Salcedo, 2003).

The inclusion of new technologies at universities forms a new digital inclusion process provided by ICTs user communities. This factor has established a research line that rises in many institutions developing interesting research to understand ICTs dynamics in universities (Tomás, Feixas & Marqués, 2000; Area, 2002; López *et al.*, 2003; Uceda & Barro, 2007; Baelo & Cantón, 2010). Outstanding results show, in first place, the increased demand from student community for appropriate and assertive use of ICTs from teacher's parameters. At second instance, the service development for investigation and teaching, in addition to process that shows the use and advantage. And finally, technical conditions that produce valuation around comfortable scenarios and facilitators of the use of ICTs (Said-Hung, *et al.*, 2015).

De Pablos (2009) supported the ICTs inclusion as a teaching process – learning where planning and training of the teacher's council establishes an essential item for effective strategy. It is a fundamental base to encourage on student's creativity, innovation, autonomy development and critical thought that are inputs for research and results.

To produce new knowledge implies to encourage the academic community a release process of products and results from investigations, request in the research culture development that looks for community valuation and the use of new knowledge or technologies for problem solving (Guzmán *et al.* 2011).

It should be emphasized the role of scientific production within the research indicators and experimental development (D+I), includes creative work executed in a systematically way by institutions for increasing the volume of knowledgement, including understanding the human being, culture and society,

besides giving solutions to problems that are concerned (Marín & Armentia, 2009).

However, it is preponderant to point out the academy essence under the development of new knowledge that gives solution to different problems that have arisen in society, weighing up the construction of theories and concepts that manage questioning. Otherwise, the formation would be diminished in the repetition table of applied knowledge to society demand, giving place to a technical approach besides than a professional one. That's why; academy is established in an appropriate place for development of present and future innovative revolutions based on scientific and technologic investigation.

The essence of a University is based on: research

Knowledge construction for prosperity of society is becoming in the University fundamental task, avoiding that classes focus on repetitive information parameters, aspects in which unfortunately arrives frequently. Under clear and precise specifications by the teachers' council, must arise knowledge over the research's base made by a practice community. Teachers have got the role of leading this process where students win a leadership and significant learning. What aims to stop informing philosophy to be creators of philosophy (Rojas, 2005).

It is important to point out that scientific products are conditioned to historical and social context. The infallible, the explanation of everything, the control of human being life is foreign to science. Actually the function of scientific knowledge is to give to human being the possibility to transform reality, transform it and to satisfy needs. Science style is dependent to the type of society, which differs among others by its content and priority problems (Vélez, 1984).

Each society "have research methods and their practical criteria of truth as well as researchers have their own sociological characteristics" (Varsavsky, 1984, p. 9).

In Latin America exists a fundamental default in scientific and technologic research: is not own. The focus with which the world looks is from developed countries and their science, technology, culture comprehension "and through that", its special type of industrialization and forehead consumption, work and society" (Varsasky, 1984, page 87).

University as a society essential element is immersed in reality. Therefore, are the nation goals the general parameter in order to respond to needs through the research exercise, development and the own innovation of Universities. This exercise leads to the constitution of a critical position face reality about a dynamic action between students and teachers. The aim is to students and teachers avoid analysis models and foreign ways of thinking (Vélez, 1984).

Another factor to avoid in research culture is to consider it as an exclusive privilege from who possess a doctorate or of geniuses in the subject. It should be estimated research levels in congruency with country's particular needs expanding coverage of undergraduate and postgraduate (Vélez, 1984).

"With these criteria we understand that the human being research by nature and unfortunately traditional training at home, school and university remove that search effort ;Man is born with the attitude for research but, through traditional formal education, we annulled it!" (Vélez, 1984, p. 51).

Research, in general terms, is defined as an activity of the human being that seeks to discover what is unknown (Sierra, 1988). In the scientific context it can be defined as an effort that is realized to solve a problem produced by certain knowledge (Sabino, 1992). Cervo & Bervian (1989), highlighted the fact of

problems solution and add the importance of this activity employing scientific processes.

Accordingly, it can be said that scientific research implies the discovery of a certain aspect of reality producing a new knowledge aimed to strengthening theoretical approaches or to apply for practical problems solutions. Although it must be differentiated from instructions design or academic, social or technological plans, systems development or other proposals (Tamayo, 2004).

Scientific research expects the increase of knowledge in a certain science. Scientific method, far from being a study technique or a monograph and it is built by people with higher skills, is a task that implies an apprenticeship that demands a thought systems organization and actions to develop within a balance between applying the rules and the originality of the student (Gómez, 2006).

Furthermore, it must be determined the investigation level as 1. Basic: experimental or theoretical works that are improved primarily for acquire new knowledge about phenomena fundamentals and observable facts, without thinking on giving any implementing or certain used. 2. Applied research: original executes works for acquire new knowledge; however, it is targeted to a certain practical objective. 3. Experimental development: systematical works it could be built by people with higher skills that take advantage of existent knowledge acquired through investigation and/or practical experience, and it is targeted to produce new materials, products or devices; to the start-up of new processes, systems and services, or to the substantial improvement of the existing ones (OECD, 2005).

In a research process some conjectures are built that are sustained by pre existing knowledge, subsequently it is tested under certain standards with valid and reliable data collection instruments. Therefore, scientific activity implies an intellectual and reflexive work within an empirical work, destined to determine

what is possible but at the same time to refute or support suppositions (Gómez, 2006).

The amount of rational knowledge, certain or probable obtained through scientific method, verified in its contrast with reality are systematized for being transmitted (Egg, 1995).

One of the essential functions of modern universities is the production of new knowledge. Such institutions promote research spaces, where different academic groups participate in production of new knowledge (Clark, 1997). Even, Spanish Real Academy (2006) says that, for an institution could be called as University it must accomplish with teaching activities and being a «research center (De Pablos, 2010).

Research-based training is propose within a pedagogic and didactic strategy where teaching and apprenticeship application is given by discovery, development that encourages skills like flexibility, adaptability for the execution of interdisciplinary workshops that allows development solution to problems from distinct point of view setting up a significant learning (Patiño & Rojas, 2009).

Research emerges thanks to interactions between teachers and students, dynamics in classrooms framed within an institutional curriculum, it is set by carry out deepening activities in certain subjects such as debates, socializations and experiments, experiences that turn on the classroom into a laboratory. In fact that's when students get immerse in research field (Bustos, 2007).

Developments of research projects empower in students the professional and disciplinary career factor on which it is training. Improve abilities and competencies required by media and society, item that becomes differential in front to other training professionals who are foreign to research. Creativity, logic

and objectivity are three characteristics that, with a different level of intensity, share the most of investigators (Sánchez, 2011).

Wagner (2015) points out four capabilities that must be developed in students to handle present and future challenges: critical capacity, collaborative capacity, communication and creative capacity. The first one refers to the ability of realize assertive questions in front of certain subject. The second one is argued about the possibilities that technologies bring of sharing information and realize collaborative projects. However, if products that are achieved through collaborative work aren't share in a clear way it will not have more functionality, for this reason the third refers to the ability to communicate in an oral and writing way. Finally, products must have a problems solution, which entails to develop creative capacity, basis for innovation.

The four capacities mentioned have a parallel relation with the faculties of a researcher, conditions that are based on mainly at undergraduate of a professional career and persist in time as long as the activity must be exercise. The bet of a new pedagogy shows a new way of investigative training to improve an attitude that leads the student to learn through question raised, problems and scientific projects that fortify their learning process (Foerster, 1996).

Nevertheless, Rojas (2007), pointed out some difficulties about higher education to improve the research culture in students. Formalism in excess, radical methods and the system that prevents a teaching that promotes scientific capacities are some of the factors that make interest have been missed by the student.

Use of ICTs in research

As an alternative for ongoing difficulties at the time of constructing a research culture, over this, at stage ICTs arise. By the information and communication increase, require a change in the way of assume it and promote research backgrounds aimed to interdisciplinary teaching. Actually, is the result of the flow of data access channels, scientific literature and technology resources applied to academy. These resources have their own criteria in promotional capacity, communication and collaboration between different characters related to unknown production (Said-Hung, *et al.*, 2015)

Projects based on the collaboration supported on internet, it is an incremental and integrator strategy at the universities subsystem, that makes easily research process to generate massive reflection products, new knowledge and experiences that, at the same time are feasible to constitute programs or institutional research lines (Espinoza & Morales, 2005).

With the emergence of Web 2.0 collaborative work has benefited researched process reflected on the facility by students to share, create, engage with others and get related around knowledge, in other words in an active apprenticeship (Dominguez, 2009).

In these subsystems dynamic it must be emphasized the role of the teacher-researcher which demands a new learning focus that rise social-educative interactions sensitive to changing backgrounds. The fact of share research experiences by the side of the students generates a favorable spirit to research (Espinoza & Morales, 2005).

Teachers are called to make careful analysis about what ICTs can give as mediators in training process. It is important clarity in support activities design

with these technologic tools that provide opportunities to make each student actively work in their own apprenticeship (Cabero Almenara, 2004).

Therefore, collaboration in educative background has generated a series of paradigmatic concerns that Escudero (1995), figure out in a model with two essential characteristics: 1) interest in to take part by the different elements that conforms educative community, where it implies an active work by the teachers; and 2) incorporation of this dynamic with other institutions and people who even don't belong to the same background, to achieve a real vision from educative institution to the surrounding community.

Incorporation of the ICTs has allowed in academic research background "1) make widely open the informatics offer; 2) to create flexible backgrounds for apprenticeship; 3) to remove space-time boundaries; 4) increase communication modalities; 5) built interactive scenes and environments; 6) to encourage independent and collaborative learning; 7) increase orientation and tutoring possibilities, as well as the organization of the teaching action; 8) to realize management activities; and 9) facilitate the continuous improvement of graduates " (Cabero Almenara, 2004, p. 87).

However, Said (2011), stated that inside Colombian universities a paradox in data since high levels were observed on the importance and use of ICTs, but there are medium and low levels in its utilization. These data have similarities with projects realized in Spain by authors like Tomás, Feixas and Marqués (2000); Area (2002); López, *et al.* (2003); Uceda & Barro (2007) also Baelo & Cantón (2010). Therefore, the new pedagogic model that is working parallel to ICTs demands more abilities to teachers that must improve autonomy, responsibility in their learning processes (Coll, Mauri & Onrubia, 2006).

E-inclusion (digital inclusion) in professional training and specialization processes are becoming today in elements to be taken into account to face what

is uncertainty and technology constant change that prints dynamism to the life rhythm. Despite this, studies from Katzman (2010); Román, Cardemil and Carrazco (2011), among others, show that technology resources got more importance in teachers' guild of Colombian universities.

Conclusions

Human being natural curiosity is limited in the academic requirements, indifferent to the potential of the student who, is looking for encourage it, through schemes and own demands of a traditional education the creation and innovation capable to achieve a reality transformation. Colombian research, as structure of creativity, creation and innovation, is sensible to reflecting traditional teaching levels in the way that achievements don't reach to impact in real solutions for problems that today are lived in the world.

The claims of the problems that human being believes in the indifferent dynamic allowed, increasingly even more scientific advances to achieve problem solutions. That's why, climate change, demands the alternative energy uses, self-sustainability. Planet recovery is constituted in tasks that overcome political, social and religion divisions. The convergence of these tasks is set in the solutions that specialized centers could give rise, in other words, Universities.

The relevance that university have got in students, must lead to a critical and active process, considering society flaws, but also, the production and solution demand. Research as a based process can reach a training that improve a position forehead to the world by the student, even in the same educative community.

The importance of associate science and formal education is based on the possibility to qualify this problem by distinguishing a formative research, linking

it to the classroom, from a scientific research in a strict sense (Hernández, *et al.*, 2005).

Higher education institutions, involved in a demanding and digital world, attach ICTs with all its tools as a sensitive one to carry out the mission of connecting systems, however connections are capable of being generated as long as research progresses indicate successful terms, in other words to give solutions, products, valid information, trustful and worthy to share.

The problem lies on these types of results are limited, also, underlying this factor, the promotion of research and professional contexts applied to teaching are not yet established or tangible in an integrated way at teaching scenes at Colombian Universities. Even more when the use by technology teachers tends to be oriented to the use of devices and resources already known like mail, computer, internet and thus facilitate its traditionalist functions (Tomás, Feixas & Marqués, 2000; Area, 2002; López *et al.*, 2003; Uceda & Barro, 2007 and Baelo & Cantón, 2010).

In this sense, the valuation of ICTs inside the universities is limited in the instrumental nature of technology and the pedagogical subordination of the above exposed about teachers and not only in promotion of new teaching-learning backgrounds (Rodríguez 2010; Francisco, 2011). It is understood in the proper use of ICTs can help to the improvement of new educative innovation backgrounds and acquisition of autonomous learning and collaboration skills, among other aspects.

"ICTs can be the tools to improve cognitive abilities through an entire applicative paradigm; is not only about to apply technology by its innovation, it would be similar to a knowledge revelation, it is about converging several disciplines that are called to work collaboratively as engineering, cognitive psychology, pedagogy and even neurosciences "(Castillo 2015, p. 62).

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