Information And Communication Technologies In Pedagogical Practice

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ABSTRACT
The objective of this article focuses on determining the degree of appropriation of digital and technological tools in the pedagogical practice within the university environment, based on a quantitative research under a descriptive approach of transversal non-experimental cut, studying the usability of the resources of information and communication technologies (ICT) by 49 teachers, applying as an instrument of information collection the questionnaire designed under the Likert scale and analyzing the information through the statistical software SPSS. In this sense, the results of the study allowed concluding that teachers understand the importance of the implementation of ICT in the classroom, which is why they use them constantly and strive to incorporate the use of digital tools in their classes; however, it was evidenced that a significant percentage of teachers do not incorporate the use of technological tools specific to the work of accountants in the classroom. It was also possible to demonstrate how teachers promote research activities in students, from the use of ICT inside and outside the classroom, while they perceive that the mechanisms of communication and digital information provided by the institution respond to the training needs, enriching the teaching-learning process.

Keywords: Digital tools; Information and Communication Technologies (ICT); Pedagogical practice; Strategies; Teachers.

1. INTRODUCCIÓN
The 21st century, which began in 2001, has been characterized by the advances induced by the integration of technology in the daily life of society, which brings as a consequence the change of perception in humanity on the way in which education is instructed and shared (Parra Bernal & Rengifo Rodríguez, 2021). From this context, in this theoretical framework two variables of studies are enunciated, which are focused on Information and Communication Technologies (ICT) and pedagogical practices, in order to know the relationship between them and the role they play in society, at the academic level.
In line with different authors and/or governmental institutions that have appropriated the main concepts discussed here, the premise of Law 1341 establishes that Information and Communication Technologies (hereinafter ICT) should be understood as the group of resources, tools, computer programs, equipment and applications that support the processing, compilation and storage of data, text, voice, videos and illustrations (Congress of the Republic of Colombia, 2009, Article 6). On the other hand, interpreting the words of Siemens (2005) as quoted in Martínez Penagos (2020), he indicates that ICTs help the dissemination and creation of new knowledge, and it is hoped that they contribute to teaching, as well as facilitate the location of quality information, as well as the interest of students in the classes that make up ICTs. Ricardo et al. (2013), state that when the term ICT is used, it refers to the current progress of technologies that are distinguished by their innovation and their priority is directed to enable communication processes, which is appropriate in the foundation and socialization of knowledge.

With respect to ICT variables, Azañedo-Alcántara (2022) expresses that they are determined as the grouping of electronic instruments and equipment that allow the processing of information that revolve around the community, approving the study and transfer of data to obtain greater digital interaction in the educational environment. On the other hand, Sailer et al. (2021) and Kjellsdotter (2020) admit that the management of technologies encourage the essential digital skills of teachers in accordance with the timely pedagogical intervention; likewise, Rahim et al. (2020) reaffirm that the introduction of ICT, require to be implemented in the execution of learning and teaching with the objective of supplying the requirements of the XXI century society in education.

In short, for the academic community and society in general, the introduction of ICT in the academy is not a new phenomenon, since these practices and/or tools have been implemented for some time for pedagogical use, according to the United Nations Children's Fund (UNICEF, 2014); Therefore, Martínez Penagos (2020), states that ICT are part of the daily life of the knowledge society, for this reason, instructors, teachers, educators, mentors and / or teachers require training and updating in the area of technology and digital communication in order to respond satisfactorily to the needs of this generation and the one to come. The need indicated above is maximized in the case of teachers linked to higher education, given that they are the mentors of the subsequent professionals who will take control and direction of society. However, although the introduction of ICT in the educational environment is not new, it has become an essential component for the appropriation of knowledge in students and teachers, since the application of these tools contributes positively to cooperative and autonomous learning, as well as to the development of communication skills and the creation of collaborative work, under the benefit of technological resources (Orozco Guzmán, 2015).

Continuing with the above, and adopting what is said by Avila Clavijo and Cantu Valadez (2017) who state that Information and Communication Technologies, are essential tools in the area of education in the XXI century, because of the different opportunities it provides to teachers, instructors and educators when sharing information or offering classes to students, thus favoring the multiple ways of learning in learners; However, for these tools to be effective, the authors mentioned in this paragraph point out that information technologies should identify
and promote methods such as PDF documents, didactic images, videos, educational games, among others; and communication technologies should promote the use of e-mails, online communication groups and learning management systems.

On the other hand, when talking about pedagogical practices, different authors and governmental institutions come out with their perceptions, such as the Ministry of Education of Colombia (Mineducación, 2018) who defines the term as a method of reciprocal relationship between the educator and the learner. In the same perspective, González et al. (2017) and Prieto Díaz (2019) sustain that when alluding about pedagogical practices, reference should be made to those activities that are executed in classrooms through continuous intervention. Finally, Castro et. al (2006) and Núñez (2018) express that it should be understood as the art to provide capabilities in students in search of the improvement of their learning.

The scenario that surrounds the world (virtuality) has caused great changes on the area of education, so that the body of teachers at a general level has been involved in the need to replace the actions and strategies to execute their pedagogical activities, facing the fearful digital world, which since years ago was expected (Martínez-Serrano, 2019), however, with the arrival of COVID-19, the entire educational system (especially Latin America) found itself forced to migrate from face-to-face classes to the adoption of virtual classes in a rude and inexperienced way, however, this global affectation that emerged at the end of 2019 and the beginning of 2020, increased the acceptance of the different platforms and technological applications that were created in advance for the mutation of educational institutions and their pedagogy to the virtual world (Scavarda et al., 2021). Now, as time goes by, it is projected that the traditional path will be left aside and the gap will be reduced, widening the way to innovative ways of teaching, polishing and perfecting digital pedagogy (Pongsakdi et al., 2021).

Currently, the role played by ICT in society at the academic level is very important, since day by day these tools have been mixed with all the actions of the daily life of humanity and education at the basic and higher levels were not exempt from the new trend (Restrepo Quijano & Arroyo Espinosa, 2019). However, although ICTs play a relevant role in education, the evolution of education may be affected by the resistance built by the academic society when facing the challenges and challenges that it demands from them. The adoption of ICT today, does not ensure that the old perceptions of education and the way it is delivered are broken or minimized; therefore, in order to reduce this possible action, it is necessary to delve into the pedagogical tools on which the educator and students rely, permanently promoting the annexation of ICT in their classroom activities, research and exploration (Ricardo et al., 2013). The lack of a master accreditation in professional terms and the absence in current competencies (virtuality), makes it impossible and is presented as an obstacle for the advancement and progress of ICT in pedagogical practices; the teacher is irreplaceable in the teaching-learning work, for such reason, if educators do not update their competencies and skills to meet the challenges of current education, excellence in academia will only be an imagination (Marín Idarraga et al., 2016).

Regarding the use of ICT by students and teachers today, Gutiérrez-Martín et al. (2022) state that knowledge institutions are still facing challenges due to the process that demands the teaching-learning methodology through the introduction of ICT tools, since many teachers do
not want to face the advances in technology, so they choose to defend the usual methodology. As for the students, a different vision is presented, since many of them see ICT as a friendly and accessible factor, which can generate pedagogical transformations in the usual teaching towards a more constructivist teaching. Finally, it is evident that ICTs have entered the classroom and are a reality today, although in many cases they are misused due to ignorance of their educational potential. Educational institutions must be able to adapt to the needs of students who enter the classroom today as digital natives, who demand a higher level of dynamism in the use of ICT tools, which requires educators with the willingness and attitude to face the challenge of mastering what was created by humanity itself (Mirete Ruiz, 2010).

2. METHODOLOGY

The development of the research was handled under a descriptive quantitative approach, which according to Hernández (2014) analyzes an objective reality based on numerical assessments and the treatment of statistical data that allow the prediction of phenomena or problems. In this sense, the present study aims to analyze the processes, uses, tools and methodologies applicable to ICT resources, which have been implemented by teachers. In relation to the quantitative approach of the research, it allows the statement of the research problem and the questions that derive in the formulation of the hypothesis. Likewise, the study will be non-experimental cross-sectional, since from this it is possible to manipulate variables, from the observation of phenomena without altering their context, being subsequently analyzed (Hernández, et al., 2014). Responding to the information needs of the research, it was defined that the collection instrument or technique was the questionnaire, being a tool that allows a closer approach to the population under study, allowing a conception of the use given by teachers to digital and technological resources.

The design of the information collection instrument, the questionnaire was structured based on the Likert Scale and the data were tabulated using the Statistical Package for the Social Sciences (SPSS) software, facilitating the elaboration of graphs and improving the processing of the information collected. On the other hand, it was established that the population under study would be made up of a total of 49 teachers of the Public Accounting Program of the Universidad Francisco de Paula Santander Ocaña, defining that the sample for the application of the questionnaire was 100% of the selected population. Finally, the results and the final diagnosis of the usability dimension are presented, responding to each of the phases of the research, as shown in the following figure 1.
3. RESULTS

The current educational context requires educational institutions to orient the teaching process towards continuous improvement, so that the need arises to incorporate new resources to facilitate pedagogical practices and improve the learning experience of students. In this sense, modern technologies have had a considerable impact in recent years in both business and educational processes, which from small contributions can generate major changes in the learning process and enable the solution of research problems, making use of the classroom as a work area (Muñoz, et al., 2020).

This research focused on determining the degree of usability and appropriation of ICT in the pedagogical practice of teachers of the Public Accounting program at the Universidad Francisco de Paula Santander Ocaña, based on aspects such as the frequency of use of digital and technological resources, the ease of use of virtual platforms used by teachers and students to support the training process, participation in training to strengthen ICT competencies, the promotion of research mediated by technological tools, the relevance of the means available in the institution to improve academic processes and the use of institutional or particular digital tools (software) for classroom work.

This section presents the analysis of the results obtained through the application of the collection instrument (Figure 2).
Figure 2. Make frequent use of each of the TIC tools (Virtual U, SIA, website, virtual library). Source: ICT implementation survey for teachers Public Accounting Program.

In the usability dimension, 86% of the teachers of the Public Accounting program who participated in the survey stated that they make frequent use of the technological and digital resources available for the development of their pedagogical practice. In this sense, 86% of the participants are in high agreement with the frequent use of ICT tools. Meanwhile, 14% of the remaining teachers stated that the use given to technological and digital resources is neither so high nor so low, but that they do use them in some way (Figure 3). Thus, Ricardo and Iriarte (2017), state that the integration of technological means to the educational environment involves innovation and the use of new resources, so that new teaching-learning environments are generated, so it is imperative that Higher Education Institutions manage and strive to supply themselves with the necessary tools to take advantage of ICT training opportunities.

Figure 3. SIA and Virtual U are easy to use. Source: ICT implementation survey for teachers Public Accounting Program.

Since teachers require tools to streamline academic processes, whether for the management of curricular content or the assessment of student learning. In this sense, the Academic Information System (SIA) tool allows the consolidation of student information in an updated manner, while the Virtual Unit is a mechanism that allows the opening of courses, activities, forums and exercises by teachers, to facilitate the transmission of the content of the different subjects. However, they must be easy to use, since some teachers may have advanced skills in the use of office automation tools, while others may have some difficulties. To this effect, 100% of the respondents agreed partially or totally that the characteristics of the mentioned tools allow the easy use of all their functionalities. Under this perspective, García, et al. (2017) consider that for a teaching-learning process within the field of higher education, it is not enough only with the availability of technological resources, but teachers must possess sufficient skills, knowledge and abilities to apply them to the educational context. For this reason, it is the direct responsibility of HEIs to guarantee the training of teachers in the use of educational media, challenging the obstacles that allow improving the educational practice and the transmission of knowledge quickly (Figure 4).
On the other hand, it is part of the institutional commitment to the development of the competencies of its human capital, to organize training programs oriented to the management of ICT resources. When teachers of the Public Accounting program were asked about their participation in training sessions, 94% stated that they had received training at some point on the applications of the digital platforms provided by the institution to strengthen the academy. Only 2% of respondents were indifferent to this statement and the remaining 2% said they had not participated in any ICT training within the institution. From this perspective, Hernández, et al. (2018) state that the integration of ICT in education requires a substantial change, which considers the teacher as an actor that facilitates the learning process and, therefore, requires a set of competencies that added to the methodological aspects allow the use of the tools, being this one of the educational challenges that must be faced in the first instance (Figure 5).

The relevance of ICT tools allows visualizing the effectiveness of the pedagogical strategies designed by the teachers of the program, whether these are articulated with the resources available in the institution or are part of the counselor's own research in the search for mechanisms that facilitate the dissemination of knowledge. In this sense, 94% of the teachers surveyed stated that during the development of their classes, they use digital tools other than the platforms, software and resources available at the University for their Support. Meanwhile, the remaining 6% were indifferent to this approach and 4% of that percentage agreed not to have used any additional resources in the process. Referring to the incorporation of new tools in pedagogical practice, Molinero and Chávez (2020) mention invisible learning, whereby teachers use media available on the Internet without the need to have received training in their use, but rather through constant use in the classroom, considering that they can be easy to use, dynamic and enjoyable for students (Figure 6).
Figure 6. Often encourages learning and research in their students through the use of digital resources. Source: ICT implementation survey for teachers Public Accounting Program.

The ultimate goal of the implementation of ICT in the classroom is to awaken a critical and investigative attitude in the student, for this reason, it cannot escape from the pedagogical practice to encourage students to use all available digital media for their academic training. In this sense, when teachers were asked about the promotion of the use of resources such as e-books, scientific and academic articles and web pages, 94% agreed that they manage the development of their subjects inside and outside the classroom, making the search for information through ICTs a priority for their students (Figure 7). HEIs should orient their actions towards the learning of the educational community in general, conceiving the role of teachers as expert learners and generators of knowledge in a continuous manner, whose approach leads them to address research aspects and pedagogical innovations, which allow the generation of new knowledge on the relevance of ICT in the teaching-learning processes (Pinto, 2015).

Figure 7. Receives advice from the university or the study plan to resolve doubts about the use of the digital platforms and technological resources available. Source: ICT implementation survey for teachers Public Accounting Program. Analyzed with SPSS Data Processing Software (2022).

Given that not all teachers have sufficient skills for the use of ICT, it is essential that they receive support from the curricula, academic departments and the institution to strengthen their knowledge in this area and thus be able to successfully develop their pedagogical practice. In this sense, 98% of the teachers surveyed stated that the university and the staff of the Public Accounting Study Plan have been attentive to resolve their concerns with the use of
technological resources and digital platforms. Torres, et al. (2021) argue that HEIs must accept the milestone that represents the training and updating of digital competencies in the teaching staff, as a continuous process that allows the development within the professional and academic environment. However, the interaction of the actors involved from a purely digital perspective, incorporates pedagogical, socio-technical and cultural aspects that affect the academic community, and must be taken into account during the pedagogical practice (Figure 8).

![Figure 8](http://www.webology.org)

**Figure 8.** Encourages the use of specific software for the development of accounting, statistical and mathematical skills in the classroom. Source: ICT implementation survey for teachers Public Accounting Program.

Regarding the development of the pedagogical practice based on the use of ICT tools directly related to the disciplinary work of CPAs, 72% of the respondents stated that they encouraged the use of specific software for the professional training of the program, whether they were accounting, statistical and/or mathematical. Meanwhile, 22% did not show a position in favor or against such a statement, possibly related to the fact that their subjects are not specific to accounting and/or financial areas, but may be related to managerial, commercial or research areas. On the other hand, 6% of the respondents stated that they do not use any specific software related to the accounting profession in the classroom (Figure 9).

In this regard, Vinueza and Simbaña (2017) affirm that ICTs allow providing students with quality education and require teachers to use tools that represent methodological changes to the pedagogical practice, hence, these as guides of the teaching-learning process acquire and incorporate new practices supported by ICTs, so as to facilitate the systematization of knowledge and the competitive development of the HEI.
Finally, the teaching-learning process requires permanent communication not only between teachers and students, but also between teachers and each member of the academic community to facilitate pedagogical practice and contribute to the academic and administrative management of classes. In this sense, to analyze the perception of teachers regarding the use of institutional e-mail, we asked about its relevance as a mechanism to facilitate communication and information with students and administrative staff of the university, to which 100% of respondents were totally or partially in agreement.

It is imperative to allude to Poveda and Cifuentes (2020), when they state that learning processes by adopting new tools that facilitate communication, allow breaking the existing gaps of space and time, constituting an opportunity to build academic networks, emerging from the inquiry and study of the context in which learning takes place. This aspect has gained importance, as it presents methodological changes and new challenges derived from the implementation of ICT tools, which involve other means of communication and access to knowledge in HEIs (Figure 10).
Figure 10. Arithmetic average results usability of ICT tools

Note: The averages of the answers provided by the teachers in the questionnaire of ICT Implementation in the Public Accounting Program can be seen. Analyzed with SPSS Software (2022).

From the analysis carried out using the Statistical Package for the Social Sciences Software (SPSS), it was determined that although the means of the answers obtained in the study are higher than four (4), a range in which the answers are considered positive, however, one (1) of them is below this parameter. In this sense, the arithmetic mean for the question "Do you encourage in your classes the use of specific software for the development of accounting, statistics and mathematics competencies?" was the lowest with 3.92, showing a disparity between those who stated that they involve specific software of the accounting profession in the classroom and those who only do it on some occasions, which is consistent with Gutiérrez-Martín et al. (2022), who argue that there may be a degree of resistance to change imposed by technological updating on the part of teachers, causing them not to seek or use the necessary resources for the development of pedagogical practice.

On the other hand, the premises related to 4 and 5, which show an average of 4.35 and 4.47 respectively, involving the dynamizing capacity of the pedagogical practice from the incorporation of digital and technological means, but also the importance of associating research during the exploitation of such resources, are a reflection that the strategies used by teachers respond to the demands of the environment and allow the disciplinary updating of students. Under this perspective, Mirete Ruiz (2010) emphasize the ability of educational institutions to meet the challenges posed by the new digital natives, which require classes to be characterized by greater dynamism and require educators to show a willingness to mediate training with ICT. Similarly, since all of them are at the threshold of responses Agree (4) and Strongly agree (5), it can be affirmed that the postulate of Ricardo, et al. (2013) on the
annexation of ICT in each of the extensive activities of training, referring to classroom work, research and exploration is fulfilled by teachers.

On the other hand, it is observed that the tools provided by the institution to facilitate communication and access to information for teachers, have a high degree of acceptance derived from the ease of use of the Virtual Unit (Moodle), the Academic Information System (SIA) and the Institutional Email, facilitating the relationship of teachers with students and administrative staff that contributes to the development of academic activities proposed in the PEP. In this regard, García, et al. (2017) state that ICTs favor the performance of the teaching-learning process, while promoting collaboration, communication and the development of the functions of teachers and schools more efficiently.

4. CONCLUSIONS
The use of ICT in the educational context has become a fundamental aspect that requires the appropriation and learning of teachers, allowing them to generate meaningful construction activities, while facilitating the approach with students as a method to awaken their interest in learning. For this reason, it is imperative that HEIs formulate teacher training programs that allow the development of strategies with greater impact inside and outside the classroom.

It is pertinent to analyze the way in which teachers are involved with the new demands of the current knowledge society, since it depends on this that they do not limit themselves only to the use of tools provided by educational institutions, but that they seek digital and technological aids that, from their own conception, dynamize the pedagogical practice and make the transfer of knowledge more enjoyable. In this sense, the research showed that teachers are interested in taking advantage of the multiple tools that allow a continuous disciplinary update and the generation of appropriate environments for the strengthening of competencies in the use of ICT resources. Likewise, the role played by the institution is highlighted, from the provision of quality resources that allow research work, communication and access to information for teachers, as inherent aspects of the academy.

However, the effect that the implementation of ICT represents in the pedagogical practice will depend on the adaptability, motivation, environment and resources used by the teachers themselves, which should be reviewed frequently to improve the use and appropriation of these tools in the classroom. For this reason, the teacher must recognize that digitalization and technology allow a real approach with the student, including them more in the classroom work, engaging and motivating them to get involved with the contents presented in class from the generation of more dynamic and effective environments.

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