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THE IMPACT OF ARTIFICIAL INTELLIGENCE TOOLS ON THE TEACHING-LEARNING PROCESS IN BASIC EDUCATION

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RESUMEN: El presente proyecto tiene como objetivo investigar la incidencia de las herramientas de Inteligencia Artificial en el proceso enseñanza y aprendizaje de la educación básica de la Unidad Educativa Jean Piaget de Guayaquil. A través de una investigación mixta marcada por la recolección de datos con técnicas adecuadas, como la entrevista a directivos, y encuesta a estudiantes y docentes, se pudo identificar y percibir una tendencia positiva en relación al uso y a la consideración de las herramientas de IA en el ámbito escolar. Sin embargo, también se muestra que existen aspectos retadores, como la consideración de parte de los estudiantes que es de forma negativa o la necesidad de aumentar su acceso y su consideración de las herramientas de IA. Para darle solución a esta problemática, se dan recomendaciones útiles y adaptadas a la realidad actual y se propone estrategias pedagógicas basadas en IA para promover un aprendizaje más significativo		
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RESUMEN

El presente proyecto tiene como objetivo investigar la incidencia de las herramientas de Inteligencia Artificial en el proceso enseñanza y aprendizaje de la educación básica de la Unidad Educativa Jean Piaget de Guayaquil. A través de una investigación mixta marcada por la recolección de datos con técnicas adecuadas, como la entrevista a directivos, y encuesta a estudiantes y docentes, donde se obtuvo resultados relevantes como que se pudo identificar y percibir una tendencia positiva en relación al uso y a la consideración de las herramientas de IA en el ámbito escolar. La investigación revela que la incorporación de herramientas de inteligencia artificial (IA) en la educación básica tiene un impacto positivo en el proceso de enseñanza-aprendizaje. Los estudiantes de 8 a 11 años muestran familiaridad con estas tecnologías, lo que mejora su motivación y comprensión, aunque persisten percepciones negativas y desigualdades en acceso. Los directores y docentes reconocen el potencial de la IA, pero resaltan la importancia de gestionar riesgos éticos, privacidad y brechas digitales. Concluyendo que La IA ofrece potencial para personalizar el aprendizaje, automatizar tareas y facilitar la toma de decisiones pedagógicas, fortaleciendo la innovación educativa. Sin embargo, su integración aún enfrenta obstáculos como falta de infraestructura, recursos limitados y necesidad de capacitación docente. Lo que conduce a proponer estrategias pedagógicas basadas en IA para promover un aprendizaje más significativo.

Palabras Clave: Enseñanza, Aprendizaje, Inteligencia artificial, Educación básica

ABSTRACT

The aim of this project is to investigate the impact of Artificial Intelligence tools on the teaching and learning process in basic education at the Jean Piaget Educational Unit in Guayaquil. Through mixed research characterized by data collection using appropriate techniques, such as interviews with administrators and surveys of students and teachers, a positive trend was identified and perceived in relation to the use and consideration of AI tools in the school environment. However, it also shows that there are challenging aspects, such as the negative perception of AI tools by students and the need to increase their access to and consideration of these tools. In addition, the research reveals that the incorporation of artificial intelligence (AI) tools in basic education has a positive impact on the teaching-learning process. Students aged 8 to 11 are familiar with these technologies, which improves their motivation and understanding, although negative perceptions and inequalities in access persist. Principals and teachers recognize the potential of AI, but highlight the importance of managing ethical risks, privacy, and digital divides. In conclusion, AI offers the potential to personalize learning, automate tasks, and facilitate pedagogical decision-making, strengthening educational innovation. However, its integration still faces obstacles such as lack of infrastructure, limited resources, and the need for teacher training. This leads to the proposal of AI-based pedagogical strategies to promote more meaningful learning.

Keywords: Teaching, Learning, Artificial intelligence, Basic education

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INTRODUCTION

Education is currently undergoing a process of transformation fueled by technological advances. In this context, artificial intelligence (AI) occupies a prominent place due to its transformative potential, as it has the capacity to change teaching and learning. This thesis aims to investigate the impact of AI tools on the teaching-learning process in basic education, where the training of young people is the foundation for the comprehensive development of children and their academic experiences as future adults (Tomalá and Tomalá, 2025).

The problem arises from the rapid increase in the incorporation of AI-based educational technologies, a development that, although it also brings advantages and benefits, raises concerns and challenges regarding its introduction, accessibility, and effectiveness in relation to basic education. In some schools, especially those located in rural areas or places excluded from development, the incorporation of these tools is in its initial stages or uneven, creating a digital divide that can translate into inequalities in learning (Cabrera, 2024). Similarly, there is a need to understand how these technologies affect student motivation, participation, and performance.

Clearly, this scenario highlights the importance of researching the real impact of artificial intelligence tools in education, which will serve to generate knowledge for a more effective and ethical introduction of educational technology tools and thus move towards more personalized, interactive learning that is connected to the characteristics of students in basic education.

This thesis presents a comprehensive analysis of the impact of artificial intelligence tools on the teaching-learning process in basic education. The research addresses a contemporary and relevant problem in the educational field, where technological advancement has promoted the incorporation of AI tools in educational contexts, yet many institutions have not effectively implemented these technologies.

The study is motivated by the potential of AI to personalize learning, automate teaching tasks, and improve student performance, while acknowledging existing barriers such as lack of teacher training and limited

technological infrastructure. The research is conducted in the Ecuadorian educational context, specifically focusing on basic education institutions.

This work is structured in four chapters: Chapter I presents the research design including the problem statement, objectives, and thesis statement; Chapter II develops the theoretical framework with relevant theories and background; Chapter III describes the methodological approach using mixed methods; and Chapter IV presents the proposal and findings that will contribute to understanding AI's role in enhancing educational processes.

This research aims to contribute to the understanding of how AI technologies are shaping the teaching-learning process with the intention of promoting responsible use and use that favors the comprehensive development of students and pedagogical innovation in our educational system. Through this work, we seek to offer insights into understanding that artificial intelligence brings with it implications, opportunities, and threats in order to achieve better use of technology. Therefore, the objective of this work, based on this analysis, is to contribute to the promotion of a more inclusive educational practice in basic education that is adapted to digitalization.

CHAPTER I

THE RESEARCH PROBLEM

1.1. Title:

The Impact of Artificial Intelligence Tools on the Teaching-Learning Process in Basic Education.

1.2. Background of the problem:

The incorporation of digital technologies into educational processes has significantly transformed teaching and learning methodologies in recent years. Artificial intelligence (AI) has become one of the main tools promoted to personalize, optimize, and improve education. However, despite its importance, its integration into basic education still presents some problems that require an in-depth approach (Salinas and Vargas, 2024).

The question at hand is the status of artificial intelligence tools in pedagogical processes in basic education workplaces, that is, whether they truly contribute to more meaningful educational outcomes for students (such as academic performance, motivation, and student engagement). The reality is that artificial intelligence in the classroom is at a very early and dispersed stage; there is a lack of consensus in the educational community about its advantages, risks, and how it should be maximized (Heredia et al., 2025). Therefore, there is a lack of consensus on the adoption of AI tools, and the paradox is that the immense opportunity these tools offer ends up coexisting with their very low actual adoption in educational contexts, especially in rural areas and other more vulnerable communities (Alcívar et al., 2024).

Several studies have pointed to a growing interest in artificial intelligence in education. For example, recent international research indicates that AI-based adaptive platforms can contribute to progress in mathematics and language for primary school students, unlike conventional teaching (Casillas et al., 2024). However, this refers to the lack of longitudinal studies that corroborate sustainability and long-term effects. In Latin America, the implementation of pilot

programs and projects to integrate technology in schools, such as in Chile, Colombia, and Mexico, among others, has been facilitated by the use of AI. However, infrastructure, teacher training, and equity still represent significant obstacles to overcome (Zamora et al., 2024).

One of the clearest examples of the use of new technologies is UNESCO itself (2023) which notes that around 65% of educational centers in countries in the South lack the necessary infrastructure for the progressive maintenance of digital technologies, including AI, making their implementation increasingly difficult. In relation to the above information, the Ministry of Public Education indicates that only 20% of teachers have received any type of training related to educational technologies, which limits their use and exploitation.

This highlights a general gap between applied technologies and pedagogical technologies, which limits the possibilities for innovation in the classroom. International research has shown that the effective integration of AI into teaching and learning processes can be useful for teaching-learning processes such as motivation, participation, student autonomy, etc.

However, in Ecuador, there is no research that delves into the activity of AI in basic education. According to data provided by the Ministry of Education in 2022, 65% of the country's educational centers had access to basic technologies, but only 20% used AI tools in their teaching (Risueño and Torres, 2024). Lack of knowledge about the effectiveness of integrating AI into basic education, coupled with resistance to change and a lack of teacher training, prevents the introduction of AI into the classroom from meeting expectations, directly impacting learning and students' access to an effective teaching-learning process (Chulde, 2024).

Therefore, the value of this research lies in its ability to present sufficient data and information to understand the impact of AI tools on the teaching-learning process, in order to offer a set of policies and highlight the importance of enhancing their potential in Ecuadorian classrooms. In conclusion, this study seeks to address the challenges posed by the arrival of AI in basic education, offering evidence of its effects and challenges, and the possibility of a change in teaching methods that favors learning in Ecuador.

1.3. Formulation of the problem:

What is the impact of artificial intelligence tools on the teaching-learning process in basic education?

1.4. Broad Objective

To analyze the impact of artificial intelligence resources on the teaching-learning process in basic education

1.5. Specific Objectives

- Conduct a critical reading of the literature and existential studies on AI in the educational context, understanding the state of the art of AI applied to education and its implications.
- Systematically analyze how AI tools are being used in the educational experience of an institution, considering opportunities and challenges.
- Examine how the use of AI resources influences teaching methods and student outcomes in context, with the aim of developing proposals to improve practice.

1.6. Idea to defend

The Artificial Intelligence tools will impact satisfactorily on the teaching-learning process in basic education.

1.7. Line of Research/ Faculty.

Holistic education, attention to diversity, and inclusive education.

CHAPTER II

THE THEORETICAL FRAMEWORK

2.1. Theoretical Framework Background

Artificial intelligence has become a global trend in education by allowing adaptation in learning systems, intelligent tutoring, and automation of assessments. However, the implementation of this system in basic education is uneven compared to upper levels. Recent studies demonstrate the potential of AI in educational settings, yet implementation challenges persist, particularly in developing countries (Quirumbay, 2024).

The incorporation of artificial intelligence (AI) tools into the teaching-learning process in basic education in Ecuador is a trend that could change more traditional teaching methods, giving them a twist to adapt to the particular needs of students and to facilitate spaces that are more open and flexible, more interpersonal, more interactive, and more personalized. However, its implementation is still a work in progress, as in other areas, and poses a major challenge, especially for developing countries, where infrastructure is not always adequate, teacher training is limited, and resources are not always sufficient to cover the educational sector. This paper presents an analysis of the background, related theories, and relevant research that support the research carried out (Bacilio, 2025).

2.2. Background and Related Theses

In order to frame the topic in context, here is a set of five theses and recent works that explore aspects related to the problem of integrating AI into basic education:

- Hidalgo, et al. (2025) The impact of artificial intelligence on intercultural bilingual education in indigenous and rural communities in Ecuador. A review of the literature: The study finds that, in many developing contexts, and in the case of Ecuador, there is a lack of infrastructure and teacher training to enable the real and effective use of AI tools in basic education schools.

- Jara (2024) Applications of artificial intelligence (AI) in the Ecuadorian educational context: challenges and obstacles: The paper addresses the applications that AI could have for primary education, the effects it may have (personalization of learning, automation of assessments, among others), and the problems that the introduction of AI in the educational environment could entail.
- Guanga (2024) Challenges of Education for the Implementation of Artificial Intelligence: This study examines how AI systems are capable of adapting content or activities to the characteristics of students, leading to improvements in performance or motivation.
- Sánchez (2023) Artificial intelligence as a teaching resource: uses and possibilities for teachers: This study addresses the importance of preparing teachers in the use of AI in the classroom.
- Piedra, et al. (2023) Artificial Intelligence at the service of management and implementation in education: It concludes that incorporating AI correctly involves strengthening technological infrastructure, accessing digital resources, and implementing public policies that facilitate this transition.

2.3. Theoretical References

2.3.1. Theories on Artificial Intelligence (AI)

i) Ray Kurzweil's Theory of Technological Evolution (2019)

Ray Kurzweil argues that technology, especially artificial intelligence, is exponential in nature, to which the author adds the possibility of foreseeing a few more advances in education within a few decades. The law of accelerating returns suggests that the injection of artificial intelligence into educational processes can bring about real change in teaching practices and clearly translate into more personalized and effective learning experiences. According to Kurzweil, the ability of machines to assimilate human situations and contexts is the answer to more inclusive education, an education in which the technologies used are adapted to students, or, in other words, educational equity is respected to a certain extent (Kurzweil, 2019).

ii) Theory of AI and Personalized Learning Luckin et al., (2016).

Luckin et al., for their part, state that artificial intelligence can break down the vast amount of information collected about students' learning styles and paces and offer learning content on demand. This theory shows that personalizing learning using artificial intelligence can influence student motivation and the academic gap or promote a more measured type of development in diverse educational communities. Artificial intelligence becomes the agent that adjusts the difficulty of learning, generates immediate feedback, and also becomes the support for the development of student autonomy (Luckin et al., 2016).

iii) Intelligent Tutoring Systems Heffernan and Heffernan, (2014)

Intelligent tutoring systems (ITS) are AI-based applications that simulate interaction with a human tutor and modify teaching interventions in real time. This theory holds that these systems can provide instant feedback, detect conceptual errors, and help students in their learning process in a personalized way. In basic education contexts, ITSs are a good opportunity to try to make up for the lack of human resources and improve individualized knowledge (Heffernan & Heffernan, 2014).

2.3.2. Theories on the Teaching and Learning Process.

i) Lev Vygotsky's Sociocultural Theory of Learning (1978)

Vygotsky asserts that learning is social in essence, and that cognitive development occurs when one interacts with others and with cultural tools (including technologies). The Zone of Proximal Development (ZPD) is the space in which a student can carry out tasks with the help of a tutor or mediating resource. The introduction of AI in the classroom favors the ZPD as a mediator that provides structured help, encourages collaboration, and promotes situated learning. AI tools (intelligent tutors and collaborative platforms) can transform educational interaction in a way that enables more contextualized and social learning (Vygotsky, 1978).

ii) Piaget's Constructivism Theory (1968).

Although not explicitly mentioned in the most current references, this theory holds that students' ideas are constructed from meaningful experiences. The insertion of AI can offer learning situations that favor exploration, experimentation, or discovery, thus coinciding with the principles of constructivism. AI can help facilitate activities that are adapted to each student's level and promote active, contextualized learning.

2.3.3. AI tools in the teaching and learning process

AI in education has completely changed traditional teaching methods, providing new opportunities to improve the quality, efficiency, and personalization of the teaching-learning process. This section describes the most relevant AI tools, along with their applications in basic education, explaining how they work and their benefits and advantages when applied (Flores and García, 2023).

A. Types of AI tools

1. Virtual assistants

Virtual assistants are computer applications that enable users to interact with them using natural language, designed to provide information, guidance, or assistance with specific tasks. In the field of education, virtual assistants can provide a digital tutoring service that allows students to ask questions, offer materials, plan reminders, or help manage time. For example, there are educational chatbots that allow questions to be exchanged in real time in the form of questions and answers, promoting autonomy and self-directed learning (Alcívar, et al., 2024). In fact, virtual assistants can also be implemented in a way that is adapted to each user's level of understanding and can provide personalized responses to facilitate learning in a more intimate and interactive way.

2. Intelligent tutoring systems

Intelligent tutoring systems (ITS) are applications that use the teaching strategies employed by a human tutor, adapting them to the characteristics of each student. They use AI algorithms to analyze student progress, detect difficulties, and offer specialized activities or resources to promote learning. In

this way, ITS allow for differentiated teaching that takes into account the particularities of each student and thus promotes greater motivation and commitment to learning. For example, in the case of mathematics or science, the STI itself will detect when a student is having difficulty with a particular concept and offer explanations or practical exercises appropriate to their level (Cabrera, 2024).

3. Learning data analysis

Learning data analysis consists of collecting, processing, and analyzing enormous volumes of information generated by digital educational platforms. AI facilitates the identification of patterns, trends, and problem areas in the learning process of students. This allows teachers and administrators to make informed decisions to modify pedagogical strategies, intervene early in cases of low performance, or manage educational interventions in a concrete manner. Similarly, predictive analytics can be used to anticipate results, which helps prevent school failure and design more consistent support plans (Bacilio, 2025).

4. Generation of educational content

AI also enables the automatic creation of educational content, such as quizzes, teaching materials, simulations, and interactive multimedia resources. Through natural language processing techniques and automatic text generation, these tools can produce materials adapted to different levels and learning styles. This reduces teachers' workload, allows for a greater variety of resources, and encourages pedagogical innovation. For example, platforms that generate practice exercises or contextualized explanations facilitate personalized and dynamic teaching (Chavez, 2024).

5. Other relevant tools

In addition to the above, there are other applications of artificial intelligence in education, such as voice recognition systems to transform speech into written representation, which facilitates accessibility or the assessment of language skills, or augmented and virtual reality platforms that facilitate the creation of immersive environments for experiential education, or neural networks that

enable improved pattern detection in complex databases. All of this enriches the educational process with new ways of interacting and learning (Sánchez, 2023).

B. Applications of artificial intelligence tools in basic education

1. Personalization of learning

One of the most relevant contributions of AI in basic education is the ability to personalize the teaching/learning process according to the needs, interests, and pace of each student. Intelligent tools that collect information on school performance, preferences, and difficulties reiterate the possibility of designing personalized learning paths, promoting greater motivation, self-esteem, and participation, because working with content and activities tailored to the student's level allows them to work better. Personalization can also help reduce educational gaps by making educational support accessible to those who need it most (Quirumbay, 2024).

2. Feedback and automatic assessment

The automatic feedback and assessment implemented by AI systems provides immediate and accurate results. The programs are capable of correcting exercises, tests, and activities in real time and offering constructive feedback that helps students identify and correct their mistakes, allowing them to carry out formative assessment throughout the learning process and facilitating progress monitoring and intervention. Teachers experience a reduction in their administrative workload, allowing them to devote more attention to their students and more time to lesson planning (Jara, 2024).

3. Assistance with teaching tasks

AI tools can also support teachers by providing them with data-driven resources, analyses, and recommendations. i.e., policies can recommend teaching strategies or identify areas where students have the most common difficulties, or automate repetitive tasks such as grading, which translates into increased work performance or the ability to focus more on the more creative or relational areas of the educational process. Similarly, AI can be an aid in the

continuing education of teachers based on adaptive learning platforms or the provision of personalized resources (Kurzweil, 2019).

4. Stimulate interactivity and motivation

The integration of certain technologies such as augmented reality, virtual reality, interactive simulations, and AI tools can enrich the learning experience of students in basic education. The incorporation of these tools creates stimulating and interesting environments that captivate students and promote interest, involvement, and motivation to learn. Interaction with digital content that offers dynamic situations not only provokes curiosity but also enhances active learning and the development of critical thinking and problem-solving skills. Other technologies, meanwhile, can be useful for supporting students with special educational needs through visual, auditory, or sensory aids and assistance (Chulde, 2024).

These types of tools form the basis for transforming the teaching-learning process in basic education, making it possible to develop more personalized, efficient, and engaging learning. The proper integration of these types of technologies requires pedagogical training to ensure their ethical and effective use, focused on the well-being and comprehensive development of students. The implementation of artificial intelligence at this educational level is an option for boosting human capabilities, enriching the educational experience, and promoting inclusive, quality education (Guanga, 2024).

4. Impacts of AI tools on the teaching-learning process.

The inclusion of artificial intelligence (AI) technologies in education has led to a paradigm shift in the design, implementation, and evaluation of teaching and learning in the classroom. AI, with its ability to process large volumes of data, personalize educational experiences, and automate student tasks, has opened up new possibilities and challenges for teaching that require thorough analysis.

C. Benefits

1. Improved learning outcomes.

One of the key criteria that makes the inclusion of AI in education attractive is its ability to deliver educational results. AI tools are capable of providing immediate and personalized feedback, allowing students to correct mistakes and reinforce concepts in real time. For example, the use of adaptive learning platforms, which modify difficulty and content based on student performance, has been shown to increase understanding and knowledge retention (Chuquitarco, 2024).

Furthermore, AI can analyze data to identify learning difficulties based on patterns in students, allowing for the creation of targeted interventions in advance. This capability is especially key in educational contexts where there are wide ranges of learning levels and learning styles, as it increases access and equity for students. At the same time, adapting educational activities and content to the unique characteristics of students helps to create motivational situations and reduce dropout and failure rates (Quirumbay, 2024).

Empirical research has shown that students using AI-supported learning platforms tend to achieve better learning outcomes than those using traditional educational practices. Specifically, adapting content to students according to their characteristics—combined with complementary resources and learning reinforcement activities—leads to more effective and lasting learning (Sánchez, 2023).

2. Increased efficiency and productivity.

AI tools also improve the efficiency of educational processes, both for teachers and institutions. The automation of administrative tasks such as grading exams or managing records allows teachers to have more time for pedagogical planning and personalized attention (Salinas and Vargas, 2024).

Similarly, AI systems can manage large volumes of performance-related data, enabling statistical analyses that aid decision-making. Through tools that, for example, allow the creation of interactive dashboards, educators and learning managers could track their students' progress, identify problem areas, and

quickly modify strategies. An additional positive aspect is the scalability of these technologies, as they allow for a greater number of students to be served without compromising the quality of teaching, especially in contexts where resources are scarce or in universities with very high enrollment rates. In this regard, it should be noted that AI also contributes to improved resource use, as these types of platforms can automate repetitive tasks and optimize the use of time and teaching resources (Sánchez, 2023).

3. Adaptation to students' individual needs

One of the issues that has revolutionized education (since AI began to be applied to current teaching-learning processes) is the ability to tailor content and activities to the individual characteristics of each student. Adaptive learning systems analyze information about students' effectiveness, interests, learning styles, and work pace to provide them with resources tailored to their personal profile (Chulde, 2024).

Let's imagine a student who has no choice but to study mathematical content in order to solve the additional exercises proposed to them, as well as other resources as a different way of putting their understanding of the subject into practice. In the same way that a student may progress at an unimaginable speed through some content, AI could also present the student with more complex tasks or content more tailored to their learning process in order for them to advance (Flores and García, 2023).

In this way, personalization leads to greater commitment and motivation among students, who feel that their needs have been taken into account on a personal level. It also promotes equal opportunities through adaptive resources that bridge the learning gaps that exist among students based on their socioeconomic and cultural backgrounds or prior skills.

4. Stimulate self-regulation and autonomy in learning.

AI tools also promote autonomy because they motivate students to take responsibility for their own learning process. Platforms that facilitate feedback, personalized resources, or control of the learning process promote self-regulation, which is one of the most valued skills for academic and professional

effectiveness. By knowing their performance, students can set goals, schedule their study, or instantly adjust their strategy based on the results obtained. AI could help with control strategies through recommendations and suggestions. This teaching methodology also promotes the acquisition of metacognitive skills, as students learn to self-assess their progress and deficits (Bacilio, 2025).

D. Challenges

1. Access to and availability of AI tools.

Despite the potential benefits, one of the biggest obstacles to the integration of AI in education is unequal access to technology. The availability of devices, internet connectivity, and technological resources varies considerably between regions, institutions, and socioeconomic groups (Cabrera, 2024).

In many developing countries or marginalized communities, the lack of technological infrastructure limits the effective implementation of AI-based solutions. This creates a digital divide that can exacerbate existing inequalities in access to quality educational opportunities.

In addition, the acquisition and maintenance of AI platforms often involve high costs, which can be a barrier for many public or low-income institutions. Reliance on commercial platforms, which require licenses and subscriptions, can also limit long-term sustainability (Chavez, 2024).

On the other hand, the digital divide affects not only technological resources, but also the digital literacy of teachers and students, who need basic skills to use these tools effectively. Without adequate infrastructure and relevant training, the incorporation of AI can be ineffective or even counterproductive (Cabrera, 2024).

2. Teacher training and education.

Another significant challenge lies in preparing teachers to integrate AI tools into their teaching practices. The successful implementation of these technologies requires teachers not only to understand how they work, but also to comprehend how to leverage their potential to improve teaching processes.

A lack of specific training can lead to resistance to change, fears related to loss of control or replacement of the teacher's role, and difficulties in designing teaching activities that effectively incorporate AI. In addition, many teachers lack skills in programming, data analysis, or the use of advanced digital platforms (Chavez, 2024).

Therefore, it is essential to offer ongoing training programs that address technical, pedagogical, and ethical aspects related to AI. Training should be contextualized, considering the particular needs of each institution and teacher profile, and promote a critical and reflective view of the use of these technologies (Chuquitarco, 2024).

The development of communities of practice and the exchange of experiences are also valuable strategies for facilitating adoption and collaborative learning around the integration of AI in teaching.

3. Effective integration into the curriculum and pedagogical practices

Incorporating AI into educational processes is not simply a matter of acquiring new tools, but rather of reconfiguring pedagogical practices and curriculum content. Effective integration requires that these technologies be compatible with learning objectives, pedagogical methodologies, and specific contexts.

An important challenge is to prevent AI from becoming an isolated or complementary element, without a real impact on improving the educational process. To this end, it is necessary to design strategies that incorporate these tools in a coherent manner, promoting student-centered, collaborative, and active pedagogical approaches (Guanga, 2024).

Likewise, curricular integration must consider aspects such as assessment, the design of meaningful activities, training in digital skills, and the promotion of 21st-century competencies. Adapting the curriculum to include the use of AI requires time, resources, and a cultural change in educational institutions.

4. Ethical and data privacy considerations

Finally, one of the most sensitive aspects of implementing AI tools in education relates to ethical issues and data privacy protection. AI platforms collect, store, and analyze personal information from students and teachers, which poses risks regarding confidentiality, misuse, and data security (Sánchez, 2023).

There are concerns about how this data is managed, who has access to it, and for what purpose. The lack of clear regulations and specific rules in some countries can facilitate misuse or violation of rights.

Likewise, automated decision-making based on algorithms can generate bias or discrimination if they are not designed with rigorous ethical criteria. Transparency in processes, accountability, and the participation of educational actors in the governance of these technologies are essential elements to ensure responsible use (Chuquitarco, 2024).

In addition, it is necessary to promote digital ethical literacy, which raises awareness among teachers and students about the risks and responsibilities associated with data management and the use of AI in the educational environment. Privacy protection and ethics in artificial intelligence must be priorities to prevent the benefits from being overshadowed by social and personal risks.

The integration of artificial intelligence tools into the teaching-learning process represents a profound transformation with the potential to improve quality, efficiency, and equity in education. The benefits, such as improved outcomes, personalized learning, and the promotion of autonomy, demonstrate that AI can be a powerful ally for innovation in pedagogical practices (Bacilio, 2025).

However, these advances are accompanied by significant challenges related to access, training, curriculum integration, and ethical issues. Overcoming these obstacles requires a multidisciplinary approach, committed public policies, continuous training, and constant ethical reflection.

The future of education with AI will depend on the ability of educational actors to harness its benefits in a responsible, inclusive, and equitable manner, ensuring that technology serves the fundamental goals of education: to train critical, autonomous citizens capable of facing the challenges of the 21st century.

Legal Framework

1. Constitución de la República del Ecuador (2008)

La Constitución ecuatoriana, lugar donde se encuentra el ordenamiento jurídico ecuatoriano. Las leyes constitucionales fijan una serie de principios fundamentales que deben orientar el desarrollo y la utilización de la IA. Entre los artículos que puede señalarse están:

- Derechos fundamentales y protección de datos de carácter personal: El artículo 66 reconoce un derecho a la protección de datos de carácter personal, indicando que toda persona de la que se trate tiene el derecho de decidir sobre la divulgación y utilización de la información relacionada con la persona; pero haciéndose cargo el legislador, a reenvíos específicos de derechos.

- Derecho a la igualdad y no discriminación: El artículo 11 garantiza un derecho a la igualdad y a la prohibición de la discriminación por razón de raza, género, orientación sexual, condición social o tecnológica, lo que resulta importante para el diseño de algoritmos de IA que puedan afectar decisiones automatizadas.

- Acceso a la información y democracia: Es el artículo 16 el que reconoce un derecho a la información y a la rendición de cuentas en una gestión pública y en los procesos judiciales que afecten derechos de las personas, lo que implica que las aplicaciones de IA en el poder público deben garantizar la rendición de cuentas.

2. Ley Orgánica de Protección de Datos Personales (LOPD) (Ley Nº 2068, 2021)

La normativa sobre la protección de datos personales en Ecuador (en vigor a partir del año 2021), regula el tratamiento de los datos de carácter personal,

incluidos aquellos que son recabados y tratados por los sistemas de inteligencia. Los puntos esenciales de la ley son:

- Consentimiento informado, se requiere que las personas cuyos datos sean objeto de tratamiento presten su consentimiento expreso para el tratamiento de los datos, algo particularmente relevante cuando hablamos de apps de AI que recogen y analizan grandes cantidades de datos personales.
- Derechos de los sujetos, la ley otorga derechos a los sujetos como el acceso, rectificación, cancelación y oposición (ARCO) que deben ser respetados en los sistemas de AI que diseñan y tratan datos.
- Seguridad y confidencialidad, todos aquellos responsables del tratamiento deben adoptar medidas técnicas y organizativas dirigidas a garantizar la seguridad de los datos y a evitar accesos no autorizados y vulneraciones que pudieran dañar a sus usuarios.
- Transferencias internacionales, la ley hace referencia a la transferencia de datos personales para otros Estados pidiendo que el Estado receptor ofrezca niveles de protección adecuados, algo que resulta relevante para la práctica de la AI que opera en jurisdicciones múltiples.

3. Ley sobre Comercio Electrónico, Firmas Electrónicas y Mensajes de Datos (Ley No. 2004) (2004)

Esta ley regula las transacciones electrónicas y la firma digital en el Ecuador, aspectos necesarios para el desarrollo de soluciones de IA en el ámbito del comercio y los servicios digitales:

- Confianza en el comercio digital: La regulación también ayuda a asegurar la creación de un entorno seguro para la interacción de sistemas de IA en las plataformas de comercio electrónico y de los servicios financieros.

4. Normas de carácter sectorial y de políticas públicas

Más allá del marco legal general, Ecuador también ha diseñado políticas y normativas concretas que inciden en el desarrollo de la IA:

- Plan Nacional de Ciencia, Tecnología e Innovación (PNCTI): Incluye directrices para impulsar la innovación tecnológica, incluyendo el desarrollo de la inteligencia artificial, con la debida atención a la ética y la protección de derechos.

- Estrategia de Gobierno Digital: Impulsa la digitalización de servicios públicos, para cuya implementación la IA juega una función central, estableciendo principios de transparencia, inclusión y protección de datos.

En Ecuador, conforme avanza la inteligencia artificial, va consolidándose un marco regulatorio de acuerdo a lo prescrito en la Constitución, en la Ley de Protección de Datos Personales y en leyes afines que regulan el comercio electrónico y la protección de la información, a pesar de que el rápido avance de la propia tecnología, puede preverse una evolución acelerada en los años venideros con la aparición de regulaciones en materia ética, de responsabilidad, de transparencia y de gobernanza. Las contribuciones de entidades internacionales y su preceptiva adecuación a principios éticos internacionales van a ser muy significativas para afianzar un marco legislativo suficiente para conseguir una gobernanza adaptada a las características del contexto ecuatoriano. Lo que pone de manifiesto el presente panorama, quiere decir que Ecuador tiene una base legal que regula aspectos específicos vinculados con la inteligencia artificial a través de distintos instrumentos legales, pero que persiste un aspecto por construir muy importante en el marco de la regulación específica, la ética y la gobernanza que permita el avance de este tipo de tecnología para que sirva a la sociedad en su conjunto, sin que con ello se vean vulnerados derechos de las personas.

CHAPTER III

RESEARCH METHODOLOGY

3.1. Research approach

This research uses a mixed-method design, that is, a combination of qualitative and quantitative methods to achieve a more holistic or comprehensive understanding of the impact of artificial intelligence tools on the teaching-learning process in basic education. This approach was chosen due to the complexity of the issue under study, which requires not only collecting quantitative data on the use and perception of the tools, but also delving into the experiences, opinions, and attitudes of teachers and students regarding their use in the educational context (Alonso, 2020).

The mixed approach aims to articulate the results required by the two ways of approaching reality, which must be seen as a more complete, richer whole. The qualitative approach allows us to draw conclusions that enable us to understand the perceptions, barriers, benefits, and obstacles associated with the inclusion of artificial intelligence technologies in the classroom, while the quantitative approach helps us to obtain degrees of use and frequency, as well as the statistical relationship that arises with respect to different variables of interest, such as academic performance, satisfaction of subjects in the educational field, etc. The combination of these methods allows us to validate the results and offers the possibility of triangulation, achieving more reliable and in-depth results in the conclusions that emerge from the study (Arias, 2021).

This strategy is conducive to detecting general patterns or trends and offers situated or contextualized explanations that enrich the reading of the data. A mixed approach that intertwines qualitative and quantitative techniques in the same study has the advantage that qualitative and quantitative techniques complement each other, which also allows for more precise answers to research questions and provides useful recommendations to teaching teams, educational institutions, and education policy makers (Bernal, 2020).

In summary, it is argued that the mixed methodology is justified by the complexity of the phenomenon under study, which allows for a complete exploration of it, combining the collection of statistical data and the testimony of human experiences, so that the results are relevant, representative, and transferable to different educational contexts based on a holistic view of the results of artificial intelligence tools on basic education.

3.1.1. Qualitative research approach

The qualitative research approach used focuses on investigating and discovering the perceptions, experiences, and attitudes of teachers and students regarding the incorporation of artificial intelligence tools in the teaching-learning process in basic education. To collect the data, semi-structured interviews will be conducted, which allow for a deeper understanding of the participants' opinions and, therefore, access to rich, detailed, and nuanced accounts (Arias, 2021).

Semi-structured interviews offer a degree of flexibility that allows interviewees to express their thoughts freely, while ensuring that, in one way or another, crucial issues related to the use of artificial intelligence in the classroom are addressed. Teachers and students will be selected through purposive sampling, prioritizing those educators and students who have some experience with these tools or who are in the process of incorporating these tools into their educational practice. This will ensure relevant responses that provide substantive information about the subject of study (Alonso, 2020).

The analysis of the interview information will be carried out using thematic coding techniques, determining the patterns, categories, and relationships of the different responses. The analysis of the interview information will reveal the general perceptions, advantages experienced, difficulties encountered, and recommendations of the educational actors. In addition, the qualitative method also ensures that resistance, fear, or expectations toward the inclusion of artificial intelligence are made visible, which are part of the design to implement it in a more beneficial way (Hernández, 2020).

This option also makes it possible to represent emotions, attitudes, and values about artificial intelligence tools, among many others, which are often not

expressed in quantitative data. The way in which this data is interpreted will help to provide a complete and contextualized picture, enriching the discussion and conclusions arising from this research. Finally, qualitative interviews contribute significantly to understanding the human side and experience of these aspects related to the social and pedagogical impact that these technologies can have on basic education.

3.1.2. Quantitative approach to research

The quantitative approach of this research is oriented toward the collection of data on social reality, perception, and the effects of artificial intelligence tools on the teaching-learning process in basic education. To this end, structured surveys will be administered to a representative sample of teachers and students from different educational institutions in the region or context of study.

The surveys are structured with closed or multiple-choice questions and are designed to collect information on specific variables, familiarity with AI tools, frequency of use, types of technologies used, perceptions of the impact on academic performance, and personal satisfaction and confidence in AI tools. Items have also been included that will allow for the detection of differences based on demographic or contextual variables, such as age, years of experience, educational level, or type of institution (Sampieri, 2018).

Data collection through surveys provides an overview of the phenomenon, enabling descriptive and correlational statistical analyses to be performed, for which frequencies, percentages, and means (and standard deviations) will be used as techniques to characterize the main characteristics of the sample, as well as the behavior of the variables. Hypothesis testing and correlation analysis can also be performed between the use of AI tools and other variables such as motivation, performance, or attitude toward technology (Tamayo, 2019).

The statistical processing of the data will be carried out using specific programs, thus guaranteeing the accuracy of the results and the possibility of objective interpretation. The quantitative information is then contrasted with the qualitative findings, providing the necessary evidence to draw conclusions from

the study and contribute to the formulation of recommendations based on accurate and generalizable data (Tamayo, 2019).

In short, the quantitative approach allows us to systematically and objectively measure the impact of artificial intelligence tools in the field of education, providing a solid basis for analyzing trends in these tools, identifying patterns, and making comparisons that can help us better understand the phenomenon under study.

3.2. Scope of the research

This research study is descriptive and explanatory in nature in relation to the impact of AI tools on the teaching-learning process in basic education classrooms. In its descriptive form, the research, in its designed form, aims to identify and describe the incorporation of these AI tools in basic education classrooms, the functionalities of the tools used by teachers and students, and perceptions and attitudes about their use. To this end, it analyzes the data provided by the research and collected on teaching practices, the technological resources available, and the level of appropriation of these tools in the school environment. The purpose of this description is to provide an overview of the current situation and to identify possible trends, benefits, and/or difficulties that may arise in the integration of AI into the educational process (Bernal, 2020).

The purpose of the research, in its explanatory construction, is to identify the causes and formalism of aspects that come into play in the impact of AI tools and in the outcome of the learning process and the classroom. The research should interpret how the use of these technologies modifies teaching strategies, student participation and motivation, and classroom performance.

On the other hand, it seeks to identify the aspects that favor the implementation of AI or, conversely, the elements that hinder it: teacher training, technological infrastructure, institutional support, and the attitudes of educational actors. The presentation of these approaches not only has an explanatory character as its ultimate goal, but also seeks to explain the interrelated causes and effects. This is what makes it possible to have a comprehensive view that

contributes to the improvement of pedagogical practices and the formulation of educational policies (Bernal, 2020).

This dual dimension is essential for presenting an image of the phenomenon studied that leads to the possibility of identifying areas of opportunity and obstacles, but also for presenting guidelines and recommendations based on the research results. In this way, the research is not limited to describing the current state of reality; on the contrary, it seeks to understand how to gain more concrete and deeper knowledge by investigating the mechanisms through which AI tools affect the teaching-learning process in basic education.

3.3. Research instruments and techniques

In order to achieve the objectives, set out, various research instruments and techniques will be used to collect information in a systematic and rigorous manner. The combination of qualitative and quantitative methods is due to the complex nature of the phenomenon studied and the desire to offer a comprehensive understanding of the impact of AI tools on the educational process.

The main instruments are observation, interviews, and surveys. Observation will be used to record, in real time, teaching practices and the use of AI tools in the classroom. Ultimately, this instrument allows us to identify behaviors, interactions, and the dynamics of the school environment. Interviews will be used with teachers and administrators to delve deeper into perceptions, experiences, difficulties, and perceived benefits regarding the integration of AI. This tool allows for more detailed and contextualized information to be obtained, which enriches the information obtained from other tools (Alonso, 2020).

On the other hand, surveys will be designed to collect data from a majority of teachers and students, allowing for the analysis of patterns, trends, and levels of acceptance or rejection of AI tools. The surveys will also make it easier to get quantitative info on variables related to use, training, access, perceived benefits, etc. Triangulating the tools makes sure the results are valid and reliable, but it also lets us compare different views and confirm findings (Arias, 2021).

Ultimately, the choice and use of these means culminate in obtaining a general interpretation of the impact of artificial intelligence on the teaching-learning process, as the richness of qualitative data is combined with the objectivity of quantitative data. The proper application of these techniques will determine the methodological stability of the research and the reliability of the conclusions.

3.3.1. Observation

Observation will be a central technique in this research, as it allows for the direct and systematic collection of pedagogical practices in the classroom (including the use of AI). An observation sheet will be compiled to facilitate participatory and non-participant observation in selected educational institutions. We aim to gather a complete picture of how teachers and students interact with these technologies in their natural contexts. To this end, an observation guide will be designed that will contain specific categories (frequency of use, types of tools, interaction between teachers and students, adaptation of teaching activities, student reactions). During the observation sessions, both qualitative and quantitative aspects will be taken into account (for example, behavior, levels of participation, possible technical difficulties, as well as the relationship between the use of artificial intelligence will be recorded) (Bernal, 2020).

The observation will allow us to identify recurring patterns, advantages, and difficulties in the integration of these tools, as well as to collect aspects that would not be verbalized in interviews or surveys. It is important that the observer always maintains a neutral attitude and records the data as noted to avoid bias. A systematic analysis will then be carried out using the records to detect emerging trends and correlations in the use of AI technologies in various school contexts (Hernández, 2020).

This strategy will also be important for triangulating information, which will complement the information obtained through other instruments and allow for a greater understanding of pedagogical practices in a contextualized manner. Observation will thus become the key moment for validating and enriching the research results, as it provides empirical evidence of how artificial intelligence tools are implemented and experienced on a daily basis in basic education.

3.3.2. Interview

The interview will be an important qualitative technique for gaining in-depth knowledge of the perceptions, experiences, and opinions of educational actors on the impact of artificial intelligence tools on the teaching-learning process. I will conduct semi-structured interviews with teachers, principals, and, on occasion, older students, who will be selected through purposive sampling to ensure diversity of perspectives. The semi-structured interview format allows for in-depth exploration of specific topics, but also gives participants the freedom to say what they think and express their own experiences, thus providing a richer and more contextualized understanding of the phenomenon (Sampieri, 2018).

The interview design will include questions an interview guide related to the training received for the use of AI tools, the pedagogical practices where these technologies are integrated, the perceived benefits, the difficulties encountered, and recommendations for improving their integration. Aspects related to technological infrastructure, institutional support, and the manifestation of the impact on learning outcomes will also be addressed. The interviews will last between 30 and 45 minutes and will be recorded with the participants' consent for transcription and analysis.

The interviews are analyzed using thematic coding techniques, analyzing patterns, categories, and relationships between responses so that this approach captures subjective perceptions and lived experiences, reflecting an understanding of the impact of AI from the perspective of those at the forefront of the educational process. The interviews also allow for the exploration of other aspects not initially considered in the theoretical framework, and the process conveys a lighter and more nuanced understanding of the data.

Thus, the approach will also generate information that complements that obtained through observations and surveys, providing a complete and abundant view of the reality of the use of artificial intelligence tools in basic education, based on the fact that it will be carried out with the teachers responsible for education at the institution that is the subject of this research, such as the principal and vice principal.

3.3.3. Survey

The survey is a quantitative instrument, designed to collect data from a representative sample of teachers and students from the selected educational institutions. However, the main objective is to collect systematic and generalizable information on the levels of use, perception, benefits, and obstacles related to AI tools in teaching-learning processes. The survey will be structured using closed questions and rating scales to facilitate statistical analysis and the identification of significant trends (Arias, 2021).

A questionnaire was formulated in the first instance as the main basis, and subsequently an interview was established as a means of greater reach to the managers and means to obtain more information on the topic of interest. It is necessary to generate clear and precise questions appropriate to the students' level of understanding, all with the aim of ensuring the validity and reliability of the instrument. The survey can be conducted in paper or digital format, depending on the technological conditions of each educational institution, with the aim of ensuring the highest possible participation and representativeness in data collection (Tamayo, 2019).

The analysis of the results can be carried out from two approaches. The first would be a statistical analysis that would allow the study of behavior patterns to analyze relationships or possible significant differences between the different variables in the study. Descriptive techniques such as frequencies, percentages, or averages should be used, as well as inferential analyses such as chi-square and Student's t-tests, as appropriate. Second, the information obtained from the survey will be used, among other things, to draw generalizable conclusions and to contrast the perceptions and experiences of various actors in education regarding the use of artificial intelligence tools.

The survey will also become a fundamental tool for obtaining quantitative data that complements the qualitative aspects that have been explored through observation and interviews. In this way, it will be possible to offer a panoramic view of the impact of artificial intelligence tools on basic education, applied to the students and teachers participating in this research.

3.4. Population and research sample

3.4.1. Population

The population studied in this research is the primary school population of the Jean Piaget Educational Unit in Guayaquil, which consists of 320 students, 50 teachers from different areas and/or subjects, and only 10 English teachers. The teaching population consists of professionals who work in different areas and subjects, with different levels of training and experience in the use of educational technologies; and the student population is made up of students from different grades, with different technological skills and levels of interaction in AI activities (Arias, 2021).

The total number of people in the study is 380 who are involved in the school where the research was done, but it's really a big group that makes for a good sample. The diversity in the terms and profiles of the actors ensures that the results can be extrapolated to many other educational contexts and can thus contribute to offering a general proposal on the impact of AI tools in basic education (Sampieri, 2018).

All of the above, together with the availability of resources and accessibility for data collection, will ensure that the selected population is viable for the purpose of the study. The inclusion of different profiles of teachers and students will favor the contrast in perceptions, use, and effects, further enriching the results and favoring the formulation of recommendations for different contexts.

3.4.2. Sample

The research sample consisted of 30 participants, selected through intentional and stratified sampling. From the total population of 380 people at the Jean Piaget Educational Unit in Guayaquil (320 students and 60 teachers), two students were chosen from each grade of 4th, 5th, and 6th grade, for a total of 15 students between the ages of 8 and 11. Fifteen teachers were also included, five of whom belong to the English department and five to the Comprehensive Development department, along with administrators and teachers who have previous experience in the use of technological tools.

The selection was justified based on the feasibility of the study in terms of resources and time, as well as the interest in ensuring the representativeness of the profiles involved in the teaching-learning process with artificial intelligence technologies. The stratification criterion ensured diversity in terms of age, gender, educational level, teaching experience, and grade level, which enriches the interpretation of the results.

It is important to note that the choice of this sample does not seek to cover the entire population, but rather to offer a valid and contextualized approximation of the phenomenon under study. The findings, therefore, correspond to the selected sample and are not intended to be generalized to the entire institution, although they do allow for the identification of trends, perceptions, and effects that can be extrapolated as a reference to similar educational contexts.

Table 1.
Student sample

Details	N~ population	Percentage
Teachers	15	50%
Students	15	50%
Total	30	100%

Source**:** Educational unit Jean Piaget
Elaborated by: Diaz (2025)

The selection of informants was carried out in coordination with the educational institution, which allowed for obtaining informed consent and ensuring the confidentiality of participants. The sample obtained data that reveal diverse realities and levels of integration through AI in basic education, as well as facilitating the analysis of relationships and trends. Likewise, the diversity of the sample also served to highlight variables that may be decisive in terms of the impact of these tools, such as socioeconomic status, teacher training, and access to technological resources.

CHAPTER IV

THE PROPOSAL

The main purpose of this research revolves around studying how artificial intelligence (AI) tools influence teaching and learning processes in basic education, specifically with students aged 8 to 11 and with the work of teachers in the institution under study. Thus, it is suggested that data be collected through surveys of students and teachers, with the main purpose of enriching the perception of the use of AI technologies in the classroom and verifying the different assessments that each of the respondents may have made.

The student surveys were mainly aimed at finding out about their experience, how it motivates them, and what improvements it can bring to their learning when they use all kinds of AI resources, such as virtual assistants, adaptive platforms, collaborative resources, etc. Likewise, the teacher surveys were no less important, as they sought to reveal how teachers perceive the usefulness and ease of integration/difficulties in including these types of tools in their teaching practice.

In addition, interviews will also be conducted with school administrators in order to understand the institutional perspective regarding the introduction of AI in education and the policies and strategies that are implemented for this purpose. This broad approach facilitates the identification of the benefits and limitations of these technologies in the teaching-learning process, but also of possible areas for improvement to increase their results.

The collection of this information facilitates a comprehensive analysis of the level of acceptance, difficulties, and opportunities presented by AI tools in basic education, which favors proposals that help make teaching more effective, personalized, and innovative. This research, therefore, seeks to help understand the role that artificial intelligence technologies play in the turbulent and complex world of education, benefiting students, teachers, and the institution in their process of adaptation and pedagogical improvement.

4.1. Interpretation and analysis and of the results

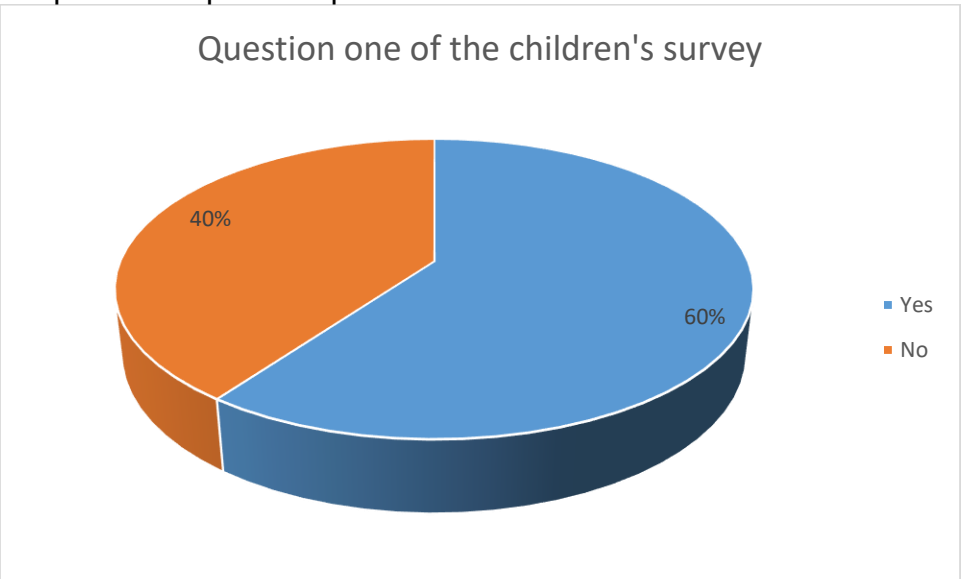
4.1.1. Surveys administered to students.

Table 2.
Question number one of the student surveys.

Have you ever used artificial intelligence tools (such as virtual assistants, learning programs, etc.) in your classes?	FA	FR
Yes	9	60%
No	6	40%
Total	15	100%

Source: Students´ Survey
Elaborated by: Diaz (2025)

Figure 1
Graphic description of question one.



Source: Students´ Survey
Elaborated by: Diaz (2025)

The first question asked by the students was whether they had ever used these tools in their classrooms. Of the 15, 9 (60%) responded that they had, and 6 (40%) that they had not. As a result of this question, the conclusion was that more than half of the children have had some type of contact with artificial intelligence technologies within their educational context, which may be indicative of a progressive increase in the incorporation of these tools in the classroom.

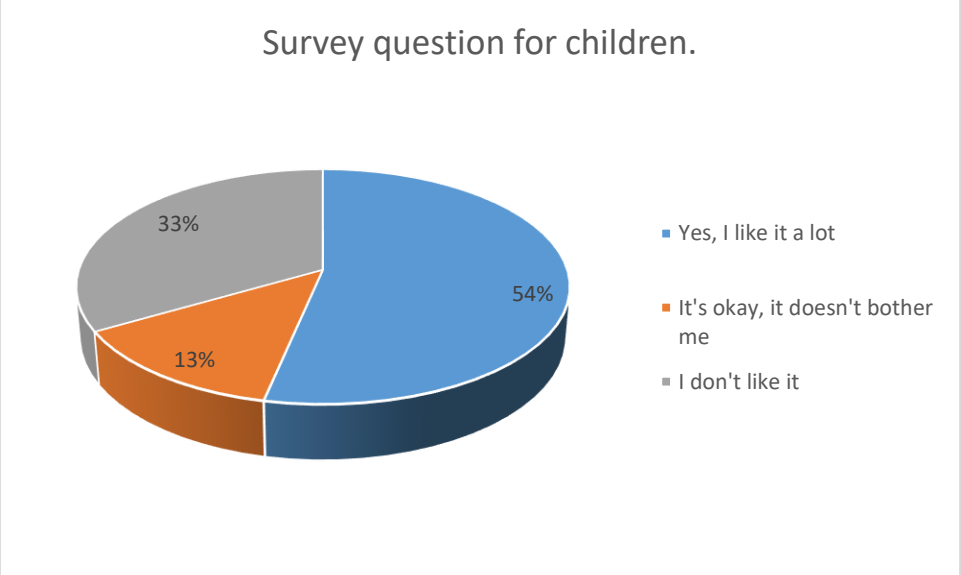
The large proportion of children who responded that they have not used artificial intelligence (40%) indicates that there is progress, but also that a considerable number have neither experience nor contact with these types of tools, which may be a consequence of the availability of resources, the level of innovation of educational institutions, or the age of the students. Furthermore, it is also necessary to consider the majority of children who have used artificial intelligence to ask how these practices affect their learning and their attitude toward these tools.

Table 3.
Question number two of the survey administered to students.

2. Do you like it when teachers use artificial intelligence tools in class?	**FA**	**FR**
Yes, I like it a lot	8	53%
It's okay, it doesn't bother me	2	13%
I don't like it	5	33%
Total	15	100%

Source**:** Students´ Survey
Elaborated by: Diaz (2025)

Figure 2
Graphic description of question two.



Source**:** Students´ Survey
Elaborated by: Diaz (2025)

In response to the second question, the children expressed how they would like teachers to use AI tools. As a result, 8 children (53%) said they like it a lot, which maintains their willingness to incorporate AI tools. However, 2

children (13%) indicated that they are fine with it and that they do not consider it a problem or a nuisance; that is, they gave a positive evaluation sheet that could be considered neutral.

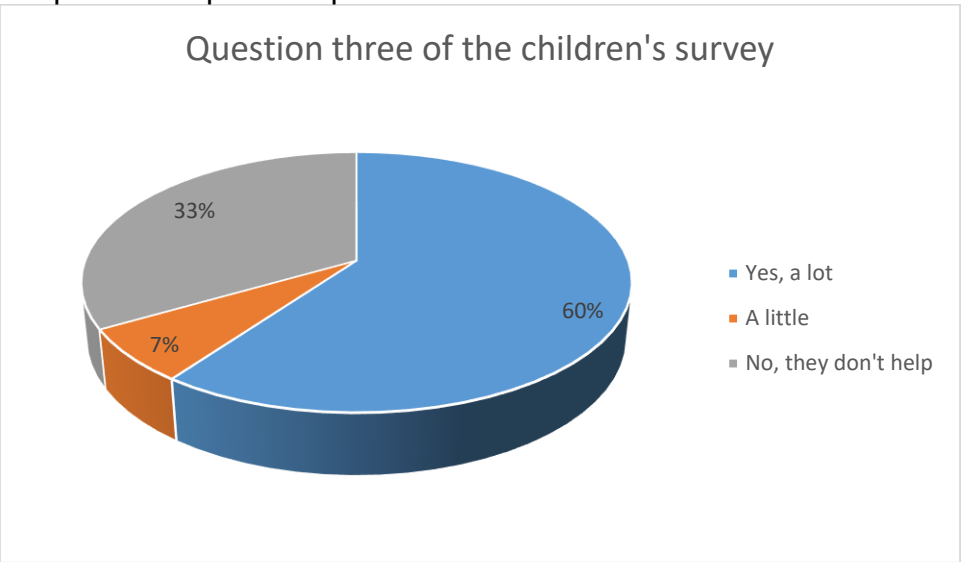
In contrast, 5 children (33%) stated that they do not like the use of AI tools. This means that there is a portion of the student body that is neither comfortable nor enjoys the classroom when teachers use this type of resource. This suggests that, while it is true that the majority have a favorable attitude toward the incorporation of this technology in the classroom, there is still a significant number of students who are dissatisfied, which suggests that strategies can be incorporated to help improve their compliance and the provision of resources in the classroom. Providing tools, sharing, or having access to AI technologies is one of the foundations of the experience and acceptance of these technologies. From this, we can infer that acceptance and enjoyment of using AI tools could be mediated by a student's familiarity, interest, prior experiences, or enjoyment of the resource. Therefore, if teachers have access to these types of resources, they should take these experiences into account.

Table 4.
Question three of the student survey.

3. Do you think artificial intelligence tools help you learn better?	**FA**	**FR**
Yes, a lot	9	60%
A Little	1	7%
No, they don't help	5	33%
Total	15	100%

Source: Students´ Survey
Elaborated by: Diaz (2025)

Figure 3
Graphic description of question three.



Source: Students´ Survey
Elaborated by: Diaz (2025)

The third question focused on students' beliefs about whether AI tools help them learn more. In this case, the majority of them, 9 children (60%), agreed that AI tools help them learn a lot, an excellent positive indicator, as it shows they are convinced that they are useful and beneficial. For example, the perception that AI helps them learn a lot can be a clear motivation for them to decide to collaborate and integrate these technologies into a learning process.

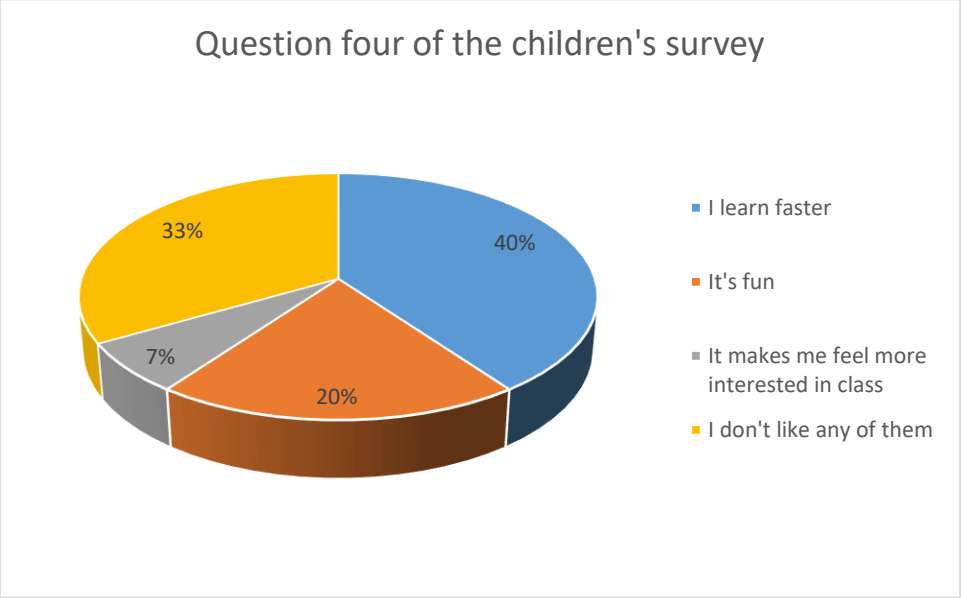
A very small group, 1 student (7%), expressed that it helps them a little, and 5 (33%) explicitly stated that AI does not help them. This shows that not all students perceive the clear benefits this can bring, and we assume that some of these children may have explicitly experienced frustrating, unhelpful, and even exhausting experiences when using AI. Ultimately, the perception that AI allows us to learn more or, in other words, that it helps a lot pushes us teachers to use this AI in the classroom54, but the presence of a third who do not perceive clear benefits leads us to continue specifying and making tools of this type more accessible to reach everyone and so that they can be used in the classroom.

Table 5.
Question four of the student survey.

4. What do you like most about using artificial intelligence tools in class? (You can choose more than one option)	FA	FR
I learn faster	6	40%
It's fun	3	20%
It makes me feel more interested in class	1	7%
I don't like any of them	5	33%
Total	15	100%

Source: Students´ Survey
Elaborated by: Diaz (2025)

Figure 4
Graphic description of question four.



Source: Students´ Survey
Elaborated by: Diaz (2025)

The results from the 15 respondents present different views on issues related to the positive contributions artificial intelligence (AI) makes to schools. The option that received the most votes was "I learn faster," the preferred option of 40% of respondents (6 responses). This suggests that a significant proportion of children identify that AI tools help them learn faster, perhaps because they help them assimilate concepts—within the possibilities offered by the tools—or because they adapt to their learning rhythms.

The second most voted option was "It's fun," with 20% (3 children). I get the impression that, for some, the interaction they propose is fun, which could

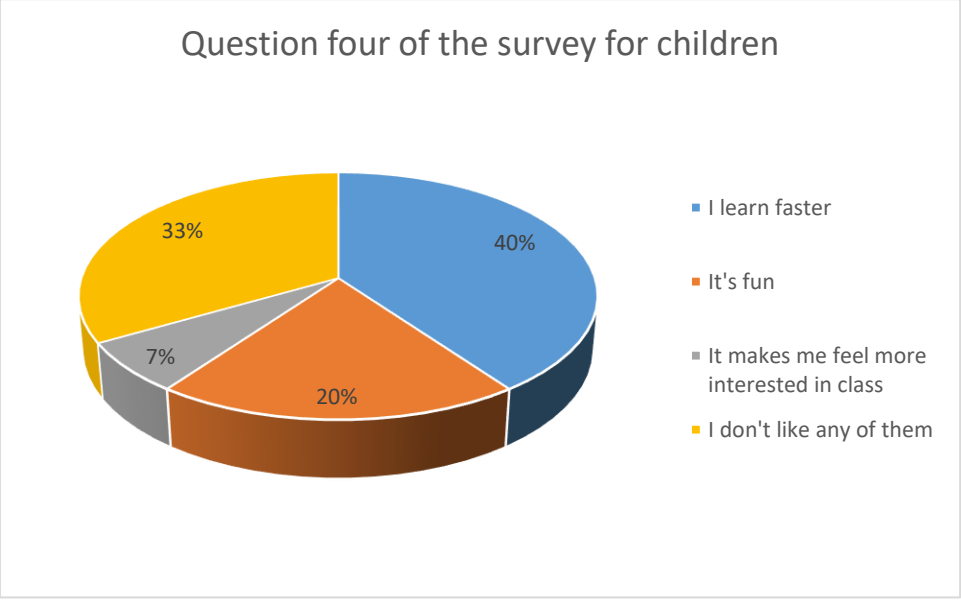
encourage classroom participation and lead to a more rewarding educational experience. The option "It makes me feel more interested in class" was chosen by only 7% (1 response), which could be interpreted as a sign that AI, generally speaking, doesn't generate much interest in most children, although it can be useful in maintaining attention. A significant number of students/children (33%) stated that they did not like any of the options presented. This could be interpreted as a clear resistance or general lack of interest in AI.

Table 6.
Question number five of the survey administered to students.

5. What difficulties have you encountered when using artificial intelligence tools?	FA	FR
I don't know how to use them	6	40%
It takes a long time to learn how to use them	2	13%
They don't work well or have errors	0	0%
I have no difficulties	7	47%
Total	15	100%

Source: Students´ Survey
Elaborated by: Diaz (2025)

Figure 5
Graphic description of question five.



Source: Students´ Survey
Elaborated by: Diaz (2025)

Regarding difficulties, the results reflect a certain heterogeneity. The most notable difficulty, reported by 40% (6 students), was "I don't know how to use them." This shows that many children still encounter some obstacles related to not knowing how to act and interact with the AI tools used in the classroom. This

can lead to a lack of knowledge or certain basic skills to put them into practice, which limits effective participation or can lead to frustration.

Another difficulty raised by 13% (2 students) was "It takes a long time to learn how to use them," which would create a connection with the possible idea, on the part of some children, that the process of acquiring skills is slow due to the complexity of the tools and the lack of support in the process. In any case, the positive aspect is that no response was marked as "not working well or having errors," as this can be a positive factor, in terms of the technological resources used appearing to be adequate and they would not encounter technical problems that limit the learning process.

The conclusion from all this is that almost 47%, exactly 7 responses, of the students stated that they "did not have any difficulties at all." This is very positive, by the way, as it may indicate that some of the students may already be familiar with, the or simply believe they do not encounter so many obstacles when using them in their *classes.*

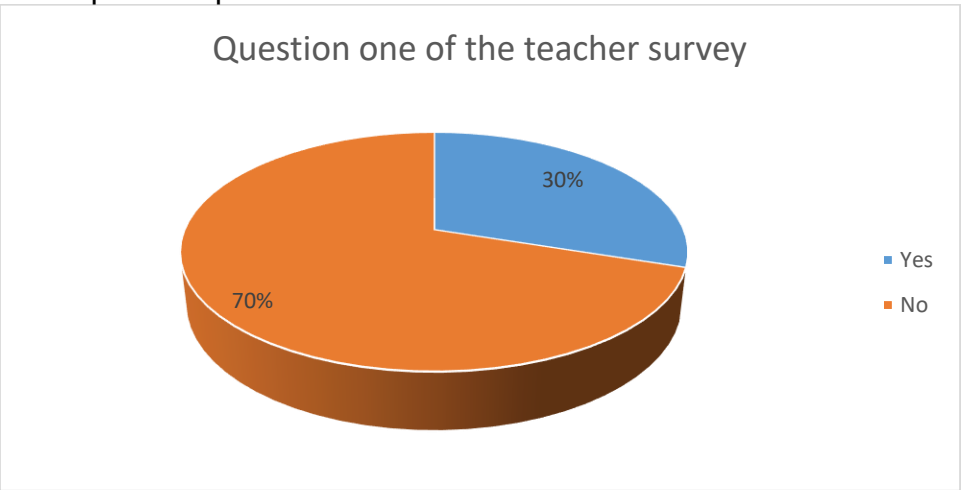
4.1.2. Survey of the institution's teachers

Table 7.
Question one of the teacher surveys.

1. Have you received specific training to integrate artificial intelligence tools into your teaching practice?	**FA**	**FR**
Yes	3	30%
No	7	70%
Total	10	100%

Source: Teacher Survey
Elaborated by: Diaz (2025)

Figure 6
Description of question one.



Source: Teacher Survey
Elaborated by: Diaz (2025)

The results indicate that the majority of teachers surveyed, 70%, have not received specific training on the integration of artificial intelligence tools into their teaching practices, while the remaining 30% have received specific training. This demonstrates a significant gap in professional preparation regarding digital skills and artificial intelligence in an educational setting. The lack of training can undermine teachers' confidence and competence in integrating these tools into their classrooms, which can jeopardize pedagogical innovation and the integration of new technologies in basic education.

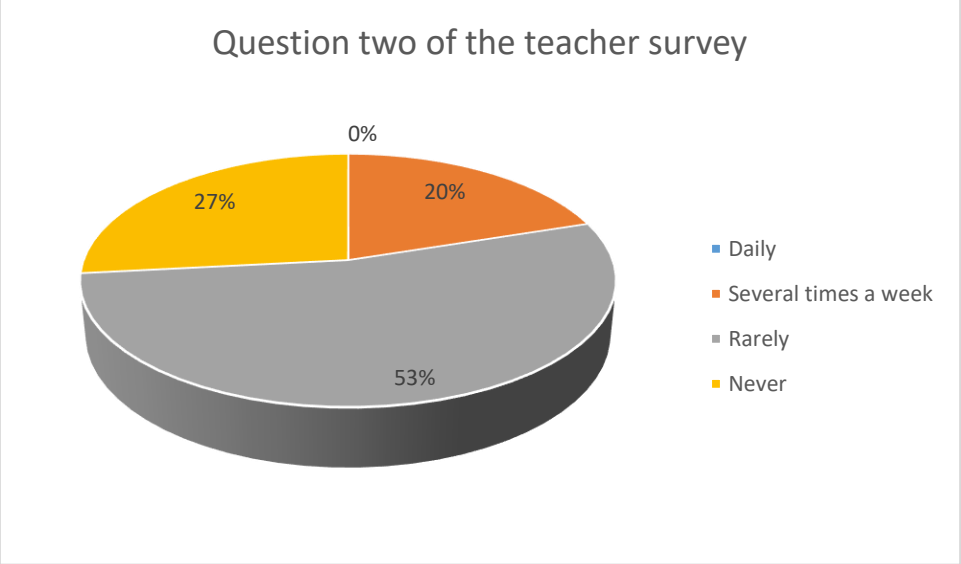
The high proportion of teachers who have not received training indicates the need to introduce training and professional development programs on the use of artificial intelligence in basic education. It may also indicate that institutions do not have policies that promote the teaching and integration of artificial intelligence in basic education, or it may simply indicate that training programs do not prioritize teachers in continuing education. It is important that they are able to observe this gap and generate training programs for teachers that go further, that integrate the teaching of the tool in question, but also take into account its pedagogical application.

Table 8.
Question number two of the teacher survey.

2. How often do you use artificial intelligence tools in your classes?	FA	FR
Daily	0	0%
Several times a week	3	20%
Rarely	8	53%
Never	4	27%
Total	15	100%

Source: Teacher Survey
Elaborated by: Diaz (2025)

Figure 7
Graphic description of question two.



Source: Teacher Survey
Elaborated by: Diaz (2025)

The data show that no teachers use artificial intelligence tools on a daily basis, which can be considered an opportunity to foster more frequent and systematic use. For the majority of teachers, 53% use them rarely, and 20% several times a week, while 27% never use them in their classes. This suggests that, while some teachers are able to identify the potential, they are not used frequently in their daily practice.

Therefore, occasional or limited use can limit the potential benefits of artificial intelligence to improve teaching and learning, such as exercise customization, automated assessment, or fostering digital skills in students. To increase the use of artificial intelligence, it is necessary to promote ongoing

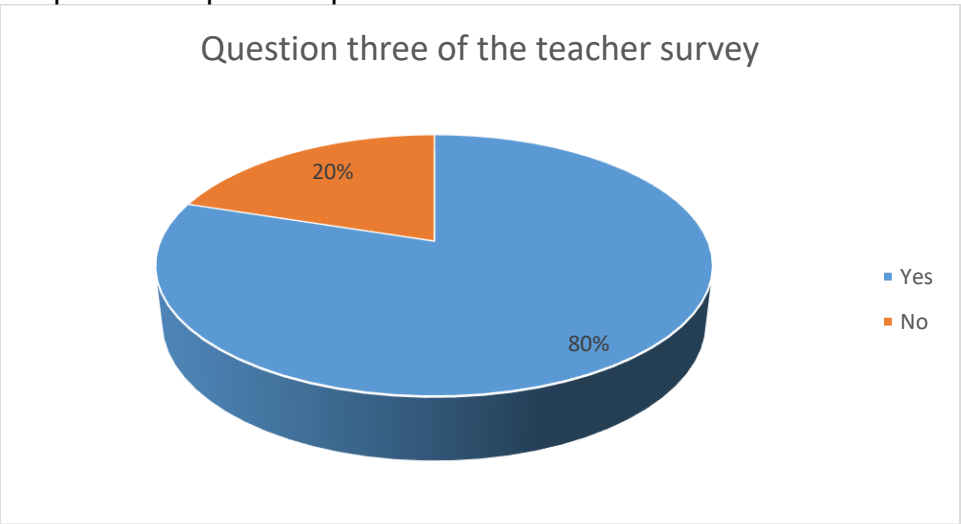
training, provide resources, and raise teachers' awareness of the advantages and practical applications of these technologies. An institutional culture that fosters pedagogical innovation in the use of digital tools, including artificial intelligence, is also essential to improve educational quality.

Table 9.
Question three from the teacher survey.

3. Do you consider there are benefits to using these tools in the teaching-learning process?	FA	FR
Yes	8	80%
No	2	20%
Total	10	100%

Source: Teacher Survey
Elaborated by: Diaz (2025)

Figure 8
Graphic description of question three.



Source: Teacher Survey
Elaborated by: Diaz (2025)

Eighty percent of teachers stated that there are benefits to using artificial intelligence tools in education, compared to 20% who did not. This result reflects a very positive perception of the potential of leveraging this type of technology to aid the educational process. This perception of benefits may perhaps be based on the hope that artificial intelligence can help personalize learning, automate administrative tasks, provide adaptive resources, and promote students' digital skills.

The existence of this positive perception may be the key factor in promoting the use of this type of tool in teaching practices, although it must be

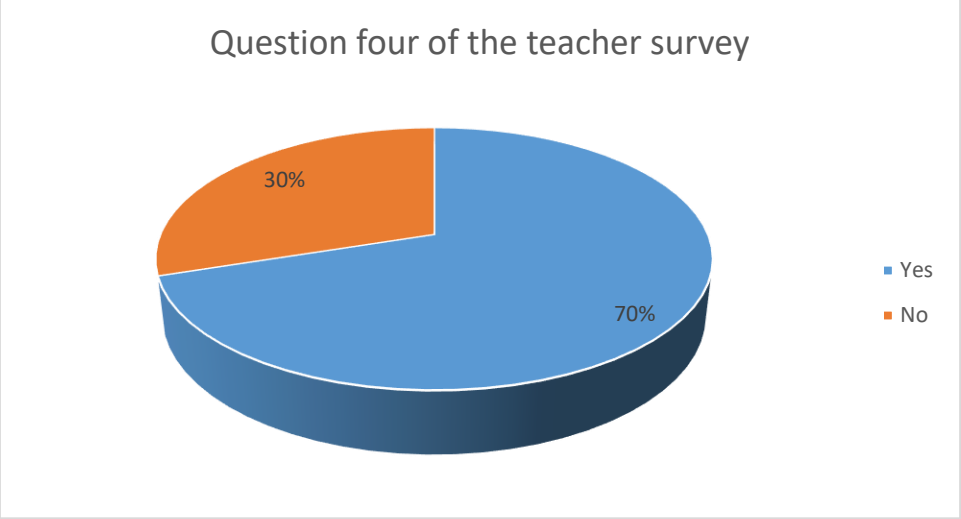
accompanied by appropriate training and material resources. Along the same lines, it is also worth highlighting the fact that 20% of the sample did not perceive any benefits due to a lack of practice, information, or resources. Therefore, it is very important to put ourselves in the shoes of these teachers to raise their awareness and offer them appropriate training that will allow us to practically demonstrate the potential benefits that this type of technology can offer in the classroom. This positive perception, in fact, is a very good indicator for future initiatives that seek to promote the use of artificial intelligence in basic education.

Table 10.
Question four of the teacher survey.

4. Do you think obstacles or difficulties persist when integrating these tools into your teaching practice?	FA	FR
Yes	7	70%
No	3	30%
Total	10	100%

Source: Teacher Survey
Elaborated by: Diaz (2025)

Figure 9
Graphic description of question four.



Source: Teacher Survey
Elaborated by: Diaz (2025)

Seventy percent of teachers believe there are still obstacles or difficulties when integrating these tools into practice, while 30% do not observe such difficulties. This high percentage of perceived difficulties does not make us optimistic either, since, although some teachers may recognize the potential

benefits, the barriers they encounter make it difficult for them to implement them. We believe these difficulties may stem from specialized training and technological resources, resistance to change, and the difficulties posed by the pedagogical integration of artificial intelligence tools. Therefore, the existence of persistent obstacles can hinder innovation and limit the implementation of new technologies in the classroom, ultimately affecting the quality of the educational process.

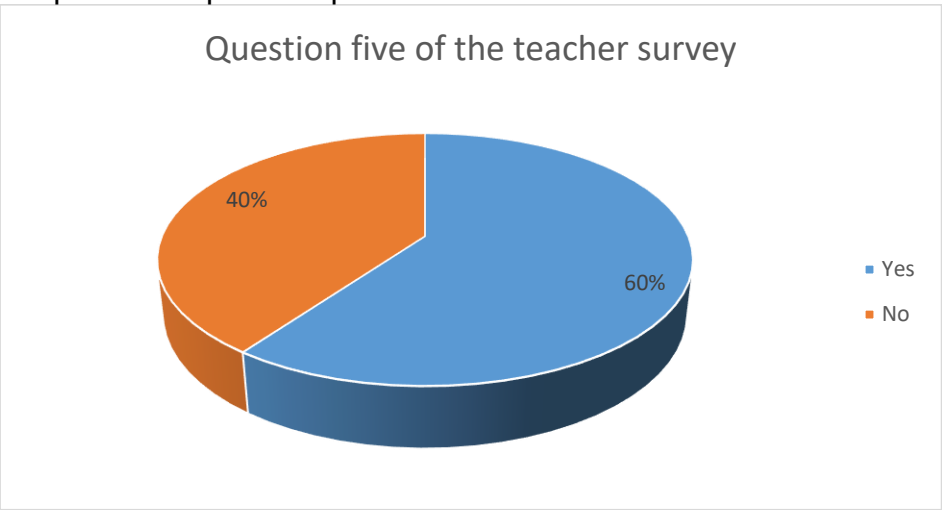
The perception of difficulties also makes it necessary to create institutional policies that address and address these difficulties, including training, the provision of adequate resources, and technical and pedagogical assistance. Likewise, identifying and detecting these obstacles is necessary to propose specific actions and formats that will facilitate the incorporation of artificial intelligence into teaching practices and foster a more competitive environment, adapted to the current and future demands of the education system. The majority perception of obstacles emphasizes the need to propose support and guidance policies that will help overcome these barriers and maximize the benefits and, consequently, the possibilities of these technological tools.

Table 11.
Question number five of the teacher survey.

5. Do you have the institutional support or necessary resources to improve the incorporation of AI in your classroom?	**FA**	**FR**
Yes	6	60%
No	4	40%
Total	10	100%

Source: Teacher Survey
Elaborated by: Diaz (2025)

Figure 10
Graphic description of question five.



Source: Teacher Survey
Elaborated by: Diaz (2025)

The first question asks about the existence of institutional support or resources to integrate artificial intelligence into their classes. Among the 10 teachers, 60% (6 teachers) stated that they do have institutional support, while 40% (4 teachers) stated that they do not have the resources. In other words, there is a gap in the level of institutional support for integrating AI into the classroom, given that a majority responded affirmatively, but also a significant proportion expressed difficulties.

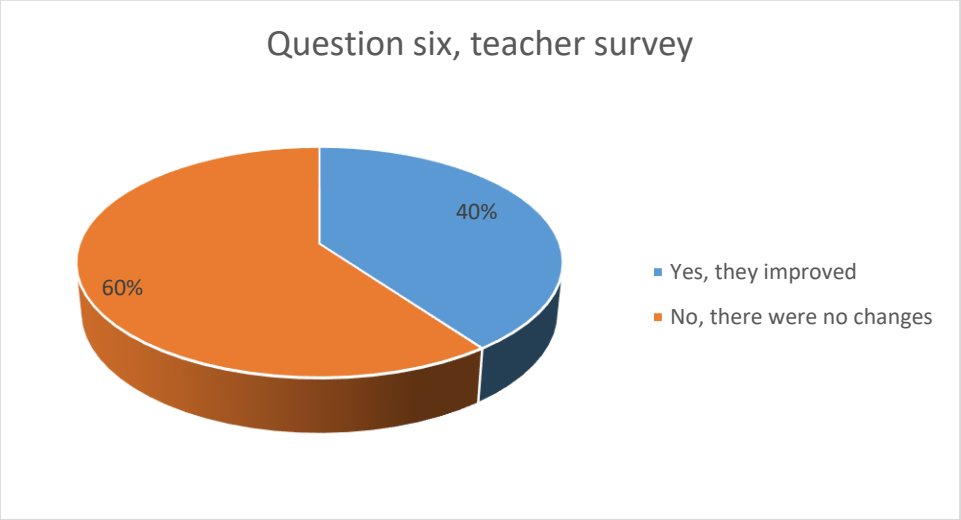
The existence of institutional support is essential to foster the effective use of new technologies. These data suggest that, in general, the school is in an initial stage of adoption, with a latent need for resources and support for teachers. The existence of a minority that reports lack of support may influence the ways in which AI is used, which could negatively impact equity in teaching and learning.

Table 12.
Question six from the teacher survey.

6. Have you noticed any changes in your students' learning outcomes since you started using AI tools?	FA	FR
Yes, they improved	4	40%
No, there were no changes	6	60%
Total	10	100%

Source: Teacher Survey
Elaborated by: Diaz (2025)

Figure 11
Graphic description of question six.



Source: Teacher Survey
Elaborated by: Diaz (2025)

Regarding whether teachers have noticed changes in learning outcomes as a result of using AI tools, 40% (4 teachers) responded favorably, saying they do notice improvements, while 60% (6 teachers) stated they did not notice any differences between those who used AI tools and those who did not. This can be understood as follows: although some teachers do perceive benefits in their students' performance, most teachers have not yet been able to notice significant changes in their students.

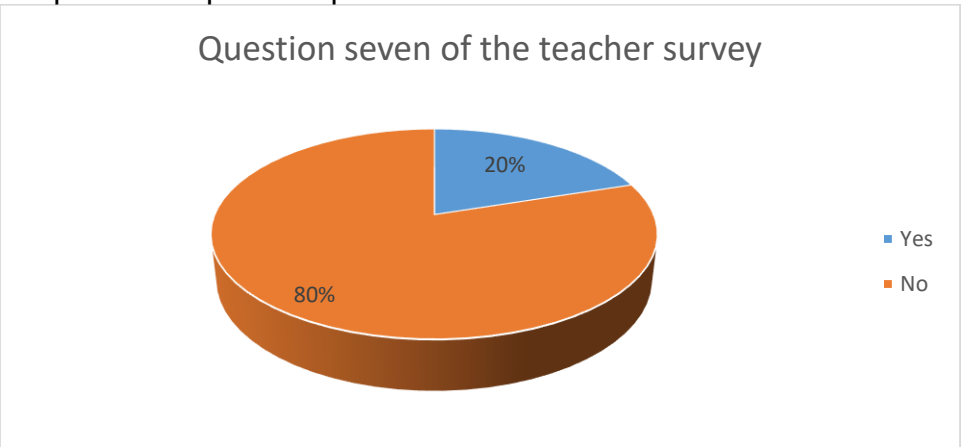
However, the perception of improvements could be related to the reality of AI tools specifically in the application of strategies with students in a given context or in specific activities. Overall, the results indicate that AI has not yet brought significant changes to what can be understood as changes in student performance. These conclusions could also indicate that its use is being implemented at an initial level, since the tools need to be fully formulated to broaden their implications for use with students. But on the other hand, it could be argued that teachers are the ones who have been unable to incorporate AI tools into the classroom. The perception of not noticing changes may motivate teachers to consider new teaching-learning possibilities or to ask for more help with using AI.

Table 13.
Question seven of the teacher survey.

7. Do you think the use of AI in education could replace teachers in the future?	FA	FR
Yes	2	20%
No	8	80%
Total	10	100%

Source: Teacher Survey
Elaborated by: Diaz (2025)

Figure 12
Graphic description of question seven.



Source: Teacher Survey
Elaborated by: Diaz (2025)

Regarding teachers who believe AI could replace teachers in the future, only 20% (2 teachers) indicated that AI could replace teachers, while 80% (8 teachers) believe that AI could not replace teachers. This implies that the majority of teachers value the role of teachers and believe that AI will not fully replace them. Most teachers believe that, although AI can complement teaching, the interaction, friendship, and guidance provided by teachers cannot be replaced.

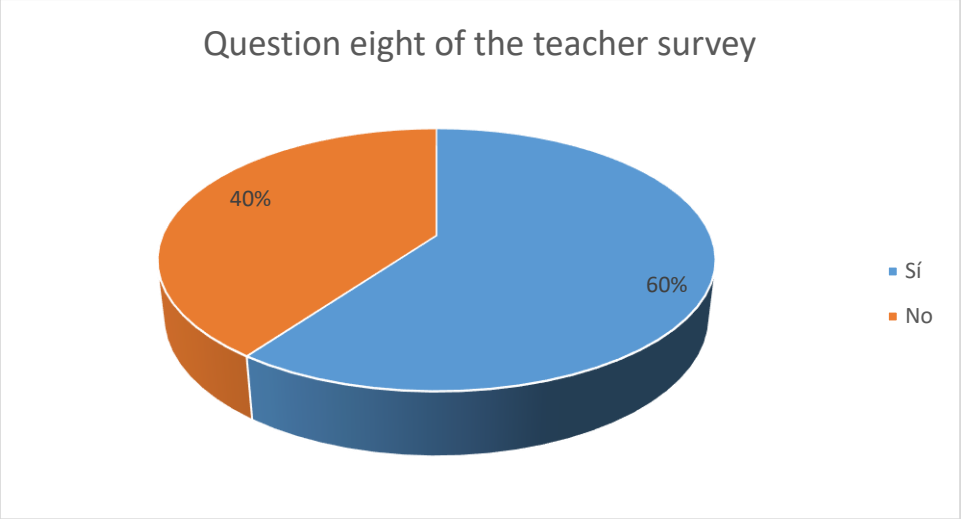
This result is especially relevant in a context where cutting-edge technologies, in particular, raise concerns about automation and the replacement of tasks with automated ones. However, in this sense, the perception is favorable to the teaching role, to the extent that most opinions favor a more balanced view of AI integration, or that AI is used as a complement to, rather than a replacement for, the teacher-student relationship.

Table 14.
Question eight of the teacher survey.

8. Do you consider that important ethical or privacy issues persist when using AI with your students?	FA	FR
Yes	6	60%
No	4	40%
Total	10	100%

Source: Teacher Survey
Elaborated by: Diaz (2025)

Figure 13
Graphic description of question eight.



Source: Teacher Survey
Elaborated by: Diaz (2025)

Finally, regarding ethics and privacy in the application of AI to students, 60% (6 teachers) stated that these aspects do exist, while 40% (4 teachers) denied that they were a significant problem. This perception indicates that most teachers understand the risk of providing data on the web.

The problems associated with these aspects, such as lack of resources and lack of rules and regulations, among others, must be addressed, since the integration of AI must be carried out within an ethical framework that guarantees the privacy of information and the rights of the students to whom it is applied. The fact that some teachers do not consider these aspects problematic may indicate a lack of awareness and/or training regarding the ethical implications. Therefore, it may be advisable to provide more training in these aspects regarding the responsible use of technology.

4.1.3. Interviews

Deputy Director 1: Innovative Perspective and Technological Integration

1. Have you received specific training to integrate artificial intelligence tools into your teaching practice?

From the moment we began operating with artificial intelligence tools in our organization, we have seen a substantial change in our pedagogical practices. The incorporation of AI-based educational platforms, such as adaptive learning systems and virtual assistants, has made it possible to tailor education to people's needs. For example, we have observed that the use of intelligent tutors has enabled teachers to provide more tailored and timely support and has improved attention to diversity in the classroom. The automation of some administrative and assessment tasks has allowed teachers to spend more time designing more innovative teaching proposals and interacting directly with students, making the classroom a more important space that is more focused on learning.

2. How often do you use artificial intelligence tools in your classes?

We have received explanatory training on the use of AI in the classroom, as well as training to update our knowledge on emerging technologies such as educational chatbots and data analysis systems for monitoring student performance. This training has been key to closing the technology gap and ensuring that teachers have the skills to integrate these tools.

We have also provided training on the operation of AI platforms in the context of administrative management, thus enabling automation and validation in relation to administrative assessment tasks.

We have promoted sessions for sharing best practices, the creation of learning communities among teachers, and the fostering of a culture of experimentation and continuous adaptation.

3. Do you consider there are benefits to using these tools in the teaching-learning process?

The most significant benefits we have identified are the ability to personalize teaching, the automation of time-consuming tasks, and the collection of accurate

data for pedagogical decision-making. AI has allowed us to develop individualized learning paths for each student, improving motivation and self-esteem. We have also observed an increase in formative assessment, as real-time analysis tools provide immediate feedback to both teachers and students, allowing for adjustments to be made to methodological strategies.

4. Do you think there are still obstacles or difficulties when integrating these tools into your teaching practice?

Resistance to change on the part of certain teachers has been one of the biggest obstacles we have had to face, as they believe that technology can replace them or that they do not have sufficient skills. There are also difficulties in using the technological infrastructure, as some classrooms do not have good network connectivity or adequate computer devices. From an institutional management perspective, the budget is insufficient to maintain and renew the tools we use, i.e., to ensure their long-term sustainability. Students themselves also have difficulty accessing devices at home, which limits equity in the use of these technologies.

5. How much institutional support or resources do you have to improve the incorporation of AI in your classrooms?

We can say that we have a basic infrastructure, but there is still room for improvement in the connectivity of all educational spaces and the acquisition of devices for all students and teachers. Institutional support has come and gone; there is a clear intention to improve innovation, but we need resources and concrete policies to promote continuous training and support for AI tools.

6. Have you noticed any changes in your students' learning outcomes since you started using AI tools?

I have noticed positive changes in student motivation and participation levels, particularly among those who had difficulties with the traditional classroom model. Personalization and on-the-spot feedback seem to facilitate knowledge acquisition. However, it should be emphasized that we are in an early stage and, in addition, we need to analyze long-term data on academic outcomes in greater depth to see how they evolve.

7. Do you think the use of AI in education could replace teachers in the future?

We have established methodologies focused on personalized learning, with activities that introduce AI to pose challenges for each student. We have also incorporated the use of data analysis platforms to design much more tailored interventions. Teaching is more flexible, allowing teachers to change their methodology.

8. Do you consider that important ethical or privacy issues persist when using AI with your students?

It is important to maintain training programs that address both the practical use and the potential pedagogical and ethical implications of AI. It is also necessary to strengthen the educational technology structure, either through assistance or partnerships with the private sector and universities that lead to access to up-to-date resources and knowledge. Likewise, training in critical thinking and digital literacy is a priority, as it will help prepare students for an increasingly digital and automated environment.

- AI and equity in access:

I am aware that the incorporation of AI can widen gaps if universal access to connectivity and devices is not guaranteed. It is therefore important that infrastructure and resources are well distributed and that there are specific programs for vulnerable students. Technology must be a bridge, not a wall, in the fight to ensure educational equity.

- Expectations and future steps:

My vision is for AI to be a key tool in the education of the future, helping to achieve more inclusive, more personalized, and more effective teaching. That is why I believe it is important to continue investing in training, infrastructure, and the creation of policies that regulate the use of these technologies in an ethical and responsible manner. And finally, to promote research.

Deputy Director 2: Cautious Perspective, Emphasizing Ethics and Equity

1. Have you received specific training to integrate artificial intelligence tools into

your teaching practice?

So far, our institution's experience with artificial intelligence tools has been moderate. We have experimented with some tools such as adaptive platforms, but we are still in an exploratory phase. I have found that these technologies have the potential to improve certain aspects of the educational process, such as personalization or the automation of administrative tasks, but they have also raised some concerns among teachers and families regarding privacy or data use. So far, in pedagogical terms, we are trying to incorporate AI in a way that complements human interaction rather than replacing it, which remains a fundamental element for us in basic education.

2. How often do you use artificial intelligence tools in your classes?

The training we have received has been limited and, in some cases, insufficient for teachers to feel comfortable using these tools. Most of the workshops have been aimed at familiarizing participants with the different platforms, but not all of the training has covered the pedagogical or ethical aspects. I believe it is necessary to offer continuous and more intensive training, with sessions on the ethical and conscious integration of AI, ensuring that teachers understand its benefits and risks.

3. Do you consider there are benefits to using these tools in the teaching-learning process?

The main benefits are that we can offer learning resources that are as tailored as possible to the needs of each student and automate highly repetitive tasks, freeing up time for more personalized attention to students.

4. Do you think there are still obstacles or difficulties when integrating these tools into your teaching practice?

The main obstacle we have observed is addressing the digital divide. Not all students at this institution have access to the internet at home or a device that allows them to connect. In short, it is impossible to overcome certain gaps in access to technology.

5. How much institutional support or resources do you have to improve the

incorporation of AI in your classrooms?

Our technological infrastructure requires significant improvements. Connectivity in many areas of the school is unstable, and resources for updating or expanding devices are scarce. Institutional support has been initial, but established without clearer policies.

6. Have you noticed any changes in your students' learning outcomes since you started using AI tools?

Even at this point, we cannot reach a categorical conclusion as to whether AI leads to better learning outcomes. We have seen greater motivation in some students (those who enjoy learning tasks through digital technologies) and, at the same time, we have also observed that lack of access and training can widen the existing gap. The key will be to continue evaluating and reviewing the implementation strategies themselves to ensure that the technology used works as an additional and equitable ally.

7. Do you think the use of AI in education could replace teachers in the future?

We have begun to experiment with activities that incorporate AI, such as adaptation exercises or online assessments, although these are still very limited. Most teachers continue to prefer traditional methods, and there is even a perception that the inclusion of these tools requires more time and resources than we generally have at our disposal at the moment. The methodologies for successfully integrating AI into the classroom still need to be worked out.

8. Do you consider that important ethical or privacy issues persist when using AI with your students?

It is important to emphasize the reinforcement of pedagogical and ethical training (with the students themselves) and, on the other hand, to advance the technological infrastructure. It may also be important to build alliances with technology-based academic institutions (universities) and each technology sector in order to have access to resources and technological regulations; this may also help in terms of policies that guarantee equitable access and respect for the

privacy of users and their data.

- AI and equity:

The introduction of AI can exacerbate inequalities if resources and access are not properly managed. Therefore, it is necessary for the state and the establishment to ensure that all students have the necessary devices and connectivity. Technology should be seen as a vehicle for reducing existing gaps, not for widening those that already exist in education.

- Future and next steps:

The reality is that I am one of those people who believe that AI plays a complementary role which, guided by good ethics, would promote educational inclusion and personalized learning. I therefore believe that there should be clear regulations and investment in structural technology with continuous training to encourage research that generates impact with sustainable tools.

Deputy Director 3: Perspective.

1. Have you received specific training to integrate artificial intelligence tools into your teaching practice?

I am somewhat wary about the use of artificial intelligence tools in our institution. We have already started testing some platforms, but we are still in the process of assessing their usefulness for the teaching process. Although artificial intelligence has brought about certain changes in the automation of administrative tasks and in the collection of data on performance, we cannot say that it has changed the way we teach and learn. I think it is important not to jump on the technological bandwagon without a critical analysis of the ethical, social, and pedagogical aspects.

2. How often do you use artificial intelligence tools in your classes?

The training we have received has been very basic and, in many cases, insufficient for teachers to effectively incorporate this tool into their classroom practice. Training needs to be ongoing and comprehensive, with a focus on

guidance and a vision for the future of technology.

3. Do you consider there are benefits to using these tools in the teaching-learning process?

I recognize that AI can have advantages such as personalizing education or helping with routine tasks, but I also recognize that there are certain risks. Interdependence may be one of them, as it can lead to a decrease in classroom interaction, which is essential, especially in early childhood education. I must also point out that the possible biases of AI, the intrusion into privacy, and the commodification of data are problems that must be taken into account.

4. Do you think there are still obstacles or difficulties when integrating these tools into your teaching practice?

The obstacles I perceive are the lack of necessary infrastructure, the continuing lack of staff training, and the lack of clarity in institutional policies regarding the responsible and ethical use of AI. On the other hand, the digital divide, socioeconomic inequalities, and limited access mean that AI is linked to those inequalities, becoming a factor that increases social inequalities rather than alleviating them. Cultural resistance is also an obstacle, often arising from insecurity or mistrust toward the use of AI.

5. How much institutional support or resources do you have to improve the incorporation of AI in your classrooms?

Our technological infrastructure is still limited. Connectivity in many classrooms is insufficient, and there are not enough financial resources to obtain sufficient and up-to-date devices. Institutional support has also been limited and even contradictory at times, as clear policies on ethical and responsible use have not been established.

6. Have you noticed any changes in your students' learning outcomes since you started using AI tools?

At this point, it cannot be said that the combination of AI systems and education has led to profound changes in outcomes. What we have been able to verify is

an increase in concerns about privacy and the dehumanization of education. Technology should be understood as an additional benefit, but never as a panacea, and always within the context of its interaction with pedagogical and ethical values within the framework of basic education.

7. Do you think the use of AI in education could replace teachers in the future?

Pedagogical practices are still quite traditional. The incorporation of AI has been limited and sometimes superficial. It is necessary to rethink methodologies, always prioritizing human interaction and/or critical thinking over systems that limit learning autonomy and reinforce biases.

8. Do you consider that important ethical or privacy issues persist when using AI with your students?

I recommend that the incorporation of AI in education be carried out in a very cautious manner, always prioritizing ethics, data protection, and equity. It is necessary for both public and private institutions to reach clear agreements, regulatory frameworks, and training programs that not only deal with technical use, but also training in the philosophical, ethical, and social spheres. Teacher training should aim to be a space for reflection on technologies and their impact.

- AI and equity:

If technology is not regulated and distributed fairly, it can exacerbate existing inequalities. The digital divide is a factor that limits access to and use of these tools in vulnerable communities.

- Expectations and future steps:

Important steps include regulating its use, providing ethical training for staff, and constantly evaluating its impact on learning and school life.

Perspective 1: Principal One.

1. Have you received specific training to integrate artificial intelligence tools into your teaching practice?

Since we began working with artificial intelligence (AI) tools in our educational institution, we have observed significant changes in pedagogical dynamics and educational management. The integration of these technologies has meant more than just the incorporation of digital tools; it has been a real transformation of our daily practices. At first, the experience was one of learning and adaptation, since many of these technologies are relatively new in our field.

In general terms, AI allows for the individualization of the teaching-learning process, adjusting to the specific characteristics of each student. For example, we have begun to use certain environments that integrate mechanisms based on adaptive learning algorithms where, based on their different levels and work pace, students are offered specific exercises and resources. This has facilitated more differentiated attention and has allowed teachers to more easily identify the areas in which their students need more support.

In addition, we have detected variations in the assessment processes. AI-supported data analysis tools provide us with real-time reports on student progress, facilitating pedagogical decisions based on sound and timely data.

2. How often do you use artificial intelligence tools in your classes?

In the context of this topic, training has been a gradual process for us, including participation in workshops and courses offered in collaboration with government institutions and some organizations in the technology sector. These have addressed, for example, aspects of what AI is and how to apply it both in the classroom and in the management of the institution. Despite this, I recognize that there is still a long way to go and that constant updating must be included and taken into account, given that technology is advancing at an unstoppable pace.

Teachers have received training on the use of specific platforms, in addition to learning methodologies that have allowed them to integrate these tools into their educational practices. We also offer sessions for teachers to exchange

experiences, where they share best practices, difficulties, and experiences.

As an institution, we have committed to creating a collaborative learning space where everyone can learn to adapt and take advantage of the potential of AI.

3. Do you consider there are benefits to using these tools in the teaching-learning process?

There are many and they are truly significant. First, the personalization of learning allows us to advance learning at the pace of the students, which promotes motivation and commitment. It also allows us to use analysis to detect specific difficulties and propose earlier interventions and implementations for learning.

Another significant benefit has been the automation of administrative and assessment tasks, which has allowed teachers to devote more time to more creative tasks that are more closely related to the teaching process. AI has also made it easier to incorporate interactive and personalized content, making classes more dynamic and engaging for students.

From a management perspective, AI has enabled more effective, data-driven planning, promoting more appropriate resource allocation and better institutional decision-making.

4. Do you think there are still obstacles or difficulties when integrating these tools into your teaching practice?

Despite the benefits, we have encountered multiple obstacles; one of these obstacles is resistance to change on the part of some teachers and members of the educational community, who still have doubts about the effectiveness of these technologies. Basic training was sufficient to get started, but the need for constant updating requires resources and time that are often unavailable.

In terms of infrastructure, although we have made progress, there are still limitations in terms of connectivity and access to devices in some sectors of the community, which can create gaps when it comes to fully addressing and taking advantage of AI tools.

Management has had to address concerns about data protection and privacy

rights for students and teachers, as the introduction of these technologies requires clear policies and ethical and legal support, which we are still strengthening.

5. **How much institutional support or resources do you have to improve the incorporation of AI in your classrooms?**

The technological infrastructure has improved in all aspects, but it is still scarce. Investment in connectivity and adequate devices is a priority to ensure that AI is integrated. Institutional support has been positive in terms of willingness to explore these technologies, although it is necessary to build a long-term vision and allocate specific resources.

6. **Have you noticed any changes in your students' learning outcomes since you started using AI tools?**

As we have seen in general, AI has had a positive influence on academic results (in terms of student motivation and autonomy), as well as some initial results showing that in those spaces where adaptive learning platforms are used, better grades are obtained.

In terms of teaching practices, teachers have introduced more active methodologies and the use of interactive digital resources. In addition, a more flexible model has been implemented that integrates formative assessment with individualized support.

7. **Do you think the use of AI in education could replace teachers in the future?**

I believe it would be beneficial to promote the continuous training of teachers and management staff, including aspects of ethics and data protection, as well as the modernization and improvement of IT infrastructure and access for all students. Collaboration with technological and academic institutions should serve to innovate and share best practices.

It would also be interesting to create an institutional culture that values innovation and lifelong learning (through spaces for reflection and evaluation of the processes implemented).

8. Do you consider that important ethical or privacy issues persist when using AI with your students?

AI can be a very powerful tool for reducing gaps, provided that access to it is considered equitable. However, given the idea that inequalities in infrastructure and connectivity are what lead to levels of inequality, there may be a risk of increasing existing gaps. It is therefore essential to invest in infrastructure and digital inclusion programs as a first step toward ensuring that students have equal opportunities.

- Future expectations

My expectation is that AI will be a strategic partner in education, capable of facilitating more personalized, inclusive, and effective processes. To achieve this, we must continue to invest in infrastructure, training, and ethical policies that regulate its use.

I believe that the following steps are extremely important: teacher training, consolidating the alliance with the technology sector, including a culture of pedagogical innovation, evaluation, and monitoring to ensure that the AI incorporated has positive and sustainable effects over time.

Perspective 2: Principal Two.

1. Have you received specific training to integrate artificial intelligence tools into your teaching practice?

The use of artificial intelligence in our educational institution has been a recent development, but an extremely enriching one. We have begun to explore the use of personalized learning platforms based on artificial intelligence, chatbots for basic inquiries, and automated assessment systems that provide us with valuable information about what is happening with our students, among other things.

The main reason for using artificial intelligence tools was to improve efficiency in some processes and provide teachers with new resources to capture students' attention.

Pedagogically, we have observed changes in the way teachers plan their classes, as artificial intelligence has facilitated the creation of teaching resources tailored to each learning style, allowing for the diversification of many practices and the implementation of more engaging learning experiences for students.

We have also seen that, regardless of the pedagogical tools used by teachers, students show higher levels of autonomy and motivation due to the fact that they have more interactive and personalized content, in addition to the fact that online review of data in real time is a practice that has allowed us to quickly identify difficulties and introduce more targeted support mechanisms.

2. How often do you use artificial intelligence tools in your classes?

In terms of training, we have developed internal workshops and some online courses to learn about the platforms and promote their possibilities, but I also recognize that training is somewhat limited and increasingly fragmented, so we are developing more powerful and permanent training programs for teaching and administrative staff. We have also promoted experience-sharing sessions in which teachers with a greater interest and knowledge of technology present best practices and challenges in order to stimulate the creation of a learning community that promotes the integration of AI into our educational practices.

3. Do you consider there are benefits to using these tools in the teaching-learning process?

The advantages are notable in terms of improved time management and teaching. The automation of administrative activities (e.g., progress tracking) means that more time is spent on teaching and supporting students. Students enjoy digital resources tailored to their interests and levels, which boosts motivation. The ability to obtain immediate information from AI platforms promotes deeper learning.

4. Do you think there are still obstacles or difficulties when integrating these tools into your teaching practice?

The main challenge has been resistance from a group of teachers and some parents, who fear dependence on technology and the associated risks (e.g., data protection). Limited training and lack of experience in using these tools create a

climate of uncertainty.

In terms of technical support, the infrastructure is still limited, especially in remote areas or areas with poor connectivity. This can lead to a certain degree of inequality and, therefore, a possible difference in access to and benefits from AI. The economic sustainability of these projects is also an unresolved challenge; investment in licenses, hardware, and training always takes away resources.

5. How much institutional support or resources do you have to improve the incorporation of AI in your classrooms?

We have made progress by modifying some equipment and classroom connections, but despite this, there is still a long way to go to guarantee equitable access to technological resources. Collaboration between the public and private sectors has been essential, and we have some support from the institutional sector, although a strategic plan with a medium- and long-term vision that prioritizes technological innovation in education is still needed.

Support from the education administration has been positive in terms of raising awareness, but this support needs to be transformed into resources and educational policies that prioritize the inclusion of AI in the classroom

6. Have you noticed any changes in your students' learning outcomes since you started using AI tools?

We have observed positive changes in some performance indicators, especially in adaptive learning programs. However, it is still early to affirm that these are substantial improvements, and we are continuously evaluating the medium- and long-term impact.

Regarding pedagogical practices, a more student-centered/classroom-based model is being promoted, based on methodologies that utilize technological resources and more interactive activities. AI has also enabled collaborative work and innovation in activity design.

7. Do you think the use of AI in education could replace teachers in the future?

I hope that the most relevant steps will be to consolidate teacher training and

support, expand technological infrastructures, and establish alliances with academic and technological institutions with the potential to provide technical support and specialized training.

It is essential to define effective ethical frameworks and data protection protocols to ensure the responsible use of these technologies. Furthermore, we must foster a culture of innovation and ongoing process monitoring.

8. Do you consider that important ethical or privacy issues persist when using AI with your students?

AI can reduce gaps if equitable access to technologies is achieved. But if existing inequalities are not addressed, it can lead to vicious cycles of inequality. To achieve this, it is crucial to invest in infrastructure and digital inclusion policies that ensure all students are capable enough to take advantage of it.

- Future Expectations and Important Steps

My focus is on solidifying AI as a basic support for personalization, inclusion, and pedagogical innovation. To achieve this, we must consolidate continuing education programs, strengthen infrastructure, and design institutional policies that promote ethics and sustainability.

Furthermore, collaboration between educational institutions, the technology sector, and the market must be fostered to create educational innovation ecosystems. Impact assessment and, essentially, research will be of utmost importance to adapt and enhance these tools for all educational stakeholders.

Triangulation of results:

The triangulation of results in this research is based on data obtained through interviews, surveys, and direct observation, providing a comprehensive view of the impact of artificial intelligence (AI) on basic education. Interviews with principals and teachers revealed recognition of the innovative potential of AI to improve motivation, personalization of learning, and educational management, although they also pointed out obstacles such as lack of infrastructure, limited resources, and the need for specialized training. Surveys of teachers and students showed a growing familiarity with AI technologies, especially among

students aged 8 to 11, who show interest and motivation in incorporating them into their learning process. However, negative perceptions and inequalities in access persist, limiting their positive impact. Direct observation confirmed that, although AI resources are beginning to be integrated into teaching practices, the process is still evolving, with moderate progress in effective implementation. Taken together, these findings indicate that, although AI has transformative potential in basic education, its impact depends on responsible, inclusive, and well-planned management that combines investment in infrastructure, ongoing training, and clear institutional policies to ensure ethical and equitable integration.

4.1.4. Proposal, relationship between AI resources, their use, changes in teaching strategies, and learning outcomes in basic education.

1. Introduction

The incorporation of artificial intelligence (AI) into education has represented one of the most significant transformations in contemporary pedagogical methods, particularly at the elementary level. The integration of these technologies not only modifies traditional ways of teaching and learning but also poses new possibilities and challenges in the management of the educational process. To fully understand this revolution, it is essential to analyze how AI resources relate to their use in the classroom, how they influence pedagogical strategies, and what effects they have on student learning outcomes.

AI, in general terms, refers to systems and programs that simulate human intelligence to perform tasks that, in traditional contexts, would require direct human intervention. In the educational field, these resources include adaptive learning platforms, virtual assistants, automatic assessment systems, chatbots, among others. The use of these resources in the classroom is not just a technological addition, but an element that can transform the dynamics of the educational process, facilitating more personalized, flexible, and student-centered teaching. One of the key aspects of incorporating AI into basic education is the ability of these resources to offer differentiated learning experiences tailored to each student. For example, adaptive learning platforms analyze

student performance in real time and adjust content and activities according to their pace and level of understanding. This allows each student to receive more individualized attention, promoting inclusion and addressing the diversity of needs in the classroom.

Likewise, AI enables the automation of routine tasks, such as grading exams or managing student progress monitoring, freeing up time for teachers to focus on more creative aspects and pedagogical interaction. The presence of virtual assistants and chatbots in the classroom can answer students' questions at any time, promoting autonomy and self-exploration of knowledge. These tools also foster more interactive and motivating learning, especially when integrated with other digital resources. However, the implementation of AI in education requires a careful analysis of how these resources integrate into existing pedagogical practices. Effective incorporation involves not only the acquisition of technology but also teacher training in its pedagogical use, the adaptation of content and activities to the capabilities of AI resources, and consideration of the socio-educational context. Teacher training is essential, as the success of integration depends largely on teachers' competence and willingness to explore new methodologies and adapt to changes.

The impact of AI on learning outcomes is a central aspect of this process. It has been observed that, when used appropriately, these resources can improve knowledge acquisition, facilitate the development of skills and competencies, and increase student motivation and engagement. Furthermore, AI can help reduce educational gaps by offering accessible and personalized resources, thus promoting greater equity in access to quality education. On the other hand, there are also challenges and risks associated with its implementation, such as a potential overdependence on technology, the loss of human interaction, concerns about data privacy and security, and the need to ensure the ethical and responsible use of these tools. Continuous evaluation of its impact and adaptation of pedagogical practices is essential to fully leverage its benefits and mitigate potential negative effects.

In short, the incorporation of AI into basic education is poised to transform the way we teach and learn, provided its use is accompanied by adequate

training, strategic planning, and a vision focused on the well-being and comprehensive development of students. The trend is toward an educational model that combines technology with pedagogy, seeking to enhance the capabilities of each student and promote more inclusive, participatory, and motivating learning.

2. Process clarification

The process of integrating artificial intelligence into education can be understood as a dynamic and cyclical sequence involving several interrelated stages, where each element influences and is influenced by the others. This sequence reflects how AI resources, when introduced into the educational context, generate changes in pedagogical strategies that, in turn, impact student learning outcomes.

The first element in this chain is the presence and availability of AI resources. These resources include adaptive learning platforms, virtual assistants, automatic assessment systems, chatbots, among others. Their incorporation into the classroom responds to the need to innovate and improve teaching processes, making them more efficient and adapted to the demands of the 21st century. The proper selection and contextualization of these resources are essential for them to fulfill their function effectively.

The second step is the use of these resources in teaching. Practical integration involves how teachers and students interact with AI tools. This can range from occasional use in specific activities to permanent incorporation into the curriculum. The way in which AI is used, the frequency, and the purposes will largely determine the effects it will have on classroom dynamics.

The use of AI in the pedagogical process generates changes in teaching strategies. These transformations can include greater content personalization, a student-centered approach, flexible learning times and spaces, and the use of real-time data to make pedagogical decisions. AI allows teachers to adopt more innovative, participatory, and evidence-based methodologies, promoting more active and motivating learning. However, these changes also require adequate teacher training and a change in school culture to be effective.

Ultimately, these changes in pedagogical strategies impact student learning outcomes. The effects can be manifested in improved knowledge acquisition, the development of skills and competencies, increased motivation, and a more positive attitude toward learning. Furthermore, AI can contribute to reducing educational inequalities by offering resources tailored to the specific needs of each student, promoting inclusion and equity.

This cycle, ultimately, can have positive or negative results, depending on several factors. These include the proper planning and design of technological integration, the training and development of teaching staff, institutional support, the appropriateness of the socio-educational context, and the purpose of use. When these aspects are properly considered and managed, the incorporation of AI can significantly enhance the teaching and learning process, leading to better results and a more enriching and equitable educational experience. Conversely, a poor or poorly planned implementation can generate frustration, inequalities, or a loss of human interaction, negatively impacting educational objectives.

Therefore, it is crucial to understand this sequence as a flexible process, requiring constant evaluation and adjustment, to fully leverage the potential of artificial intelligence in basic education and ensure that its integration contributes to developing more competent, motivated, and inclusive students.

3. Matrix of relationships between AI resources, their use, changes, and outcomes in basic education

Below is a matrix that illustrates the relationships between these elements and their impact on learning in basic education.

Table 15.
Relationships between resources.

AI Resources	Use in Teaching	Changes in Teaching Strategies	Impact on Learning Outcomes
Adaptive learning platforms	Personalization of content based on the student's level and pace	1. Shift toward a more student-centered, differentiated learning model	Improved comprehension, motivation, and academic performance

Virtual assistants and chatbots	Personalized attention, real-time question resolution	2. More flexible teaching strategies, 24/7 availability, individualized attention	Greater active participation, autonomy, and confidence in learning
Automatic assessment systems	Continuous and formative assessments, instant feedback	3. Incorporation of formative assessment, real-time progress monitoring	Early identification of difficulties, adjustment of teaching strategies
Big Data Analytics	Monitoring student performance and behavior	4. Designing data-driven pedagogical interventions, differentiating supports	Improving attention to diversity, more equitable academic outcomes
Multimedia resources with AI	Use of videos, simulations, and interactive games	5. More interactive and engaging teaching strategies	Increased motivation, conceptual understanding, and practical skills
Intelligent tutoring systems	Personalized learning guides	7. Implementation of virtual tutors for individualized support	Improved independent learning and reinforcement of difficult content

Source: Teacher Survey
Elaborated by: Diaz (2025)

The presented matrix provides a comprehensive overview of the interaction between artificial intelligence (AI) resources, their applications in teaching, the pedagogical changes they generate, and learning outcomes in the context of basic education. This analysis seeks to break down and explain in depth how each of these components relates to and contributes to the transformation of the educational process, highlighting the trends, benefits, and challenges associated with the incorporation of AI technologies at this educational level.

First, the matrix identifies various AI resources used in basic education, such as adaptive learning platforms, virtual assistants and chatbots, automatic assessment systems, data analysis (Big Data), AI-powered multimedia resources, and intelligent tutoring systems. Each of these resources has a specific function, and their incorporation impacts pedagogical strategies, changes in teaching, and, ultimately, student learning outcomes.

Adaptive learning platforms, for example, allow content to be personalized according to each student's level and pace. This represents a fundamental shift toward a student-centered model, where teaching is tailored to individual needs, fostering greater understanding, motivation, and academic performance. Content adaptation helps reduce learning gaps and empower students, as they are offered a tailored learning path, facilitating more effective and meaningful learning.

Furthermore, virtual assistants and chatbots represent a tool for offering personalized attention and resolving doubts in real time. 24/7 availability and the possibility of individualized attention make teaching strategies more flexible and tailored to student needs. This encourages greater active participation, autonomy, and confidence in the learning process, essential aspects for developing more autonomous and motivated students.

Automatic assessment systems introduce a form of continuous and formative assessment with instant feedback. This resource allows for real-time monitoring of student progress, early identification of difficulties, and timely adjustment of teaching strategies. Automatic assessment facilitates closer

monitoring of learning, providing immediate feedback that helps consolidate knowledge and correct errors in a timely manner, rather than waiting for traditional summative assessments.

Data analytics, or Big Data, allows for large-scale monitoring of student performance and behavior. This analytical capability facilitates the identification of patterns that can be used to design differentiated pedagogical interventions, promoting attention to diversity and contributing to more equitable academic outcomes. Using data to guide pedagogical decisions represents a step toward more inclusive and personalized education, although it also poses challenges related to privacy and the ethical handling of information.

AI-powered multimedia resources, including videos, simulations, and interactive games, make teaching strategies more interactive and engaging. The incorporation of multimedia elements increases student motivation, fosters conceptual understanding, and develops practical skills, making learning a more engaging and effective experience. Interaction with multimedia resources also fosters the development of digital skills and critical thinking. Finally, intelligent tutoring systems offer personalized learning guides and allow the implementation of virtual tutors for individualized support. These resources promote independent learning and reinforcement of difficult content, allowing students to progress at their own pace and receive targeted support based on their needs. Intelligent tutoring helps consolidate knowledge and skills in areas where students struggle most, increasing the likelihood of academic success.

From a general perspective, the matrix shows that the incorporation of AI resources into basic education significantly transforms traditional pedagogical practices. The personalization of learning, continuous assessment, the use of data analytics, and the use of interactive multimedia resources create an ecosystem that fosters a more inclusive, flexible, and student-centered educational process. However, this transformation also entails significant challenges: the need for teacher training in the use of these technologies, ethical and responsible data management, equitable access to technological resources, and the adaptation of regulatory frameworks.

The matrix also reflects positive learning outcomes, evidenced by improved understanding, motivation, active participation, autonomy, and academic performance. The interaction between these resources and pedagogical changes produces a synergistic effect that enhances the educational process, creating more dynamic, personalized, and effective learning environments. In conclusion, the relationship matrix shows that the integration of AI resources into basic education is a process that fosters profound changes in pedagogical strategies and learning outcomes. The key to fully harnessing its potential lies in adequate teacher training, ethical data management, and ensuring equal access to these technologies. Technological innovation, when implemented responsibly and thoughtfully, can become a fundamental driver for improving quality and equity in basic education, better preparing students for the challenges of the 21st century.

4.2. Proposed AI-based pedagogical strategies

Based on the above matrix, it is possible to design specific pedagogical strategies that leverage these resources to improve learning outcomes in basic education:

Figure 14.
Cover illustration: Proposals for AI-Based Pedagogical Strategies.

Elaborated by: Diaz (2025)

Activity number one

Strategy 1	**Implementing personalized learning with adaptive platforms like DreamBox for Mathematics.**
Objective	To promote autonomous learning and cater to different learning paces.
Expected results	Increased motivation, better understanding, and improved performance.
Actions	Use adaptive learning platforms that tailor content to the needs of each student.
Duration	**20 minutes in total (divided into phases for teacher and student).**
Description	Activity and Development: The activity consists of integrating the adaptive platform DreamBox into the classroom to support personalized learning paths in mathematics. It is structured in three phases: **1. Teacher training (5 minutes):** Short orientation session where he teacher learns how to interpret platform data, understand its features, and receive guidance for assigning adaptive tasks. **2. Classroom preparation (5 minutes):** The teacher explains to students how to log in, navigate the platform, and set personal learning goals. Students are encouraged to reflect on their own pace of learning and strategies. **3. Practical activity (10 minutes):** Students access DreamBox, explore customized content, and complete assigned activities. They set personal goals and conduct a brief self-assessment.

	Meanwhile, the teacher monitors real-time progress using the data generated by the platform. **Scope of the activity:** • Assign adapted math tasks and monitor student progress in real time. • Encourage reflection and self-assessment so that each student can make decisions about their pace and strategies. **Expectations:** The activity seeks to: • Foster autonomous and motivating learning. • Reduce learning gaps by addressing individual needs. • Increase understanding of mathematical content and academic performance. • Empower teachers to use platform data for educational decision-making. • Create an inclusive environment where all students benefit from adapted resources and support. **What the participants will learn:** **-Teachers** will learn to integrate adaptive platforms into their practice, interpret learning data, and adapt teaching strategies accordingly. **- Students** will learn to manage their own learning process, set goals, identify challenges, and seek appropriate resources to overcome them.

Activity number two

Strategy 2	**Integrating chatbots into classroom activities for personalized support.**
Objective	To develop digital skills in teachers and students through the use of chatbots as support tools for assignments, exercises, and resolution of everyday questions.
Expected results	• Teachers acquire skills to configure, manage, and design chatbot-based activities. • Students learn to interact with chatbots independently and responsibly, using them as complementary resources in their learning process.
Actions	Incorporate educational chatbots to support teaching, promote independent inquiry, and provide immediate feedback.
Duration	**20 minutes in total (divided between teacher preparation and student implementation).**
Description	Activity and Development: The activity consists of a teacher-guided implementation of chatbots in the classroom, organized into three phases: **1. Teacher training (5 minutes):** Teachers receive a short induction on how to configure and design chatbot activities, including guidelines for ethical and pedagogical use. **2. Classroom preparation (5 minutes):** The teacher introduces the chatbot to the students, explains its limits and advantages, and models how to use it responsibly. **3. Practical activity (10 minutes):** Students interact with the chatbot to solve exercises, ask questions, or complete tasks. During this stage, the teacher supervises, provides support, and

	monitors how the students use the chatbot to ensure proper learning outcomes. **Scope of the activity:** • Teachers design and guide the chatbot-based activities. • Students apply what they learn in class, using chatbots as an additional support tool for independent work. **Expectations:** • Encourage responsible and ethical use of AI in the classroom. • Strengthen students' autonomy in solving academic tasks. • Improve classroom interaction by combining teacher guidance with technological mediation. • Provide teachers with resources to innovate in their teaching practices. **What the participants will learn:** - **Teachers** will develop skills to configure and integrate chatbots into their lessons, interpret data generated by student interactions, and adapt strategies according to the results. - **Students** will learn to use chatbots to ask questions, reinforce content, and practice problem-solving independently, while also reflecting on ethical use and responsible management of AI tools.

Activity number three

Strategy 3	**Use of automated assessment and data analysis for educational monitoring through Google Cloud for data and Megaprofe for assessment implementation.**
Objective	Detect difficulties early and personalize pedagogical interventions.
Expected results	Improvement in academic results and educational inclusion.
Actions	Implement online assessment systems that provide instant feedback and analyze data to adjust teaching.
Duration	**25 minutes**
Description	**Duration:** expected duration of two weeks (initial phases) **Duration per activity:** between 1 and 2 hours of biological time **Participants:** teacher, technical team, students **Activities:** **1. Account setup and creation (1 hour):** ◦ The teacher begins creating their accounts on Google Cloud (they must also create an account on Megaprofe, which links to the effective creation of the correction procedure that will be used for assessment). **2. Assessment design (2 hours):** ◦ The teacher configures the questionnaires and activities in Megaprofe and uploads them to the platform to set the procedure (the parameters for automatic correction).

	3. Uploading and running the assessments (30 minutes per assessment): ◦ Uploading the assessments so that students can answer them through the platform. ◦ Students respond live according to the scheduled program. **4. Analysis of results (30 minutes per assessment):** ◦ In Google Cloud, the platform returns automated reports with performance data. o ◦ The teacher reviews the reports generated by Google Cloud, determining which areas are problematic and need to be addressed in their teaching.

Activity number four

Strategy 4	**Integration of interactive multimedia as Kahoot! resources in classes.**
Objective	To make classes more dynamic and interactive.
Expected results	Improvements in conceptual understanding and interest in learning.
Actions	Incorporate AI-based videos, simulations, and interactive games into lessons.
Duration	**15 minutes**
Description	**Total time, estimated total time:** 1 week of preparation + regular sessions.

	Time for each activity: 15-20 minutes each. **Participants:** teacher, students. **Activities:** **1. Creating and designing quizzes (30 minutes):** o The teacher uploads an account to Kahoot! and designs quizzes on the content being covered. **2. Advance preparation (15 minutes):** o The quiz is programmed, limiting the time and response options. **3. Application in class (15-20 minutes):** o On the day of the session, the teacher shares the Kahoot! code with the students. o Students access it from their devices and answer in real time. o The results are displayed instantly so that the teacher can use them in the lesson. **4. Feedback (10 minutes):** o The results are discussed and concepts are consolidated based on the questions that have been identified.

Activity number five

Strategy 5	Teacher training in the ethical and effective use of AI (Gradescope).

Objective	To ensure the effective and ethical integration of AI into the educational process.
Expected results	More thoughtful and strategic use of technology, with a positive impact on student outcomes.
Actions	Train teachers in the pedagogical use of AI resources and data interpretation.
Duration	**30 minutes**
Description	**Total, approximate:** 3 hours (split into sessions) **People:** Teacher, facilitator, technical team **Activities:** **1. Initial preparation session (1 hour):** o The facilitator presents the ethical principles of AI and the main functions of Gradescope (assignment upload, automatic grading, and feedback). o Practical use cases are presented. **2. Guided practice (1 hour):** o Teachers carry out a simulation: creating an assessment in Gradescope, uploading test assignments, and learning how to use the automatic grading and feedback features**.** **3. Follow-up session and reflections (1 hour):** o Ethical principles, current challenges, and best practices are discussed.

	o o Ways for teachers to integrate Gradescope into their assignments are planned, reviewing curricula and ethical considerations.

Conclusions

The Transformative Potential of AI in Education: Research shows that AI tools can transform basic education, as through personalized learning, AI tools allow students to advance at their own pace and work with content that reflects their interests. In other words, these tools not only allow for a deeper understanding of what is being learned, but also increase student motivation and engagement.

Challenges in development: However, even though AI opens up promising opportunities, the integration of AI in institutions faces barriers related to lack of infrastructure, limited resources, and the need for ongoing training of educational staff. What is needed is for institutions to understand that AI should not be seen as a replacement for teachers, but rather as a complement to their work.

Incompatibility between perception and reality: Although students show greater familiarity with the use of AI tools, negative perceptions also emerge that limit their potential. At the same time, inequality in access to and appropriation of technologies could intensify learning inequalities, which is an issue that requires attention from educators and administrators.

Perspectives of educational managers. Interviews with principals and assistant principals highlight a divided perspective on AI in education. According to the first point of view, it has clear innovative potential as it has the capacity to contribute positively to the improvement of education. According to the latter point of view, the general perception is that ethical risks must be better managed and that it is essential to implement policies to prevent inequalities from worsening. Investment in infrastructure and training can be a way to properly consolidate pedagogical innovation.

Teaching Strategies and Effective Learning. The research highlights that, if properly applied, AI resources have the potential to improve teaching strategies and can even transform education into a more student-centered process. It concludes that the use of AI must be combined with the application of innovative

teaching practices to sustain the positive impact on student performance and motivation.

Need for Training and Awareness. In order to maximize the impact of AI resources on basic education, it is necessary to have ongoing training programs for teachers and to raise awareness among the entire educational community about the ethical and privacy implications.

Determinations for Strategic Implementation: Research concludes that the implementation of AI in education requires a strategy that includes the design of explicit and clear policies, the provision of adequate educational resources, and the adaptation of the fact that AI must be used ethically and collaboratively in the context of technology use. Only in this way can we guarantee that the benefits of artificial intelligence will extend to the entire educational community, avoiding the creation of new inequalities.

In conclusion, the integration of artificial intelligence tools in basic education is a problematic process, but at the same time, it can offer great potential if approached responsibly and under the principle of equity that prioritizes student learning and development.

Recommendations

Learning Styles and AI: The aim is to investigate how different learning styles among students can determine the use and effect of artificial intelligence tools, in order to adapt learning and individualize it based on AI.

Mental Health of Students and Teachers in Relation to AI: It is considered necessary to identify the impact of AI tools on the mental health and well-being of students and teachers. Evidence in this regard can help establish strategies to alleviate technological stress and create the conditions necessary to generate a healthy learning environment.

Measures for the inclusion of students with special needs: Research should be conducted on how AI tools can be adapted to students with special educational needs. Research in this area could contribute to the development of inclusive materials to ensure that students have equal access to education.

Assessment of Digital Competences and their Evolution: If possible, the digital competences of teachers and students should be monitored and assessed before and after AI training, as this provides insight into the impact of the continuing education program and allows for adjustments to be made to the training.

Code of Ethics on AI for Education: The aim is to establish a code of ethics on AI with the necessary characteristics for education, which can be used for ethical decision-making in relation to the use of technologies in the classroom.

Review of Continuing Teacher Training: We must go beyond initial training and explore models of continuous and reflective training for teachers on AI, so that educators themselves can keep up with the rapid advance of technology and adopt AI in their teaching practice.

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ANNEXES

Annex 1. Student Survey

UNIVERSIDAD LAICA VICENTE ROCAFUERTE DE GUAYAQUIL

Survey for students ages 8 to 11

Instructions: Please read each question and mark the option that best describes your opinion or experience. There are no right or wrong answers.

Questions:

1. Have you ever used artificial intelligence tools (such as virtual assistants, learning programs, etc.) in your classes?

- o [ ] Yes
- o [ ] No

2. Do you like it when teachers use artificial intelligence tools in class?

- o [ ] Yes, I like it a lot
- o [ ] It's okay, it doesn't bother me
- o [ ] I don't like it

3. Do you think artificial intelligence tools help you learn better?

- o [ ] Yes, a lot
- o [ ] A little
- o [ ] No, they don't help

4. What do you like most about using artificial intelligence tools in class? (You can choose more than one option)

- o [ ] I learn faster
- o [ ] It's fun

- o [ ] It makes me feel more interested in the classes
- o [ ] I don't like any of them

5. What difficulties have you had when using artificial intelligence tools?

- o [ ] I don't know how to use them
- o [ ] It takes a long time to learn how to use them
- o [ ] They don't work well or have errors
- o [ ] I don't have any difficulties

Annex 2. Survey for Teachers.

UNIVERSIDAD LAICA VICENTE ROCAFUERTE DE GUAYAQUIL

Survey for Teachers

Instructions: Please answer the following questions truthfully, considering your experience with artificial intelligence tools in education.

Questions:

1. Have you received specific training to integrate artificial intelligence tools into your teaching practice?

- o [ ] Yes
- o [ ] No

2. How often do you use artificial intelligence tools in your classes?

- o [ ] Daily
- o [ ] Several times a week
- o [ ] Rarely
- o [ ] Never

3. Do you consider there are benefits to using these tools in the teaching-learning process?

- o [ ] Yes
- o [ ] No

4. Do you think there are still obstacles or difficulties when integrating these tools into your teaching practice?

- o [ ] Yes
- o [ ] No

5. How much institutional support or resources do you have to improve the incorporation of AI in your classrooms?

- o [ ] Yes
- o [ ] No

6. Have you noticed any changes in your students' learning outcomes since you started using AI tools?

- o [ ] Yes, they improved
- o [ ] No, there was no change
- o [ ] I haven't noticed

7. Do you think the use of AI in education could replace teachers in the future?

- o [ ] Yes
- o [ ] No

8. Do you consider that important ethical or privacy issues persist when using AI with your students?

- o [ ] Yes
- o [ ] No

Elaborated by: Diaz, Luis

Annex 3. Interview with school administrators.

UNIVERSIDAD LAICA VICENTE ROCAFUERTE DE GUAYAQUIL

Interview guide on the impact of artificial intelligence tools on the teaching-learning process for school administrators and assistant administrators.

1. Could you share your general experience regarding the use of artificial intelligence tools in your educational institution? What changes have you observed in pedagogical processes?

2. What type of training have you received to integrate artificial intelligence tools into your management and teaching practices?

3. From your perspective, what are the main benefits that the incorporation of artificial intelligence has brought to teaching and learning at your institution?

4. What obstacles or challenges have you identified in the implementation and use of these technologies, both from institutional management and from the perspective of teachers and students?

5. How do you perceive the technological infrastructure and institutional support to facilitate the integration of artificial intelligence tools into the educational process?

6. In your opinion, how has artificial intelligence impacted student learning outcomes? Have you observed any specific changes?

7. What pedagogical or methodological practices have been modified or developed to incorporate AI tools in the classroom?

8. What recommendations would you make to improve the integration of artificial intelligence into teaching, both at the institutional level and in staff training?

9. How do you perceive the relationship between artificial intelligence technology and equity in access to educational resources?

10. Finally, what expectations do you have regarding the future of the use of artificial intelligence tools in education and what steps do you consider important to enhance their positive impact?