



Research article

# Human dimension in the integration of artificial intelligence in a rural educational institution: case study in the Eustorgio Salgar school

## Dimensión humana en la integración de la inteligencia artificial en una institución educativa rural: estudio de caso en la i. e. Eustorgio Salgar

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**Abstract:** The incorporation of artificial intelligence (AI) in education presents opportunities to strengthen personalized learning, support teachers, and optimize pedagogical and administrative processes. However, in rural contexts, its integration requires a situated understanding of institutional conditions, technological gaps, teacher training, and the indispensable role of human mediation. This article analyzes the possibilities of incorporating AI at the Eustorgio Salgar Educational Institution, located in the Salgar district of the municipality of Puerto Colombia, as an educational innovation strategy with a human-centered approach. Methodologically, a qualitative study was conducted with a descriptive-analytical scope and a case study design, supported by document review, contextual analysis, and institutional observation. The information was organized thematically into four dimensions: institutional conditions, pedagogical opportunities, risks and tensions, and teacher mediation. The findings show that the technological infrastructure represents a relevant opportunity, but is insufficient for the meaningful integration of AI; Its potential depends on pedagogical guidelines, teacher training, ethical criteria, data protection, and an understanding of the rural environment with urban influences. It is concluded that AI can be consolidated as a support tool for teaching, learning, and school management when it is integrated with conscious teacher mediation and an educational vision centered on human dignity, inclusion, and contextual relevance.

**Keywords:** Artificial intelligence, Rural education, Educational innovation, Teacher mediation, Ethical approach

**Resumen:** La incorporación de la inteligencia artificial (IA) en educación plantea oportunidades para fortalecer la personalización del aprendizaje, apoyar la labor docente y optimizar procesos pedagógicos y administrativos. No obstante, en contextos rurales su integración exige una lectura situada de las condiciones institucionales, las brechas tecnológicas, la formación docente y el papel irrenunciable de la mediación humana. Este artículo analiza las posibilidades



de incorporación de la IA en la Institución Educativa Eustorgio Salgar, ubicada en el corregimiento de Salgar, municipio de Puerto Colombia, como estrategia de innovación educativa con criterio humano. Metodológicamente, se desarrolló un estudio cualitativo, con alcance descriptivo-analítico y diseño de estudio de caso, apoyado en revisión documental, análisis contextual y observación institucional. La información fue organizada mediante categorización temática en cuatro dimensiones: condiciones institucionales, oportunidades pedagógicas, riesgos y tensiones, y mediación docente. Los hallazgos muestran que la infraestructura tecnológica constituye una oportunidad relevante, pero insuficiente para una integración significativa de la IA; su potencial depende de lineamientos pedagógicos, formación docente, criterios éticos, protección de datos y comprensión del entorno rural con incidencia urbana. Se concluye que la IA puede consolidarse como herramienta de apoyo para la enseñanza, el aprendizaje y la gestión escolar cuando se articula a una mediación docente consciente y a una visión educativa centrada en la dignidad humana, la inclusión y la pertinencia contextual.

**Palabras clave:** Inteligencia artificial, Educación rural, Innovación educativa, Mediación docente, Enfoque ético

## 1. Introduction

The incorporation of artificial intelligence (AI) in education cannot be understood merely as the adoption of technological tools, but rather as a pedagogical, institutional, and ethical process that transforms the ways of teaching, learning, providing support, and making decisions within schools. Rouhiainen [10] defines AI as the ability of a machine to use algorithms, learn from data, and apply what it has learned to decision-making, in a way that resembles certain human processes. This understanding is complemented by the idea that artificial intelligence seeks to develop systems capable of performing tasks associated with human reasoning, learning, and problem-solving [8].

However, in the educational field, its value does not depend solely on the technical capacity to process information, but on how such information is articulated with formative purposes, pedagogical criteria, and contextual realities.

In rural educational institutions, this discussion acquires particular relevance. The integration of AI does not occur under homogeneous conditions, as it is shaped by gaps in connectivity, the availability of technological resources, teacher training, institutional support, and the sociocultural characteristics of the territory. Therefore, the analysis of AI in rural contexts requires moving beyond general statements about technological innovation and situating the reflection within the concrete conditions of the school, its actors, and its educational needs.

From this perspective, the Eustorgio Salgar Educational Institution constitutes a relevant case for analyzing the possibilities of incorporating AI with human judgment. Located in a rural district with urban influence, the institution simultaneously faces demands associated with the strengthening of digital competencies, the continuity of community dynamics typical of the territory, and the need to preserve the pedagogical relationship as the core of holistic education.

Nevertheless, the discussion on AI in education has moved away from focusing solely on the availability of tools and has shifted toward the pedagogical, ethical, and contextual conditions that guide their use. In institutions located in rural contexts, this discussion becomes especially relevant because technological innovation depends not only on access to infrastructure, but also on the relevance of institutional decisions, teacher training, student support, and a situated understanding of the educational community's needs.

In these types of settings, rurality is not merely a geographical condition, but rather a factor that influences forms of access to knowledge, school-community relationships, educational expectations, and the real possibilities of technological appropriation. Therefore, analyzing AI in a rural institution makes it possible to recognize specific tensions: the gap between resource availability and meaningful pedagogical use, the need to strengthen teachers' capacities, data protection in small school communities, and the importance of preventing technology from deepening existing inequalities.

The Eustorgio Salgar Educational Institution, affiliated with the Departmental Secretariat of Education of Atlántico and located in the district of Salgar, municipality of Puerto Colombia, constitutes a case of

interest for this analysis. The institution serves preschool, primary, lower secondary, and upper secondary students in a rural setting with urban influence, marked by economic dynamics linked to tourism, territorial transformations, and growing demands for training in digital and socio-emotional competencies.

Although the strengthening of institutional technological infrastructure opens up possibilities for educational innovation, specialized literature warns that the presence of technology in the classroom does not, by itself, guarantee improvements in the quality of learning. In the case of the Eustorgio Salgar Educational Institution, the challenge lies in understanding how these resources can be articulated with a pedagogical project that is relevant to a rural context with urban influence, without reducing AI to an instrumental tool or displacing the human mediation that characterizes educational relationships.

Based on this problem, the study is guided by the following question: how can the integration of artificial intelligence in a rural educational institution, such as the Eustorgio Salgar Educational Institution, enhance pedagogical and administrative processes without blurring the human dimension that characterizes educational relationships in rural contexts? This question makes it possible to link technological analysis with institutional conditions, teacher capacities, student needs, and the ethical principles that should guide any process of educational innovation.

Within this framework, the objective of the article is to analyze the possibilities of incorporating artificial intelligence in the Eustorgio Salgar Educational Institution as an educational innovation strategy guided by human judgment, in such a way that it strengthens pedagogical processes without replacing human interaction or the values of holistic education. Methodologically, the study is developed from a qualitative approach, with a descriptive-analytical scope and a case study design. The analysis is supported by document review, contextual analysis, and institutional observation, with the purpose of understanding the conditions, opportunities, and tensions associated with a possible integration of AI in the Eustorgio Salgar Educational Institution. This approach does not seek to measure quantitative impacts or evaluate an experimental implementation, but rather to provide a situated interpretation of the possibilities for incorporating AI from a humanistic, ethical, and pedagogically relevant perspective.

The article is structured as follows. Section 2 presents the main contributions of the study to the discussion on artificial intelligence integration in rural educational contexts. Section 3 reviews previous research related to artificial intelligence, rural education, educational innovation, and teacher mediation. Section 4 describes the qualitative methodological approach, the descriptive-analytical scope, and the case study design used to examine the Eustorgio Salgar Educational Institution. Section 5 presents the findings organized around institutional conditions, pedagogical opportunities, risks and tensions, and teacher mediation. Section 6 discusses these findings in light of the human, ethical, and contextual dimensions of AI integration. Finally, Section 7 summarizes the main conclusions and highlights the relevance of incorporating artificial intelligence as a support tool for teaching, learning, and school management without displacing the human dimension of education.

## 2. Contributions

This article presents the following contributions to the study of artificial intelligence integration in rural educational contexts:

- ii. This study provides a situated analysis of artificial intelligence integration in a rural educational institution, emphasizing the importance of contextual, pedagogical, and ethical conditions for its meaningful adoption.
- ii. The article highlights the role of teacher mediation as a central factor in the responsible use of AI, showing that technology should support, rather than replace, the human dimension of educational relationships.
- ii. The study identifies opportunities and risks associated with AI implementation in rural education, including personalized learning, teacher support, institutional management, data protection, algorithmic bias, and digital inequality.
- ii. The research contributes a human-centered framework for understanding AI as an educational innovation strategy linked to inclusion, dignity, contextual relevance, and the needs of rural communities.

### 3. Related Works

Recent literature agrees that AI can expand teaching and learning possibilities through learning analytics, personalization, task automation, and support for pedagogical decision-making. However, these benefits depend on their articulation with clear pedagogical models rather than on a purely technical incorporation. These benefits also require inclusive criteria, especially when AI is applied in contexts marked by gaps in access, training, and technological appropriation [2;7].

Cabero-Almenara and Llorente-Cejudo [3] argue that AI offers relevant possibilities for education, but also poses challenges related to teacher training, data quality, and the institutional capacity to guide its use in a meaningful way. From a complementary perspective, García-Peñalvo [5] emphasizes that AI applied to education should be understood from an ethical-pedagogical approach. This implies recognizing that the value of these tools does not lie in replacing teachers, but in enriching educational mediation, broadening support pathways, and strengthening contextualized decision-making.

In Latin America, studies on digital transformation in education show that the gap between urban and rural contexts cannot be explained solely by connectivity. Other factors are also involved, such as unequal access to teacher training processes, the availability of institutional support, and the relevance of technological solutions in relation to territorial realities. Rivera and Cárdenas [9] argue that rural education should be understood in connection with territorial transformation and with the relationships among school, community, and life projects. Along these lines, Area-Moreira, Bethencourt-Aguilar, and Martín-Gómez [1] point out that the digital transformation of education requires addressing challenges of equity, inclusion, and pedagogical meaning. Therefore, the integration of AI in rural contexts with urban influence cannot be reduced to the adoption of platforms; rather, it must be built upon real educational needs, concrete institutional practices, and effective possibilities for appropriation.

International frameworks have insisted that AI in education must be guided by principles of human dignity, equity, data protection, and non-discrimination. UNESCO has emphasized that any educational implementation of AI must prioritize the well-being of students and teachers, especially in vulnerable or transforming contexts.

From this perspective, human judgment is understood as the institutional and pedagogical capacity to decide when, how, and for what purpose AI should be used. Such judgment positions teachers as ethical and formative mediators, responsible for interpreting information, contextualizing tools, and ensuring that innovation contributes to the integral development of students rather than replacing the educational relationship.

### 4. Materials and Methods

The study was conducted using a qualitative approach, with a descriptive-analytical scope and a case study design. This methodological choice made it possible to understand, from a situated perspective, the institutional, pedagogical, and contextual conditions that influence the possibilities for incorporating artificial intelligence in a rural educational institution with urban influence. This methodological orientation is consistent with qualitative approaches and case study designs, which make it possible to understand educational phenomena within specific institutional contexts [6;11;13].

The unit of analysis was the Eustorgio Salgar Educational Institution, located in the district of Salgar, municipality of Puerto Colombia, Atlántico. The selection of the case responded to three criteria: first, its location in a rural context shaped by urban and tourism-related dynamics; second, the existence of initial technological conditions that make it possible to project educational innovation processes; and third, the relevance of analyzing AI from a humanistic perspective, considering the centrality of teacher mediation and the particular characteristics of the educational community.

Three main techniques were used for the collection and organization of information:

- Document review. Academic sources, regulatory guidelines, institutional documents, and international frameworks related to artificial intelligence, rural education, educational innovation, digital ethics, and data protection were analyzed. This review made it possible to construct the conceptual framework of the study and establish criteria for interpreting the case.

- Contextual analysis. A characterization of the social, territorial, educational, and technological conditions of the institutional environment was carried out, considering the relationship among rurality, urban influence, demands for digital training, and needs for pedagogical support. This technique made it possible to situate the discussion on AI within the real conditions of the institution and its community.
- Institutional observation. The technological and pedagogical conditions available at the institution were reviewed, as well as the possibilities for the educational use of digital resources in teaching, learning, and school management processes. This observation was supported by records derived from the author's master's research process, as well as by institutional information available to identify resources, practices, and training needs.

The information was processed through thematic categorization. To this end, the data obtained from the document review, contextual analysis, and institutional observation were organized into four analytical dimensions:

1. institutional conditions for AI integration;
2. pedagogical opportunities;
3. risks and tensions of technological integration; and
4. the role of teacher mediation. These categories made it possible to establish relationships between the specialized literature and the reality of the case under study.

Given the exploratory and descriptive-analytical nature of the study, artificial intelligence tools were not experimentally implemented, nor were learning outcomes compared. The purpose was to identify conditions, possibilities, and criteria for the future integration of AI from an ethical, pedagogical, and contextualized perspective.

From an ethical standpoint, the research was guided by the principles of respect for human dignity, confidentiality of institutional information, and protection of personal data, in accordance with Law 1581 of 2012 [4]. Likewise, UNESCO's recommendations on the ethical and responsible use of artificial intelligence in education were taken into account, especially in relation to transparency, equity, the well-being of students and teachers, and the prevention of discriminatory or decontextualized uses of technology.

## 5. Results

### 5.1. Institutional Conditions for a Possible Integration of AI

The case analysis made it possible to identify that the Eustorgio Salgar Educational Institution has initial technological conditions that may serve as a starting point for future educational innovation processes supported by AI. However, the findings show that the available infrastructure does not, by itself, guarantee pedagogical transformation. Its use depends on the existence of institutional guidelines, teacher training, criteria for use, and clearly defined curricular purposes.

Within the category of institutional conditions, it was found that the main opportunity lies in the possibility of articulating existing digital resources with planning processes, academic support, and school management. Nevertheless, a relevant tension was also identified: the gap between having technological resources and having an institutional culture sufficiently prepared to integrate AI in a critical, ethical, and contextualized manner.

The rural context with urban influence adds a specific dimension to the analysis. The institution must respond to digital training demands characteristic of a transforming environment, while also recognizing the community, economic, and cultural dynamics of the territory. Therefore, AI integration requires considering not only the availability of technology, but also access conditions, students' educational trajectories, teacher training, and the relevance of the tools in relation to the real needs of the educational community.

### 5.2. Identified Pedagogical Opportunities

Within the category of pedagogical opportunities, the analysis made it possible to identify three main possibilities for AI integration. The first is related to the personalization of learning, insofar as AI-based tools could support the identification of students' learning paces, needs, and difficulties. The second corresponds to

the strengthening of teacher planning, through resources that facilitate the design of differentiated activities, support materials, and feedback strategies. The third is linked to institutional management, especially in tasks related to organization, academic monitoring, and systematization of information.

However, these potential uses only acquire meaning if they are subordinated to pedagogical decisions made by teachers. In the case analyzed, AI should not be understood as a substitute for the educational relationship, but rather as a support resource that can expand teachers' capacity for accompaniment. This condition is especially important in rural contexts, where the closeness among school, family, and community constitutes a central component of the formative process.

The results also indicate that AI could contribute to strengthening relevant educational innovation, provided that its incorporation responds to the concrete needs of the territory. Instead of adopting tools in a generalized or decontextualized manner, the institution needs to define priorities: teacher training, data protection, student support, criteria for platform selection, and strategies for evaluating the pedagogical use of technology.

### 5.3. Risks and Tensions of Technological Integration

Within the category of risks and tensions, the study identified four critical aspects. The first is the risk of assuming AI to be an automatic solution to structural problems in rural education, such as connectivity gaps, inequalities in access to resources, limitations in teacher training, or the need for institutional support. The second is related to the possibility of deepening inequalities if the incorporation of AI is not accompanied by digital and pedagogical literacy processes for teachers and students.

The third risk concerns the protection of personal data. In small educational communities, the handling of academic, family-related, or behavioral information requires special care, since the identification of individuals may be more likely even when apparently general data are used. The fourth risk is associated with algorithmic bias and technological dependence, especially when platforms are used without clear criteria for selection, evaluation, or human oversight.

Consequently, the analysis makes it possible to reject a technocentric view of innovation. AI can contribute to educational improvement, but its incorporation without a pedagogical framework, teacher support, and ethical reflection could lead to superficial, decontextualized uses, or even uses that run counter to the aims of integral and inclusive education.

### 5.4. Teacher Mediation as an Articulating Axis

The cross-cutting finding of the study is that teacher mediation constitutes the decisive condition for a relevant integration of AI. Technology, by itself, does not interpret the needs of the group, recognize students' backgrounds, or understand the particularities of the territory. These functions correspond to teachers, whose work is essential for guiding, contextualizing, and evaluating any educational use of AI-based tools.

In the case of the Eustorgio Salgar Educational Institution, human judgment must operate as the organizing principle of innovation. This means that decisions regarding AI should not be limited to the selection of platforms, but must respond to prior pedagogical questions: what the tool will be used for, what educational problem it seeks to address, what data it requires, what risks it entails, how information will be protected, and how it will be ensured that students remain at the center of the formative process.

From this perspective, AI can serve as a support tool for teaching, feedback, and school management; however, its educational value depends on the quality of teacher mediation, contextual relevance, and the institution's capacity to regulate its use in an ethical and responsible manner.

## 6. Discussion

The results of the study engage with the literature that emphasizes the need to move beyond reductionist views of digital transformation. In line with Area-Moreira, Bethencourt-Aguilar, and Martín-Gómez [1], the case analyzed shows that educational innovation cannot be assessed solely on the basis of the presence of devices, platforms, or connectivity, but rather through the institution's capacity to transform these resources into meaningful, inclusive, and contextualized pedagogical experiences.

Likewise, the findings are related to the arguments put forward by Cabero-Almenara and Llorente-Cejudo [3], who warn that AI offers possibilities for education, but also requires teacher training, quality in the use of data, and clear institutional criteria. In the case of the Eustorgio Salgar Educational Institution, this relationship is evident in the need to move from an initial availability of technology toward pedagogical appropriation guided by concrete formative objectives.

Similarly, the study is consistent with the ethical-pedagogical approach proposed by García-Peñalvo [5] and with UNESCO's guidelines [12], according to which AI in education must be guided by principles of equity, inclusion, data protection, transparency, and well-being. These principles acquire special relevance in rural contexts, where technological and training gaps may increase if innovation is adopted without support or without a territorial understanding. The discussion allows us to affirm that the main contribution of the case does not lie in demonstrating the impact of AI on academic performance, since this was not the scope of the study, but rather in identifying the institutional and pedagogical conditions necessary for future integration. In this sense, the article provides a situated reading of AI in rural education: it recognizes technological infrastructure as a starting point, while placing teacher mediation, contextual relevance, and the ethics of educational care at the center.

Based on these elements, it can be argued that the central question is not whether AI should or should not be incorporated into the school, but rather under what criteria, for what purposes, with what teacher capacities, and through what protection mechanisms it should be integrated. This perspective makes it possible to address the risks of technocentric innovation and strengthens a humanistic understanding of digital transformation in education.

## 7. Conclusions

The study made it possible to conclude that artificial intelligence represents an opportunity to strengthen pedagogical and administrative processes in rural educational institutions, provided that its incorporation responds to ethical, pedagogical, and contextual criteria. In the case of the Eustorgio Salgar Educational Institution, the existence of initial technological conditions constitutes a favorable basis, but is insufficient by itself to guarantee a meaningful integration of AI.

The main conclusion of the analysis is that teacher mediation must occupy a central place in any process of technological incorporation. AI can support the personalization of learning, pedagogical planning, feedback, and institutional management; however, its value depends on teachers' capacity to guide its use, interpret its results, and adapt it to the real needs of students and the territory.

The rural context with urban influence requires that AI integration not be carried out in a generalized or decontextualized manner. On the contrary, it requires institutional guidelines, teacher training, data protection criteria, participation of the educational community, and a clear understanding of the opportunities and risks associated with these technologies.

In response to the objectives of the study, it is concluded that AI can become a support tool for educational innovation at the Eustorgio Salgar Educational Institution, provided that the human dimension of education is preserved. This implies recognizing that technology does not replace the pedagogical relationship, but can strengthen it when integrated in a critical, ethical, and situated manner.

Finally, the descriptive-analytical nature of the study made it possible to understand current conditions and project possible scenarios, but not to evaluate quantitative impacts or measure educational transformations derived from an experimental implementation. Therefore, it is recommended that future research include AI use pilots, the evaluation of concrete experiences, the participation of teachers and students, and the analysis of direct primary data that would allow for a deeper understanding of technological appropriation processes in rural educational contexts.

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All authors contributed equally to this work. All authors have read and agreed to the published version of the manuscript. Please refer to the [CRediT taxonomy](#) for the definitions of the terms. Authorship should be limited to those who have made substantial contributions to the reported work.

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