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ORIGINAL

Pedagogical model for the integration of ICTs into teaching practices in official educational institutions in rural Monteria

Modelo pedagógico para la integración de las TIC a las prácticas docentes de las instituciones educativas oficiales de la zona rural de Montería

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ABSTRACT

The general purpose of the research is to configure a pedagogical model for the integration of ICT to the teaching practices of official educational institutions in the rural area of Monteria. The epistemic structuralism model and the structural analysis method were assumed, with a type of ethnographic research and a field design, to collect information the semi-structured interview, the focus group and the documentary analysis were applied. The key participants were 50 teachers working in other educational institutions of the official sector. The results of this research have revealed that the technological infrastructure in these areas is still limited, which represents a significant challenge for the successful implementation of ICT. This suggests the need for investments in improving connectivity and the availability of technological devices in these institutions.

Keywords: Pedagogical Model; ICT; Educational Institutions.

RESUMEN

El propósito general de la investigación es configurar un modelo pedagógico para la integración de las TIC a las prácticas docentes de las instituciones educativas oficiales de la zona rural de Montería. Se asumió el modelo epistémico estructuralismo y el método análisis estructural, con un tipo de Investigación Etnográfica y un diseño de campo, para recolectar la información se aplicó la entrevista semiestructura, el grupo focal y el análisis documental. Los participantes clave fueron 50 docentes que laboran en otras instituciones educativas del sector oficial. Los resultados de esta investigación han revelado que la infraestructura tecnológica en estas áreas es aún limitada, lo que representa un desafío significativo para la implementación exitosa de las TIC. Esto sugiere la necesidad de inversiones en la mejora de la conectividad y la disponibilidad de dispositivos tecnológicos en estas instituciones.

Palabras clave: Modelo Pedagógico; TIC; Instituciones Educativas.

INTRODUCTION

Within the Colombian scenario, the guidelines for incorporating ICTs in education are stipulated by Law 1341 (2009) or the ICT Law. This regulation provides the main framework for designing public policies in Information and Communication Technologies, addressing aspects such as coverage, quality of service, incentives for investment in the sector, and promotion of these technologies. It also refers to the appropriate use of networks, the radioelectric spectrum, and the state's powers in planning, management, resource

administration, regulation, and supervision, ensuring equitable access to the Information Society for all citizens.

For this purpose, the Ministry of National Education conducts training programs for teachers to enhance their competence in using ICTs, recognizing that merely using computers is not enough. In 2008, the Ministry presented a report entitled Apropiación de TIC en el Desarrollo Profesional Docente, which seeks to provide guidelines about the necessary training that Colombian teachers should receive about the application of ICT in their pedagogical work (Ministerio et al., 2013, p.48).

Likewise, the Ministry of National Education (MEN) has been promoting initiatives that encourage the incorporation of emerging technologies to modernize education in Colombia, highlighting initiatives such as Computadores para Educar, among others. In addition, strategies have been formulated, such as the Sector Plan 2010-2014, emphasizing innovation's relevance. All this has been done to ensure Colombian educational institutions are aligned with international trends and demands.

However, it is worth noting that, although there has been an emphasis on updating the technological infrastructure, pedagogy must be effectively adapted to these new media. A clear example is incorporating the competency-based learning approach in the MEN guidelines, which includes technological competencies. This suggests that every digital tool used in the educational environment should have a clear educational purpose.

In addition to the policies above, the Colombian government has implemented the Vive Digital Plan, which since 2010 seeks to reduce the digital divide and promote the use of ICTs in all sectors of society, including education. This strategic Plan focuses on increasing the number of computers in schools, improving Internet connectivity, and training citizens in basic and advanced digital skills. In education, in particular, the Plan has promoted creating educational digital content and online training for teachers and administrators. They must guide and facilitate learning in digital environments effectively. This comprehensive approach ensures that the implementation of ICTs is focused on infrastructure and the development of capabilities that allow effective and transformative use of these tools in educational processes.

In this context, it is also essential to highlight the importance of continuously evaluating and monitoring the effectiveness of the interventions carried out within the framework of the ICT Act and associated programs. Continuous evaluation makes it possible to identify areas for improvement and ensure that the resources invested in educational technology generate a positive return in terms of improved student learning and competencies. For example, monitoring programs such as Computadores para Educar have shown the need to strengthen technical support and teacher training in rural areas, where technological difficulties may be more pronounced. In addition, these programs should be inclusive and consider the specific needs of vulnerable populations, ensuring that technology is a vehicle for equity and not for widening the educational gap. These coordinated and critically evaluated actions are essential for Colombia to move towards a more effective and equitable integration of ICTs in its educational system.

According to the MEN (2013), more than simply integrating ICT into the teaching-learning process is required to guarantee an automatic improvement in that process. Specific strategies are required to maximize the potential of these resources for the benefit of student learning. Although the adoption of ICTs can revitalize teaching methodologies and enhance student learning, it is essential to have innovative educators who know how to exploit ICT-enhanced learning environments fully. From this arises the imperative need to develop a pedagogical model to guide the incorporation of ICT into teachers' didactic strategies.

Following the line of what was previously exposed in the rural schools of Monteria, based on non-systematic observations of the researcher, a challenge in the pedagogical performance of educators stands out: the limited incorporation and coherent use of ICT in their professional work. This situation affects the optimization of the teaching-learning process since the didactic and methodological approach teachers adopt needs to be more appropriate and varied, lacking stimulating environments that encourage reflection and critical analysis in students about contextualized situations. In addition, teaching in these schools tends to follow a traditional pattern, with no space for reflection and critical analysis of contextualized situations traditional pattern, without spaces for reflection and integration of technological tools, which leads to student demotivation, difficulties in comprehension of subjects, and a limited mastery of technologies.

Along the same lines, educators use minimal technological tools, opting for conventional methods like blackboards and photocopies. Their classes are directed, where the educator explains the subject and transcribes information on the blackboard for the students to copy. Printed workshops are often used for students to complete during class to reinforce the subject matter. Under this scenario, there still needs to be a defined pedagogical model to guide the educator in effectively using the new technological tools and to boost motivation and self-learning in students.

Therefore, the purpose is to establish a model incorporating ICT into pedagogical routines, encouraging the desire to use technological tools and creating educational tactics that guide their use. Batista et al. (2015) argue that the inclusion of ICTs in education significantly changes the purpose of their use since they enhance the educator's work and promote student learning. From this perspective, educational contexts that take advantage of technologies not only provide multiple pedagogical tools but also allow the creation of didactic

approaches for their effective integration, ensuring a more enriching educational experience.

METHOD

As a starting point, the questions and purposes of the research and the methodological aspects are defined, which sustains, in principle, an epistemic posture from Structuralism that considers researching as an interpretation and explanation of reality from the relationships established in the process. In addition, it seeks to clarify or resolve the links between the behavior of human beings, socially and personally. According to Hurtado (2010), "Structuralism is defined as follows from the approaches of Saussure in the field of linguistics, and extends to the social sciences through the approaches of Levi Strauss" (p. 89), symbols are identified as structures that are created when analyzing the interrelationships between human behaviors in the personal and social aspect. Therefore, the success of the processes depends largely on the analytical capacity of the researcher to establish relationships and generate models. The results of the research are given from an interpretive analysis.

In coherence with this epistemic position, the structural analysis method will focus on analyzing language, culture, and society where real observation is presented. Constructing models of that reality is initiated to analyze structures (relationships) between the elements found. To perform this process, levels must be specified, units in a hierarchical way, and notions, using an adaptable terminology, to validate the results obtained; it is done with the level of congruence between the model obtained and the context studied.

Regarding this method, Hurtado (2010) proposes a series of stages for its application:

The first phase is the observation of the real, the exhaustive description of the totality of the phenomena and their interrelationships; that is, the collection of all possible data referring to the surveyed system.

The second phase is dedicated to the investigation of the laws that govern the system and the creation of intelligible models that explain the constellation of data: the best hypothesis, the true one, will be the one that, in the simplest form, accounts for all the observed and observable phenomena.

The third phase deals with experimentation with the devised models. It is a theoretical, not empirical, praxis using which these models are retrospectively refined and perfected.

The fourth phase, in continuity with the third phase, tries to investigate the structural, abstract relations until the formulation of the structure of such a system is reached.

The fifth phase reworks the data collected on the functioning of the structures of the different particular systems, and its purpose is to detect and one day formulate the structure of the structures.

The present study assumes a type of ethnographic research that Martinez (2005) allows to approach the true nature of human realities, focusing on description and understanding. From this perspective, this research is based on the conviction that the traditions, roles, values, and norms of the environment in which one lives are gradually internalized and generate regularities that can adequately explain individual and group behavior. In other words, the members of an ethnic, cultural, or situational group share a logical or reasoning structure that is usually not explicit but is manifested in different aspects of their lives.

In order to fulfill the purpose of the research and answer the question, a Field Design is required, which, according to Hurtado (2010), is one in which the researcher obtains data from direct sources in their natural context. Field designs are widely used in education to identify educational problems in schools and institutions. The advantage of this design is that the information can be obtained directly in the educational context without the interference of artificial factors that could alter the results, making them very realistic.

Qualitative techniques will be used by the field design for data collection in this research. According to Hernández, Fernández, and Sampieri (2014), with the collection of information in a qualitative study, we seek to obtain data (which will become information) from people, living beings, communities, situations, or processes in depth in the own forms of expression of each one. Since we are dealing with human beings, the data of interest are concepts. Techniques to be used:

A semi-structured interview refers to face-to-face meetings between the interviewer and the interviewee channeled to analyze the participants' conceptualizations concerning their lives, circumstances, events, or experiences. In the semi-structured interview, the interviewer is responsible for preparing a thematic script about what he/she wishes to discuss with the interviewee.

For this purpose, it is important to use open questions that allow the interviewee to express himself/herself broadly and without conditioning, without deviating from the essential topic. However, this may happen, in which case the researcher should reorient it prudently without causing feelings of limitation or conditioning in the interviewee, highlighting that emerging topics may arise that were not planned but that are useful for the research (Hernández et al., 2014). Similarly, the interviewer must remain focused on the activity carried out to progress in the topic raised, linking the answers given by the respondent with the next question to be asked, helping the activity to develop spontaneously and, at the same time, creating new questions associated with the main topic.

Focus groups are considered a process of meaning production, where group discussion is used to generate

a deep understanding of the participants' experiences and beliefs. Focus groups provide a climate of trust, in which the informants do not feel pressured to answer the questions asked and can do so in a natural and free manner, thus obtaining a variety of quality answers, complementing the information obtained from the interview. In this regard, Hernández, Fernández, and Sampieri (2014) state that the purpose of the focus group is the controlled production of discourse by a group of subjects who are brought together for a limited period to discuss a certain topic proposed by the researcher.

Documentary review: selecting the most outstanding ideas of all the information in a text to structure its content, avoiding misrepresentations or changes to its essence. Therefore, it does not refer only to the recovery or dissemination of information but is channeled to facilitate users' learning by providing adequate and relevant information to the topic being addressed (Hernández et al., 2014). Therefore, it is a technique developed through a set of intellectual activities, in which it is intended to detail and find the meaning of the texts in a unified way, which helps them to be preserved over time; at the same time, in the development of this work, a process is carried out in which the meaning of the texts is analyzed.

In the development of this work, a process of analysis, synthesis, and deduction is carried out, in which the bibliography on which it is based must be taken into account, and an extraction attached to the central ideas of the document must be carried out.

The informants correspond to two secondary school teachers from each official rural educational institution of the corresponding municipality, and recognizing that many other teachers do not want to participate in the research, it will be carried out only with those who accept by signing the informed consent and comply 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 was arranged.

RESULTS AND DISCUSSION

The comparison of the information collected through the instruments applied, the previously defined study categories, and the emerging categories allowed for an enriching evaluation of the data collected in this research. By comparing the information with the study categories, it was possible to identify significant trends and patterns related to integrating ICTs into teaching practices. Moreover, incorporating emerging categories revealed additional aspects and approaches that might not have been evident initially but contributed to a more complete understanding of the phenomenon studied. This contrastive process also involved consideration of the relevant theoretical foundations, which made it possible to relate the empirical findings to the research's conceptual basis and deepen the understanding of the theoretical and practical implications of the results.

The findings related to the category of pedagogical models highlight the diversity of educational perspectives and approaches among teachers regarding the integration of ICTs in teaching. This diversity is a reflection of a constantly evolving constantly evolving educational landscape. As Agurto (2021) points out, the role of technology in teaching is constantly changing, and different teachers adopt different approaches to integrate it effectively. The persistence of the traditional pedagogical model in some educational areas underlines that the shift towards more modern teaching methods is gradual and contextualized. Thus, ICT integration must be considered a variety of approaches but must be flexibly adapted to meet students' changing needs and the educational environment's demands.

In this regard, Castro (2017) highlights the importance of the coherent and organized implementation of pedagogical models in the teaching-learning processes. This translates into increased student interest and the achievement of meaningful learning. It also highlights how this approach contributes to developing competencies related to collaborative learning, which promotes an educational experience focused on socialization and solidarity. It also emphasizes that this practice facilitates the development of students' intellectual capacities, leading to individual and social growth.

The heterogeneity in adopting pedagogical models that integrate ICTs is both a challenge and an opportunity. On the one hand, the variability of approaches reflects the richness of perspectives and the capacity of teachers to adapt to different contexts and needs. On the other hand, this diversity can lead to consistency in students' educational experience, depending on how and to what extent ICTs are implemented in different school environments. This situation underscores the need to establish clear frameworks and policies to guide educators in effectively integrating technology, promoting a balance between innovation and pedagogical cohesion.

In addition, the transition towards incorporating ICTs in educational processes raises critical questions about teachers' preparation and continuing education. The effectiveness of technological pedagogical models depends not only on the availability of digital tools but also on the competence and confidence of teachers to use these tools in ways that enhance learning. The teacher training must, therefore, go beyond the mere functional use of technology and encompass pedagogical aspects that foster creativity, critical thinking, and

dynamic interaction in the classroom. This training must be continuous and adapted to technological advances, ensuring that educators are kept up to date and motivated to explore new pedagogical possibilities.

The role of collaboration and social interaction in modern pedagogical models, as Castro (2017) highlights, is crucial in the context of teaching with ICT. Digital technologies offer unique platforms for distance collaboration, co-creation of knowledge, and cultural exchange, which can significantly transform classroom dynamics. However, for these opportunities to translate into real educational benefits, it is essential that pedagogical models not only integrate technology but also actively promote educational practices that foster interaction and cooperation among students. This implies a paradigm shift from a more traditional, teacher-centered approach to one that values and capitalizes on student interactions as an essential part of the learning process.

Similarly, the analysis of the effectiveness of pedagogical models that incorporate ICT must consider success metrics relevant to current educational objectives. It is not enough to evaluate academic performance through standardized tests; measuring problem-solving, creativity, and adaptability skills is equally important. The monitoring and evaluation of these models must be adapted to reflect the complexity and multidimensional nature of learning in the digital age. Only in this way can truly meaningful data on the impact of ICT on education be obtained and pedagogical practices adjusted to maximize the benefits for all students.

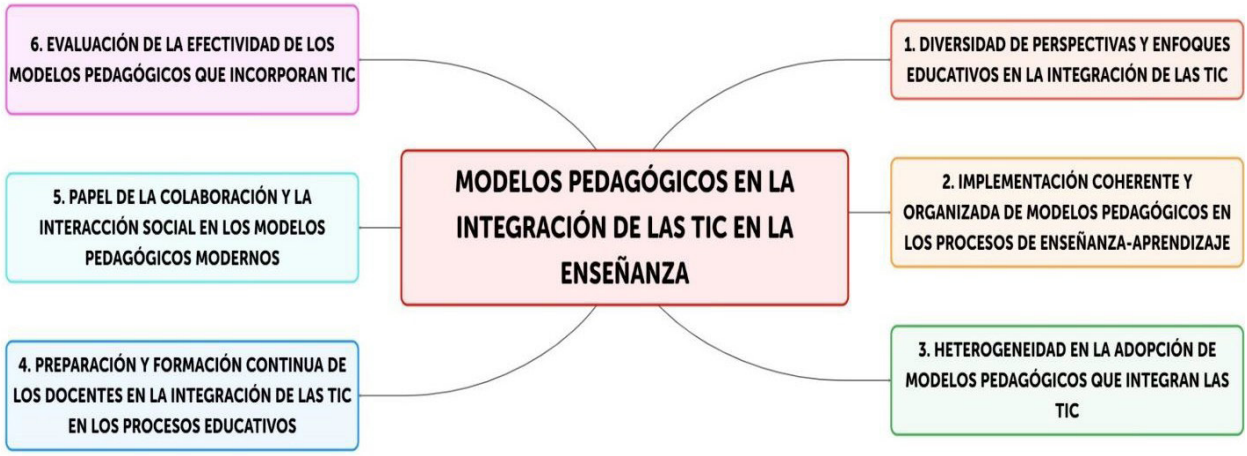

Figure 1. Pedagogical models in the integration of ICTs in education

Regarding the ICT integration category, the findings reveal a diversity of technological competencies among teachers, which coincides with Sandí and Sanz's (2018) observation on the existence of digital natives and immigrants. This highlights the need for a personalized approach to training and technological support for teachers, supported by authors, the importance of training teachers in transforming teaching through technology. In addition, the active engagement of teachers to improve their technology skills highlights the importance of continuous learning. This commitment is essential to staying current and ensuring effective teaching in the digital age. Teachers who adopt a highly personalized and student-oriented pedagogical approach respond to the demands of students seeking personal meaning in their learning.

Integrating ICT into this personalized approach highlights how technology can effectively ally in modern education. This concept is supported by authors such as Losada, Correa, and Fernandez (2017), who describe how ICT can enhance teaching and learning by transforming existing practices. ICT facilitates personalization and differentiation of learning by providing technological tools that enable teachers to tailor instruction according to individual student needs.

The diversity in teachers' technological competencies revealed by Sandí and Sanz's (2018) findings highlights the existence of a significant gap between those who have grown up in the digital era (digital natives) and those who have had to adapt to it (digital immigrants). This dichotomy suggests that ICT training strategies should be differentiated and adaptive, recognizing the varying levels of skill and confidence with technology among faculty. By offering customized training, teacher effectiveness in the use of technology can be maximized, ensuring that each teacher can move from their specific starting point toward a more complete and effective mastery of digital tools in their pedagogical practice.

Furthermore, teachers' commitment to continuous learning is essential in a field as dynamic as digital technologies. ICT training is not a one-time achievement or a once-and-for-all goal but a continuous process that requires constant updating and adaptation. Professional development programs must, therefore, provide regular opportunities for teachers to update themselves on new tools and emerging methodologies. This approach not only supports teachers in their professional development but also ensures that they are equipped to provide relevant, up-to-date education that responds to the changing needs of their students.

The personalization of learning enabled by ICT is another crucial aspect to emphasize. Technological tools, such as learning management systems and adaptive platforms, provide teachers with the means to tailor content and teaching methodologies to the individual needs of each student. This not only facilitates a more student-centered approach but also allows for addressing diverse learning styles and rates of progress, which is essential for fostering an inclusive and equitable classroom environment. The effective implementation of these tools can significantly transform pedagogical interaction, making learning pedagogical interaction, making learning more interactive, engaging, and personalized.

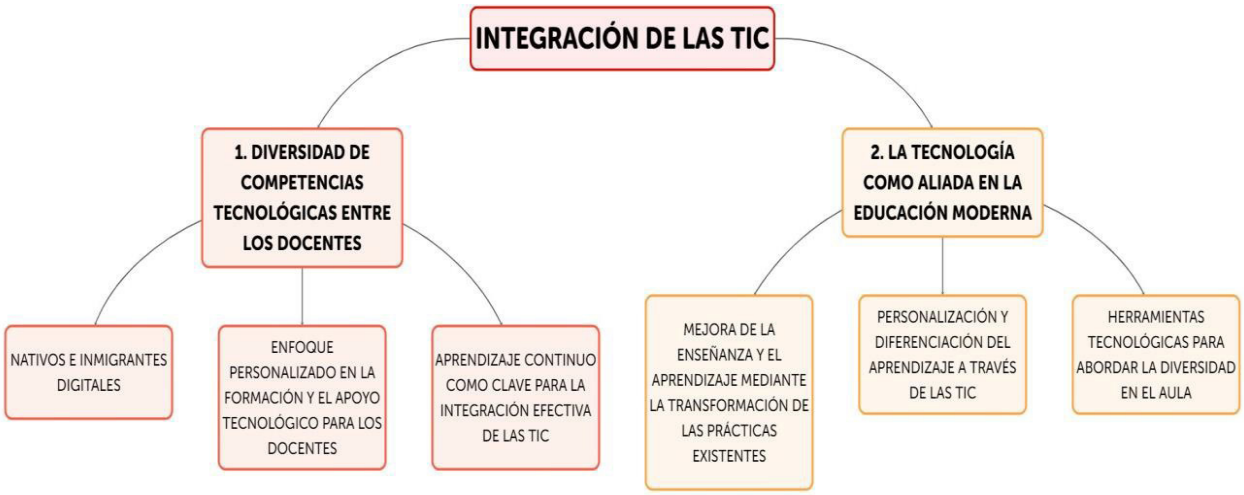

Figure 2. ICT integration

Regarding the theoretical-methodological aspects category, management, as highlighted by Castro (2017), is a critical factor for the success of any educational process. It is a decision-making process that encompasses planning, defining purposes, organizing the necessary steps to achieve them, and considering the available resources. In addition, management involves anticipating possible obstacles or drawbacks while implementing plans and establishing strategies to address them.

In this context, management becomes a central element of the methodological route since it guides decision-making in all institutional aspects, from the planning of pedagogical practice to the administration of resources and the implementation of institutional purposes. It is also important to note that management not only refers to administrative aspects but also encompasses the interactions and relationships among all school and academic community members. These interrelationships develop according to the rules, culture, and specific parameters of each school context, which underlines the importance of effective and coherent management for the successful functioning of an educational institution.

As pointed out by Hernández (2017), the consideration of theoretical-methodological aspects is fundamental for the successful planning and implementation of institutional projects in the educational setting. Considering time, mode, and place factors, these aspects provide an organizational structure to anticipate and manage the necessary transformations in an educational institution. Essentially, they establish the path and strategies necessary to materialize institutional purposes.

Effective management in the educational context requires leaders who possess administrative skills and a deep understanding of the pedagogical principles that guide teaching and learning. This implies that managers must be able to translate educational theories into concrete practices that can be implemented in their institutions. Such capacity is crucial when adapting education to rapid technological and social changes. Therefore, the continuous training of these leaders should include both management aspects and a deepening of new pedagogical and technological approaches, enabling them to lead with vision and effectiveness.

On the other hand, the management process must also be reflective and adaptive, allowing the decisions made to be reviewed and modified based on feedback and results obtained. This flexibility is essential to respond to unforeseen challenges and to take advantage of opportunities that arise during the implementation of educational projects. In this sense, evaluation and monitoring systems play a fundamental role, as they provide the necessary data to adjust strategies and ensure that educational objectives are being met effectively and efficiently.

In addition, educational management must consider inclusion and diversity as central axes of any institutional planning or action. This means that policies and practices must be designed to include all students, regardless of their personal, social, or cultural conditions, and have access to quality learning opportunities. This inclusive perspective not only enriches the educational environment but also prepares students to live and work in a

globalized and diverse society, reinforcing the role of education as a pillar for equity and social justice.

Figure 3. Theoretical and methodological aspects

CONCLUSIONS

The diversity in teachers' technological competencies was evident. Some showed strong and up-to-date ICT skills, while others admitted needing more training. This variability highlights the importance of assessing and improving educators' technology skills. Teachers also revealed a highly personalized and student-interest-oriented pedagogical approach. They were committed to empowering students to make active decisions about their learning, using ICT to access resources and explore topics that deeply interest them.

The findings showed that selecting appropriate technology tools is crucial to aligning ICT with learning purposes and course content. Careful planning and considering how ICT can support and enhance instruction are critical. Tailoring digital resources to meet individual learner needs reflects a concern for personalization of learning. Promoting online collaboration and creating an accessible learning environment highlight the importance of inclusion and equity in technology-enhanced education.

Continuous training in educational technology and regular evaluation of ICT integration strategies highlight the importance of teacher professionalization and continuous improvement. In addition, creating clear policies and guidelines on the appropriate use of ICTs and promoting cybersecurity demonstrate the need for a holistic approach to technology management in the educational environment.

These teachers use ICT to diversify and enrich the educational experience. Online platforms, collaborative tools, and diversified digital resources create dynamic and participatory learning environments. In addition, technology is facilitating the adaptation of methods and resources to the individual needs of each student, reflecting a deep understanding of the diversity of learning styles.

Technology has proven to be an effective ally in modern education, facilitating the personalization of learning, tracking student progress, and providing specific feedback. In addition, ICT integration fosters the development of essential skills such as critical thinking, problem-solving, and effective communication, preparing students for the challenges of the contemporary world.

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