Chapter 16

Information and Communication Technologies in the Educational Process:
Mapping the Critical Success Factors

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ABSTRACT

The study aimed to map the critical success factors for the adoption of information and communication technologies (ICTs) in the educational process of educational institutions. Problems related to the adoption of ICT in the educational system stem from the need to adapt to the use of new technologies in the internal processes of institutions and in teaching and learning processes, common to different profiles of educational institutions including of engineering courses with them specificities. To meet the objective, a review of the existing bibliography in the Scopus database was carried out to highlight articles relevant to the topic. Based on the review, 31 articles identified the main factors and effects that influence and impact the process of implementation and continued use of ICTs. The survey generated a broader view of the challenges faced in different dimensions, from SWOT framework, involving different stakeholders. It is suggested in future studies to engineering analyze deeper the complex scenario that involves the theme.

INTRODUCTION

The fast and growing evolution of Information and Communication Technologies (ICTs) leads educational institutions to invest resources in research and implementation of innovative technologies to improve the teaching-learning process in order to develop competitive graduates. Universities benefit from ICTs, which offer important economic advantages, accessibility and support the development of specific skills in students (Hernandez-de-Menendez & Morales-Menendez, 2019).

Educational institutions take advantage of the opportunity to use ICTs in the educational area through technologies such as internet, social media, simulations, games, augmented reality and using mobile applications as a means of virtual communication. The use of ICTs for educational purposes engages students and helps to develop creativity and collaboration in addition to oral and written communication skills (Hernandez-de-Menendez & Morales-Menendez, 2019).

According to Martínez-Cerdá et al. (2020), recent studies shows that "current online universities have to take into account many factors related to improve the skills of their students in pursuit of social and economic progress" (p. 8). Their results present the influence on the development of competences for employability, considering the importance of social factors, the time use by students, and the use of ICT for pedagogical practices, with more relevance to Science, Technology, Engineering and Mathematics (STEM) students.

The application of ICT in educational environments, as well as in higher education institutions, is important due to the potential to contribute to the improvement of the teaching and learning process, in addition to stimulating the knowledge construction process. It is necessary to develop educational models focused on information and communication technologies (ICT) as tools to support equal opportunities and social responsibility (Buenaño-Fernandez et al., 2019; Lytras et al., 2018).

The training of individuals for life and the labor market demands preparation for the required level of preparation for the exercise, added experience and constant change in the needs of expertise in technologies imposed by technological evolution. However, the integration of ICTs in the educational process by educational institutions is part of a complex process in which several factors and stakeholders intervene. According to Almerich et al. (2016), the literature presents several factors that influence the integration of these technological resources into the educational process.

The results of the study by De La Iglesia et al. (2018) confirm that the integration of ICTs in the classroom is directly or indirectly influenced by the understanding of factors that interact with each other. Factors such as the availability of means; skills in technical management of ICT, allowing the acquisition of other types of ICT skills, such as teaching skills (main modulating factor); sex and age cause low to moderate effects when interacting with different types of variables (De La Iglesia et al., 2018).

For Langroudi (2015), the main factors that affect the use of ICT in the university are based on the attitude of professors regardless of their age, according to the research carried out with 97 professors. Therefore, to improve the use of ICTs, the attitude of professors and their professional applications of ICT must be modified. On the other hand, the results of several researchs such as that of Radovan & Kristl (2020) support that the key to success of learning and teaching in virtual learning environments (VLE) lies in the creation of effective learning communities. In the study, the authors assume that effective higher education is the result of the functioning of cognitive factors, the professor's intervention and the social dimension that defines the development and functioning of the community.

The interdisciplinarity of new technologies and the impact of cyberinfrastructure demand new paradigms in engineering research and development. Technology is a means to facilitate educational

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