ORIGINAL

Theoretical foundations and methodological guidelines for the appropriation of ICT in the pedagogical practice of teachers

Fundamentos teóricos y lineamientos metodológicos para la apropiación de las TIC en la práctica pedagógica de los docentes

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ABSTRACT

The main objective of this study is to propose theoretical and methodological foundations that facilitate the appropriation of Information and Communication Technologies (ICT) by teachers in the pedagogical practice of Primary Basic Education, specifically in official educational institutions located in the urban area of the city of Monteria, Colombia. The research was methodologically based on the epistemic pragmatism model, the Action Research method, under a projective type of research, with a field design. The participation of at least 50 teachers working in other educational institutions of the sector and belonging to the official system of the Colombian Ministry of National Education was arranged. In conclusion, the importance of educational policies and teacher training to support adaptability to the digital world is highlighted.

Keywords: Theoretical Foundations; Methodological Guidelines; ICT; Pedagogical Practice; Teachers.

RESUMEN

El estudio realizado tiene como objetivo principal proponer fundamentos teóricos y metodológicos que faciliten la apropiación de las Tecnologías de la Información y la Comunicación (TIC) por parte de los docentes en la práctica pedagógica de la Educación Básica Primaria, específicamente en instituciones educativas oficiales ubicadas en la zona urbana de la ciudad de Montería, Colombia. La investigación se fundamentó metodológicamente en el modelo epistémico pragmatismo, el método de Investigación Acción, bajo un tipo de investigación proyectiva, con un diseño de campo. para recolectar la información se empleó la entrevista semiestructurada, el grupo focal y el análisis documental. Se gestionó la participación de al menos 50 docentes que laboran en otras instituciones educativas del sector y pertenecientes al sistema oficial del Ministerio de Educación Nacional de Colombia. Como conclusión se destaca la importancia de políticas educativas y formación docente para respaldar la adaptabilidad al mundo digital.

Palabras clave: Fundamentos Teóricos; Lineamientos Metodológicos; TIC; Práctica Pedagógica; Docentes.

INTRODUCTION

ICT is present in all areas of society, and the educational field has the challenge of generating scenarios of articulation of the same in the different processes that are developed in it; as expressed by the European Commission (2005), in academic scenarios, there is an obligation to ensure the integration of digital educational tools in the practice of teachers to ensure better learning in students, which will directly influence the quality of education.

On this, Barcos (2017) considers that technological advances and the globalization process that is experienced in current times have generated ICTs are configured as a necessary aspect in all aspects of society; therefore, education cannot be away from this reality to the extent that the technologies of the Therefore, education cannot be far from this reality, since information and communication technologies promote interactive teaching and learning and the transformation of both how teachers carry out their professional practice and how students learn, improving educational results.

Thus, ICT becomes a tool that guarantees changes in educational practice from the actors of this; as expressed by Soto (2018), information and communication technologies contribute to teachers implementing innovative and interesting pedagogical strategies for students, which generates more meaningful learning. For such reason, it is necessary that in school contexts, the articulation of these technological tools is propitiated to be at the forefront and respond to the demands of an updated world.

Despite the importance of ICT in the educational field, Epper (2018) warns that teachers need to appropriate and use technological tools, highlighting that it is necessary to respond to the social dynamics imposed by technological advances. In this same line, Losada et al. (2017) show that few European teachers use ICT as a mediating element of their educational practices. Specifically, only 43,1 % of teachers use the computer daily in their class, and 44,2 % use some digital educational resource to energize their professional practice. Likewise, it is evident that of the teachers who apply ICT in their classes, 56,8 % do so to select some educational tool, and 54,1 % only use it for aspects related to their personal lives.

In the Colombian context, several programs have been developed to improve teachers' knowledge of using ICTs. In 2004, the Colombia Aprende Network implemented a series of virtual courses for teachers in the country's official educational institutions. In 2008, the Ministry of National Education published a document establishing methodological guidelines for applying ICT in school contexts, which implied that teachers assimilated these guidelines to put them into practice.

The Education Sector Plan, 2010 - 2014 of the Ministry of National Education sought to promote the application of digital educational resources in Colombia's official educational institutions to promote using ICTs in schools.

The Ministry of Education's Education Sector Plan 2010 - 2014 sought to promote the application of digital educational resources in Colombia's official educational institutions to close the digital gap in using ICTs in the educational field. Similarly, the National System of Educational Innovation 2011 supported articulating ICT in nationwide schools. Likewise, the Plan Vive Digital 2014-2018 sought to improve the connectivity conditions of educational establishments with the provision of technological equipment.

All this allows us to say that there has been an interest in state policies over the years in fostering spaces for applying ICTs in the Colombian educational field. However, it has not had significant results in strengthening the appropriation of ICT by teachers since Moreno (2019) states that one of the problems of education in Colombia refers to the limited knowledge that teachers have about the use of ICT in their professional practice, due to the approach established by the government in the designed programs, which emphasize the provision of technological resources without considering teacher training as an essential element in these programs.

In this regard, Cárdenas and Malpica (2019) warn that in Colombia, one of the reasons that generates the little application of ICT as an educational resources refers to the limited knowledge that teachers have on this subject, to the extent that the programs defined by the Ministry of National Education focus on training on technological tools that are far from the contextual realities faced by teachers in their schools. In other words, Colombian teachers do not receive plans to strengthen their technological competencies in their school contexts that allow them to generate changes in their practices, which results in maintaining the tendency to develop classes masterly.

That is to say, considering education as the mechanism for the development of a society, it must respond to the contextual characteristics of the times we live in today, where technological development implies transformations in all social spheres. The educational context is obliged to renew itself and promote virtual training scenarios where the role of the teacher is changed. To the extent that ICTs are bringing about transformations in how teachers execute.

Insofar as ICTs are leading to transformations in how teachers carry out their pedagogical practice, it has also encouraged teachers to reflect on the importance they assign to digital resources in their professional practice. According to UNESCO (2016), schools commit to responding to the current demands of today's society by promoting critical learning among their students mediated by ICT. Therefore, the study's objective was to propose theoretical-methodological foundations for teachers' appropriation of ICT in the pedagogical practice of elementary schools and official educational institutions in Monteria-Colombia.

METHOD

In order to define the methodological elements of the research, the question and its objective are taken as a reference. Therefore, this study is based on the epistemic position of Pragmatism, in which knowledge is valued from the practical activity to know and support what is known with rational explanatory capacity. To investigate

a problem is to solve it from practice; in other words, the value of knowledge is in practice (Hurtado, 2010). Pragmatism seeks to provide the necessary and feasible solutions at the moment of the research using the available materials.Based on the epistemic position, the action research method will transform reality by applying inclusive and participatory strategies. Given the complex nature of this approach, it is crucial not to dissociate the individual from the object of knowledge since it is vital to fully incorporate the parties involved in this evolutionary process to foster positive changes in the social sphere. Action Research aims to examine current teaching practices, create conducive and effective learning environments, investigate institutions, and take action after continuous reflection, understanding, planning, and implementation. This cycle must constantly refine the educator's work and ensure alignment between desired and achieved results. About this, Restrepo (2002) this, Restrepo (2002) states that Action Research refers to the incessant exploration of the appropriate educational system, analyzing and optimizing both the teaching practice and its principles. This educational system includes beliefs, approaches, techniques, and routines that can be reviewed and modified anytime. The teacher-student relationship is considered essential, requiring a thorough understanding of the strengths and weaknesses of each party, as well as a continuous self-analysis that facilitates a broader and more detailed understanding of the pedagogical process.

The type of research is projective since, according to its purpose, this typology obeys to be a projective or feasible project as established by the position of the following authors: firstly, Hurtado (2010, p.49) this type of research has as its objective the design or creation of proposals directed towards the specific solution of a problem raised; secondly, according to the position of the Universidad Pedagógica Experimental Libertador de Venezuela (UPEL, cited in Hurtado 2000, p.135) projective research corresponds to a type of research called Feasible Project, which consists of the elaboration of a proposal, a plan, a program, a procedure, an apparatus, as a solution to a problem or need of a practical nature, either of a social group, an institution, or a geographic region, in a particular area of knowledge.

A field design is assumed from the postulates of Hurtado (2010), who states that this design allows the researcher to collect information directly from the context in which the study is conducted. For this reason, the data collection techniques used in this design aim to locate the event in its context and find ways to access direct observation or the direct collection of information. Likewise, the internal validity criteria are related to the instruments' precision, the observers' training, and the clarity and coherence of the premises and theoretical approaches on which they are based.

Qualitative techniques will be used to respond to the methodological elements of this research. Therefore, the following techniques will be used:

Semi-structured interview: It facilitates a process of connection with an essential source and, through consecutive encounters, a communication is established in which it is emphasized how the interviewee structures, relates, and organizes his or her narrative, as well as the metaphors, images or links he or she chooses to establish. Thus, the interviewer seeks to understand the interviewee's interpretations and perspectives on a particular topic. The interview will be conducted directly and personally with the teachers.

Focus groups: A process is carried out in which participants create interpretations of the phenomenon under investigation. The focus group is seen as a tool whose objective is the deliberate generation of discourse by a group of individuals convened in a given period to discuss a specific topic proposed by the researcher. This method creates an environment of trust where participants can respond without feeling coerced, allowing them to express themselves authentically and freely. This results in diversified and high-quality responses that complement the data collected in the interviews. In this study, focus groups are essential as they provide a detailed insight into the perceptions of the protagonists involved in the research.

Documentary analysis: This refers to the method used to identify, obtain, and validate data, allowing the integration of both primary and secondary sources. This strategy is based on inspecting documents, which involves identifying, locating, choosing, and examining the sources and records necessary to meet the proposed objectives. Analyzing these documents, analytical notes and observations are developed that reflect patterns, repetitions, gaps, and inconsistencies. The result is a consolidated understanding of the reality under study.

Although only two teachers from each Educational Institution will be approached and recognize that many other teachers want to avoid participating in the research, it will be carried out only with those who accept by signing the informed consent and complying with the established inclusion and exclusion criteria. Therefore, the sample will not be obtained by probability sampling but will be intensive, especially with those who wish to collaborate with the research. The participation of at least 50 teachers working in other educational institutions of the sector and belonging to the official system of the Colombian Ministry of National Education.

RESULTS AND DISCUSSION

The incursion of technology in education has radically changed the landscape of traditional learning, no longer limited to physical classrooms or conventional teaching methods. Online educational platforms, interactive applications, and digital resources have democratized information, allowed wider access and

facilitated personalized learning. In addition, these technological tools foster collaboration, creativity, and communication between students and teachers from different parts of the world, eliminating geographical and time barriers.

However, evolving at a dizzying pace, technology imposes an imperative need for adaptation. It is not a matter of adopting the latest tool or application but of understanding how these innovations can be effectively integrated into the curriculum to improve learning outcomes. In this regard, Afanador (2023) considers that educational institutions must keep updated regarding technological infrastructure, methodologies, and pedagogical approaches that allow them to take full advantage of these tools.

In this scenario, the role of the teacher has evolved significantly since the 21st-century teacher is not simply a repository of knowledge but a facilitator in the true sense of the word. His role has been transformed to guide and support students in their autonomous learning journey, using technology as an ally. According to Beltrán and Enciso (2019), in addition to mastering their area of expertise, the teacher must now be competent in digital skills, online ethics, and digital teaching methodologies.

Likewise, with the increasing integration of ICTs in education, the need arises to educate students on the responsible and ethical use of technology. This ranges from understanding copyright to online privacy and cyber security cyber security. Therefore, teachers have a duty to instill digital awareness in their students, teaching them how to navigate the online world safely and ethically.

In other words, it is essential to recognize that today's educational world increasingly values digital skills and the ability to adapt to changing technological environments. Therefore, education must not only focus on imparting theoretical knowledge but also on equipping students with the competencies needed to meet future challenges. This means integrating technology into learning to reinforce critical thinking, problem-solving, collaboration, and digital communication skills.

In this order of ideas, Brenes (2020) expresses that the emergence and constant evolution of Information and Communication Technologies in education has radically changed the pedagogical landscape. This transformation is not simply an addition of digital tools to the classroom but a complete renewal of how teaching is conceived and practiced. Now, the student is not a passive recipient of information but an active agent in his or her educational process, thanks to the wide range of resources and platforms that ICTs provide. The possibility of accessing multiple sources, interacting in real-time with experts and peers from all over the world, and personalizing learning has raised the educational potential to heights unimaginable a few decades ago.

These opportunities, however, come with significant challenges. Immersion in a digital environment means that students must develop skills to discern the quality and veracity of information and acquire self-management competencies and responsibility in their learning process. This is only possible if a student-centered educational approach is adopted, where collaborative learning and self-exploration become fundamental pillars (Cejas, 2018). On the other hand, the effectiveness of ICT in education does not depend exclusively on the technology itself but, to a large extent, on the mediator between it and the student. It is the teacher who decides how, when, and why to integrate these tools into the teaching-learning process teaching-learning process. Their role is not only that of facilitator but also that of guide and mentor in an ever-changing digital landscape.

However, the effective integration of technology in the classroom goes beyond mere technical competence; it requires teachers to understand at a pedagogical level how ICT can enhance, complement, and sometimes transform traditional teaching strategies. According to Cruz (2019), this is where continuing education and professional development for teachers become crucial. Preparation should focus not only on how to use a tool but also on how to integrate it effectively to maximize learning.

ICT, therefore, offers a horizon for 21st-century education, but its success depends on a balanced combination of advanced technology, renewed pedagogy, and well-prepared teachers. Educational institutions and teacher educators are responsible for ensuring that this equation is fulfilled, thus ensuring that technology integration in the classroom is a real advantage for students and not just a superficial add-on.

Similarly, the conjunction of education and ICT has resulted in a paradigm shift in the global educational landscape. Education, historically considered the pillar of human development, has found in technology an ally to broaden horizons, democratize access to knowledge, and foster autonomous learning (Guerrero, 2022). The digitization of education allows that, now more than ever, learning is not limited by the classroom walls but transcends multiple platforms and contexts, allowing continuous learning at any time.

Moreover, in these modern learning environments, the learner is not simply a passive receiver equipped with technological tools but becomes an active explorer of knowledge, selecting, analyzing, and synthesizing information from diverse sources. This active approach, combined with the adaptive nature of digital educational platforms, ensures that the learning process is uniquely tailored to each student, taking into account his or her pace, learning style, and preferences.

CONCLUSIONS

It is imperative to recognize and address the diversity in the technological competencies of teachers while

highlighting their resilient attitude and commitment to teaching that adapts to the challenges of the digital age. In Monteria, Colombia, the educational scenario reflects a remarkable spirit of adaptability and a strong aspiration to provide cutting-edge education to students. Educational policies and teacher training initiatives must persist in supporting and enhancing these efforts.

The heterogeneity in teachers' technological competence mirrors the wide range of experiences and career paths they have within education. Far from being a barrier, this diversity represents a valuable opportunity to enrich learning and training through diverse perspectives. It is crucial that educational institutions, in line with the rapid evolution of Information and Communication Technologies (ICT), provide the necessary tools and opportunities for every educator to advance and develop in this area, regardless of their initial level.

The lack of adequate technological resources, such as computers and a reliable Internet connection, exacerbates educational inequalities. This digital divide restricts students' ability to access online learning opportunities and limits their ability to compete in an increasingly digitized world. It is critical to address this disparity to ensure that all students, regardless of their socioeconomic background, enjoy equal learning opportunities.

Despite the obvious benefits that ICTs offer for education, there is still significant resistance on the part of some teachers towards adopting these tools and methods. This reluctance may stem from several factors, including lack of adequate training, fear of technology, or the perception that these tools may be more distracting than beneficial. To overcome this resistance, it is crucial to invest in professional development, provide training specifically tailored to the needs of teachers, and foster an educational culture that values and supports innovation.

Identifying emerging trends, such as the application of artificial intelligence in education, is essential to anticipate future needs and prepare students and teachers for the demands of the 21st century. These trends open up new possibilities for improving teaching and learning, and educational institutions must be well-informed and prepared to adapt to these innovations, thus ensuring that their potential benefits in education are maximized.

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CONFLICT OF INTEREST
The authors declare that there is no conflict of interest.

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