



REVOLUTIONIZING EDUCATION IN SUCRE WITH AI: A CASE STUDY ON RESEARCH AND PEDAGOGICAL TRANSFORMATION.

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Summary

This article explores how the integration of AI into educational research at CECAR is fostering significant academic and professional transformation. By equipping students with analytical, critical and creative skills and familiarizing them with state-of-the-art AI tools, future educators are prepared to lead in an increasingly technological and digitized global environment. Moreover, by combining traditional teaching with technological innovations, it enriches the educational process, preparing students for a future where AI will be an essential component in education and the professional sphere. This pioneering approach not only improves the quality of educational research but also prepares students to face the challenges of the modern world, equipping them with the skills necessary to thrive in an environment where technology and innovation are crucial. CECAR's experience highlights the importance of a teaching methodology that integrates advanced technologies and innovative learning strategies, marking an important milestone in the continuous improvement of educational quality and research, and offering cutting-edge solutions to the challenges faced by educational institutions in the 21st century.

INTRODUCTION

Can Artificial Intelligence radically transform research processes in education? At Universidad Corporación Universitaria del Caribe (CECAR) in Sucre, Colombia, we have discovered that it can. Through an educational revolution where AI is not just a tool, but a partner in the pursuit of knowledge.

At Universidad Corporación Universitaria del Caribe (CECAR) in Sucre, Colombia, 27 Literature and Spanish Language students are tackling an exciting academic challenge in their 'Educational Research' course. These students have undertaken the task of developing 10 research projects, ranging from evaluating the impact of ChatGPT on academic performance to designing strategies to improve critical literacy. These projects are not only based on diagnoses made during their internships, but also seek to propose innovative solutions with the potential to positively influence educational institutions in Sucre, impacting primary through university education.

This challenging and complex process has led students to face significant challenges, demanding a deep understanding of the topics and the ability to effectively structure their research proposals. In this environment, Artificial Intelligence has become an invaluable resource, simplifying tasks such as



information search and analysis and enriching the creative process with new perspectives and methodologies.

To produce quality scientific research, it is crucial that future educators develop critical skills and adapt to emerging technologies. AI facilitates this process and expands methodological and conceptual possibilities, acting as a bridge between traditional knowledge and new forms of educational exploration and discovery. Its effective and ethical integration into education makes research more accessible and prepares future teachers for a digital and data-driven world. In doing so, these students are not just learning to research; they are learning to innovate and lead in an ever-changing educational landscape.

This article explores how the integration of Artificial Intelligence (AI) into student research at the Universidad Corporación Universitaria del Caribe (CECAR) in Sucre, Colombia, is catalyzing educational innovation and efficiency. Various projects will be examined, highlighting their contribution to educational transformation in Sucre and emphasizing the role of AI as an enabler that improves the quality of research and fosters creative and effective approaches.

Through this narrative, the significant impact of these projects on education is uncovered, highlighting the lessons learned and opportunities that emerge when education merges with advanced technology. This narrative goes beyond research and technology, showing how their combination redefines education in Sucre.

The integration of AI in research processes is crucial in the current educational context. This innovative approach not only represents a breakthrough in educational research methodology, but also responds to the needs of an increasingly digitized educational environment.

Students and future teachers are the protagonists, facing the challenge of understanding complex issues and applying technologies such as AI to enhance their research. Educational institutions in Sucre, from primary schools to universities, will benefit directly from these innovations, finding in the results of the projects practical solutions to current challenges.

It not only highlights the relevance of AI in education, but also how its integration is preparing future teachers for a technological world. The projects presented exemplify how technological innovation is improving education, driving significant transformation in Sucre and redefining the horizons of teaching and learning, a vital topic for educators, students and stakeholders in the future of education.

Development

In the current educational context of the Corporación Universitaria del Caribe (CECAR) in Sucre, Colombia, students face multifaceted challenges ranging from the need to integrate advanced technologies such as Artificial Intelligence (AI) into their studies to the development of strong research competencies. These challenges are a reflection of a broader situation in education in Colombia and Latin America in general. A 2020 UNESCO study highlights that, in Latin America, only 37% of teachers feel prepared to integrate technology in education (UNESCO, 2020). This data is indicative of the urgent need to improve technological training in the educational field, a challenge that is reflected in CECAR. Students of the Bachelor's degree in Literature and Spanish Language, for example, must learn to apply AI tools in their research, which requires not only theoretical knowledge, but also practical and ethical skills.

In addition, several studies in Latin America show that many university students show interest in research, but often lack critical skills such as data analysis and the application of research methodologies. Ramírez, Arcos and Domínguez (2020) point out this gap in their studies. At CECAR, this gap is evident in the challenges students face when developing research projects. Despite having access to AI tools, many students find it difficult to apply these technologies effectively, pointing to the need for more in-depth and practical training.

In a concrete example, CECAR students worked on a project to optimize learning processes in children with dyslexia, where they had to combine innovative pedagogical methods with AI technologies. This effort highlights the complexity of integrating theory and practice in a real educational context. A 2020 report by the Colombian Ministry of National Education indicates that, although progress has



been made in incorporating technologies in education, special attention is still required in training in research skills, especially in areas such as literature and Spanish language, where an interdisciplinary and creative approach is needed (MEN, 2020).

The Corporación Universitaria del Caribe (CECAR) has made significant efforts to integrate AI into education and improve the research competencies of students. However, these advances still face considerable challenges. According to a 2020 World Bank report, higher education institutions in Latin America, including Colombia, are adopting digital and AI technologies at an increasing rate (World Bank, 2020). At CECAR, this trend is reflected in the incorporation of AI tools into the micro-curriculum, providing students with access to advanced technologies for research.

The Organization of Ibero-American States for Education, Science and Culture (OEI), in its 2022 report, has emphasized the growing importance of developing research and creative thinking skills in the region's universities (OEI, 2022). This includes the promotion of critical thinking and innovation in research methodology, an aspect that is reflected in the projects developed by CECAR students. However, there are critical challenges, such as ethical issues and dependence on AI. Vera (2023) warns about the risks of over-reliance on AI in education, particularly in terms of ethics and originality, highlighting concerns about plagiarism and lack of originality in research.

The Economic Commission for Latin America and the Caribbean (ECLAC) in its 2021 report highlights the existing gap in specific training in technologies such as AI (ECLAC, 2021). In addition, the Colombian Ministry of National Education (MEN, 2021) stresses the importance of developing critical and abstract thinking skills in students, essential for conducting autonomous and creative research. Innovative and transformative projects at CECAR require an approach that goes beyond mere technological adoption and fosters true innovation and creativity in research. Current trends in the integration of AI in education point towards a more personalized, ethical and efficient approach, preparing educators and professionals to contribute significantly to the transformation of society.

Artificial intelligence is being used to tailor the educational experience to the individual needs of students, facilitating the development of more innovative research projects. Ethical and responsible use of AI, as seen in the responsible AI principles applied by companies such as Microsoft, is essential in education and research. By fostering critical, creative and ethical research skills, these technological innovations are enabling educators and professionals to contribute more effectively and meaningfully in their respective fields.

The experience at the Corporación Universitaria del Caribe (CECAR) in Sucre, Colombia, has been an innovative initiative that consisted of integrating Artificial Intelligence (AI) tools into the curriculum of the Bachelor's degree program in Literature and Spanish Language. This integration was carried out specifically in the "Educational Research" course, with a double objective: to improve and modernize the educational research process and to develop the students' research competencies. This initiative sought to prepare students to be effective and versatile future teachers and professionals in an increasingly technological and digitalized educational world.

During the second class break, AI tools were dynamically incorporated into each session. A variety of specialized research platforms and applications were used, such as Scite and Consensus, among others. These tools facilitated a systematic review and discovery of relevant information, supporting students in their research projects.

Students also actively participated in a conference on the topic of AI in education and attended external workshops, including those offered by UNESCO in MOOC (Massive Open Online Courses) format. These activities provided a hands-on and interactive experience with various AI tools, enriching their learning and understanding of the subject.

In the context of the constant evolution of research methodologies and the growing integration of technology in education, the Corporación Universitaria del Caribe (CECAR) has undertaken a pioneering project aimed at revolutionizing the traditional approach to educational research. This project culminated in the creation of 10 research projects, conceived and developed by students as part of their professional practices. These projects covered a broad thematic spectrum, with the



purpose of providing innovative solutions and support to educational institutions throughout the department of Sucre, impacting educational levels from elementary school to the university sector.

- **Innovation in Educational Research using Artificial Intelligence**

The educational experience at CECAR was based on clear and strategically defined objectives, which seek not only to improve but also to enrich the educational research process through the integration and application of Artificial Intelligence (AI). This effort was oriented towards research efficiency and effectiveness, taking advantage of the potential of AI to reformulate traditional research methods and approaches, thus optimizing the processes of data collection, analysis and interpretation.

- **Development of Key Competencies Through the Use of Advanced Technologies**

Central to CECAR's vision was the commitment to equip students with critical, analytical and creative skills, seen as indispensable for contemporary research. Particular emphasis was placed on the familiarization and management of the most advanced AI tools, preparing students not only to effectively employ these technologies in their future research, but also to lead the vanguard in educational and technological innovation.

- **Preparing for the Challenges of the Modern World**

The program was designed with an eye toward preparing students for the challenges inherent in the modern professional and academic world, an environment in which technology, and especially AI, play crucial roles. The aim was to equip students with the skills and knowledge necessary to navigate and thrive in a context where technological innovation is not an add-on, but a fundamental requirement.

- **Merging Traditional Teaching with Technological Innovation**

In this endeavor, CECAR set out to merge traditional teaching with technological innovations, with the goal of providing education and research that is not only contemporary but also futuristic. This hybrid approach ensures that students are able to adapt and evolve in a future where AI and technology in general will be essential components in all areas of life, especially in education and the professional sector.

This project reflects a deep commitment to educational excellence and research innovation, positioning CECAR and its students at the forefront of higher education. With these advances, the institution not only contributes to the academic and professional development of its students, but also offers tangible and cutting-edge solutions to the challenges faced by educational institutions in the 21st century, marking an important milestone in the use of advanced technologies for the continuous improvement of educational quality and research in the region and beyond.

METHODOLOGY

The methodology implemented at Corporación Universitaria del Caribe (CECAR) represents a holistic and avant-garde approach in the field of higher education, specially designed to enhance the quality of educational research and the development of research competencies in students. This methodological approach is characterized by its integration of advanced technologies and innovative learning strategies, carefully selected to respond to the contemporary challenges of research and pedagogy.

At the heart of the methodology is the inclusion of Artificial Intelligence (AI) and machine learning tools, which are fundamental pillars for streamlining and optimizing the research process. Among these, the following stand out:

- **AI Systematic Review Tools:** We use Rayyan, an AI-based platform, to streamline the systematic review process. Rayyan facilitates the management of bibliographic references and the identification of relevant studies, allowing students to focus their efforts on critical analysis of the literature.

- **AI-Powered Search Engines:** Consensus acts as an advanced search engine, optimizing the search for relevant and accurate information in scholarly articles and specialized databases. Its ability to filter and provide access to quality information is a significant improvement in research efficiency.



- **Research Discovery Platforms:** Research Rabbit is positioned as an innovative discovery engine that allows students to explore and visualize academic literature interactively. This tool facilitates the understanding of knowledge networks and research trends, enhancing the ability to generate new questions and lines of research.
- **Literature Analysis and Synthesis Tools:** SciSpace is incorporated as an essential platform for the analysis and synthesis of scholarly literature. It allows users to find answers to specific research questions and discover related works, promoting a deeper and more contextualized understanding of research topics.
- **ChatGPT as a Research Support Tool:** The integration of ChatGPT as a support tool in the research process marks a milestone in the adopted methodology. ChatGPT assists in idea generation, paper writing, and literature review, providing valuable support that improves the quality of academic papers and fosters greater efficiency in the research process.

This advanced methodology, by incorporating state-of-the-art technologies and innovative pedagogical strategies, not only significantly improves the quality of educational research, but also prepares students to face the challenges of a constantly evolving academic and professional world. By fostering the development of advanced research skills and promoting the effective use of technological tools, the Corporación Universitaria del Caribe (CECAR) is positioned at the forefront of higher education, actively contributing to the formation of competent researchers prepared to contribute to global knowledge.

Learning Strategies and Methods:

The learning strategies and methods implemented at Corporación Universitaria del Caribe (CECAR) constitute a student-centered educational paradigm designed to equip students with the competencies and skills necessary to cope and excel in the academic and professional environment. Through the integration of advanced technologies and contemporary pedagogical methodologies, these approaches seek not only to transmit knowledge, but also to foster autonomy, collaboration, and a deep understanding of literature and the Spanish language. The pillars of this innovative educational strategy are detailed below:

- **Project-Based Learning (PBL):** This methodology places students at the center of the learning process by engaging them in the practical application of AI tools in real research projects. This approach provides experiential and contextualized learning, allowing students to apply theories and concepts in real-life scenarios, which reinforces their understanding and fosters the development of critical research skills.
- **Collaboration and Teamwork:** Recognizing the importance of collaboration in the learning process, we actively promoted the use of digital platforms that facilitate real-time cooperation, the exchange of ideas and resources, and collective work. This strategy not only enhances students' interpersonal and teamwork skills, but also reflects the dynamics of today's professional environment, where remote collaboration has become essential.
- **Participation in MOOCs and Workshops:** The integration of Massive Open Online Courses (MOOCs), as well as workshops given by renowned institutions such as UNESCO, offered students a global perspective on the use and implementation of AI in the fields of education and research. This exposure to international approaches and trends enriches the learning process and prepares students to participate effectively in global discussions and projects.
- **Blended Learning Methodology:** The combination of traditional teaching methods with the use of digital resources and AI tools constitutes a hybrid pedagogical strategy that offers a more dynamic, interactive and enriching learning experience. The integration of different teaching formats and media allows addressing the varied learning styles of students, increasing their engagement and facilitating a deeper understanding of the content.

These learning strategies and technologies are fundamental to equip CECAR students with the essential skills to conduct efficient and effective research in the field of literature and Spanish language. The adoption of these advanced methodologies prepares students for the challenges of the modern academic and professional world, ensuring that they are well equipped to contribute



meaningfully to knowledge and society.

Result

By integrating Artificial Intelligence (AI) tools into the curriculum of the Bachelor of Arts in Literature and Spanish Language program, specifically in the "Educational Research" course, it produced remarkable results both in terms of students' skill development and the quality of their research. The results and how they were evidenced or evaluated are detailed below:

1. Students' Perceptions and Attitudes toward AI:

The majority of students (25 out of 27) expressed "Strongly Agree" with positive statements about the impact of AI on their learning and research development. This was reflected in a broad recognition of the usefulness of AI in improving the quality of research, enriching the learning process, and overcoming specific challenges in their research.

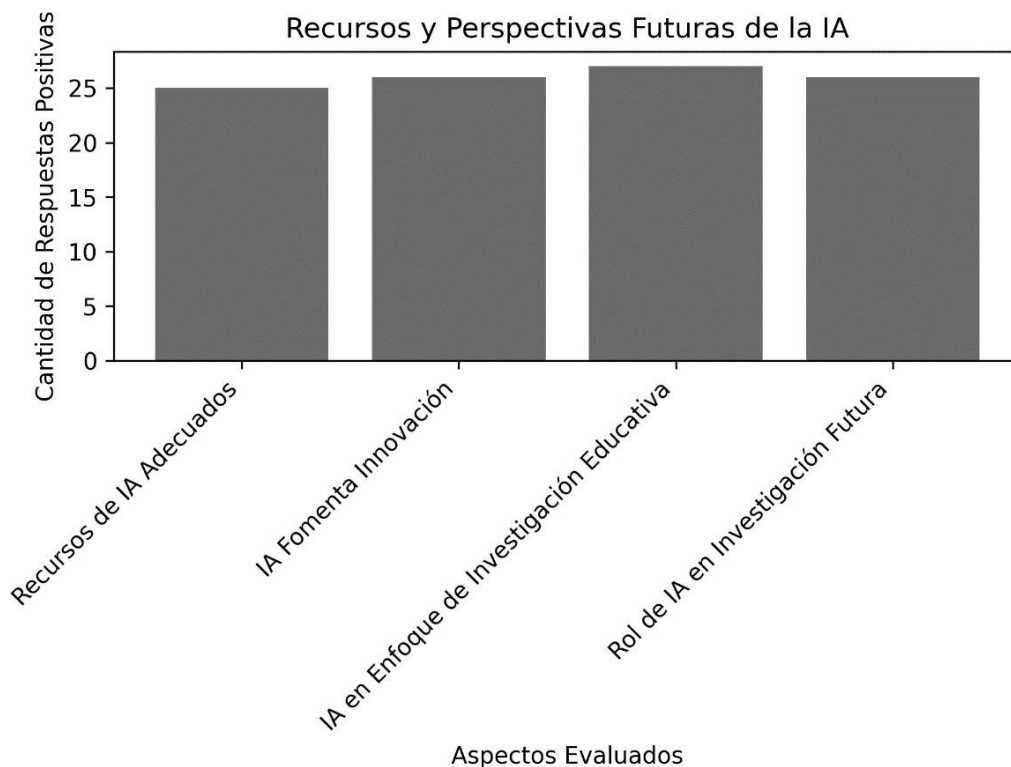


Figure 1. Students' perceptions of AI. Data reflect high familiarity and comfort with AI tools, as well as their positive influence on research design and quality. Source: End-of-course surveys, 2023.

students' perceptions of their familiarity with AI, comfort using AI tools, and how AI influenced the design and quality of their research.

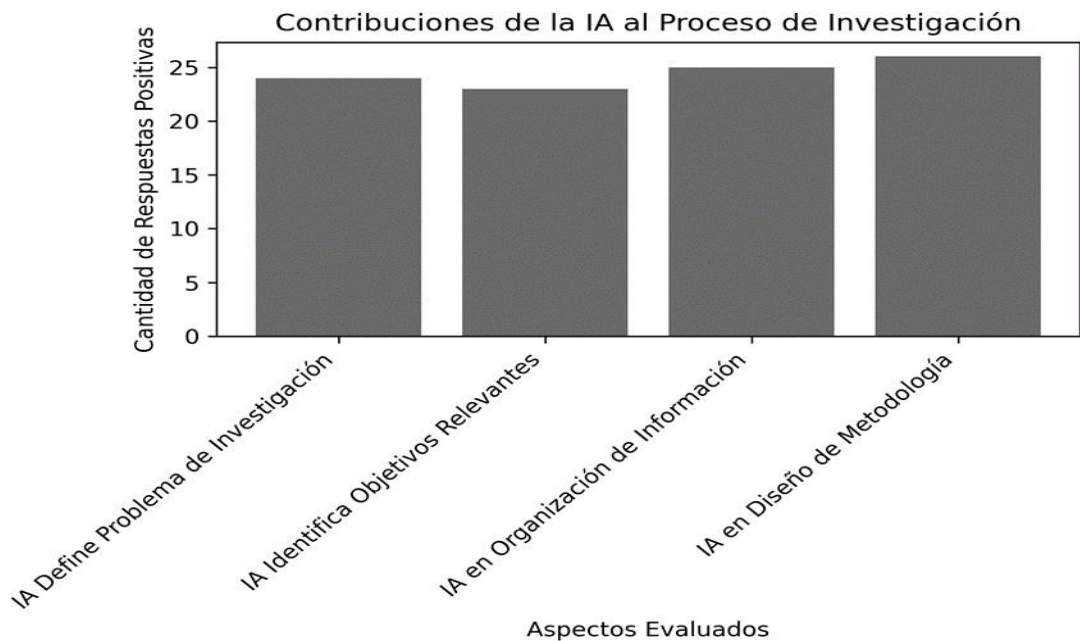


Figure 2. Students' perceptions of AI. Data reflect high familiarity and comfort with AI tools, as well as their positive influence on research design and quality. Source: End-of-course surveys, 2023.

AI helped students define research problems, identify relevant objectives, organize information, and design effective research methodologies. These perceptions were evaluated through surveys conducted at the end of the course, where students rated their experience and the impact of AI on different aspects of their learning. As also related by Ocaña-Fernández Valenzuela-Fernández, L., and Garro-Aburto, L. (2019).

Academic Performance and Grades:

Final course grades were at an average of 4.44 on a scale of 1 to 5, indicating high academic performance. This suggests that students not only adapted well to AI integration, but also found it beneficial to their academic performance.

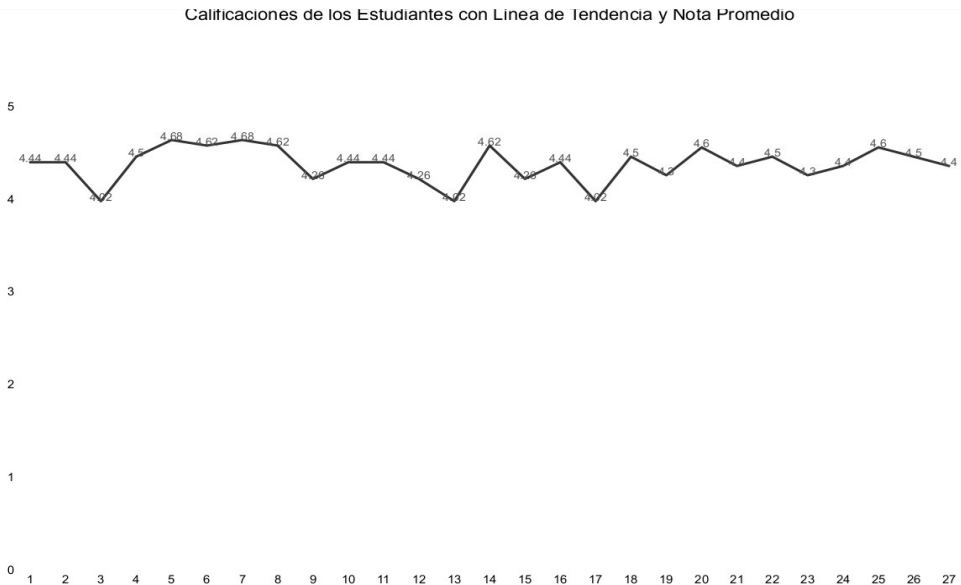


Figure 3 Academic performance in the course with AI integration. Average grades were 4.44 on a scale of 1 to 5



5. Source: Course performance evaluation, 2023.

Performance Evaluation: These grades were the result of a continuous evaluation of the students' performance in the course, including their participation in practical activities and the quality of their research projects as well as the presentation to two external juries that evaluated their proposals.

3. Development of Research Projects:

The students generated 10 research proposal projects, demonstrating their ability to apply the knowledge acquired in practical and real situations. These projects addressed a variety of topics and were intended to support educational institutions throughout the department of Sucre.

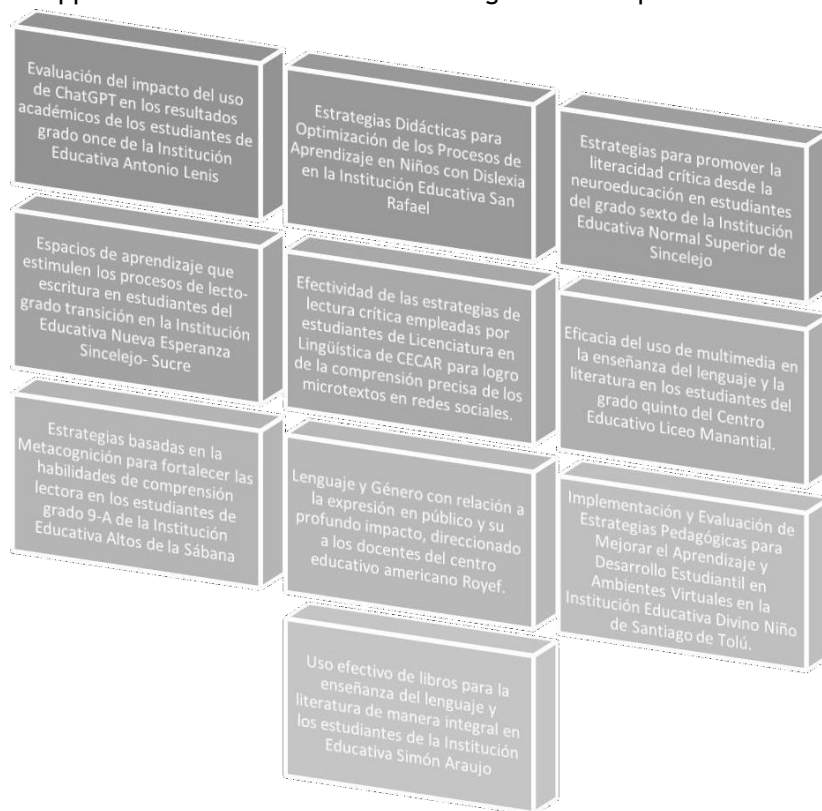


Figure 4. Evaluation of research projects developed by students. The projects were evaluated in terms of originality, methodological rigor and use of AI. Source: Project evaluation, 2023.

Project Evaluation: Projects were evaluated in terms of originality, methodological rigor, and effective integration of AI tools, reflecting the practical application of the skills and knowledge acquired in the course.

4. Practical and Interactive Experience:

Students attended a conference on AI in education and participated in external workshops, including MOOCs offered by UNESCO. These activities provided hands-on, interactive experience with various AI tools, complementing their theoretical learning.

Participation Evaluation: Student participation and engagement in these activities were taken as indicators of their interest and ability to apply knowledge in practical contexts.

5. Qualitative Comments from Students:

Student comments reflected an enriching and meaningful experience with the use of AI tools. These comments provided a qualitative assessment of the impact of the course on their perception and on their professional and academic development.

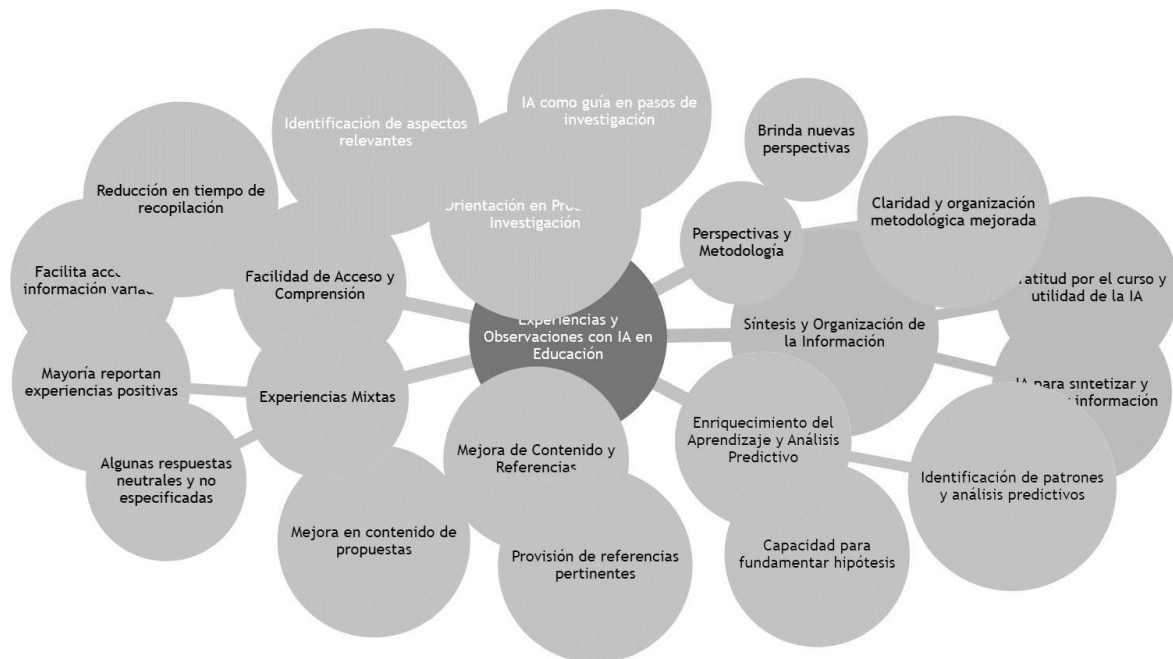


Figure 5. Mind Map of Experiences and Observations with AI in Education. Source: focus group and end-of- course evaluations, 2023."

The experience at Corporación Universitaria del Caribe (CECAR) with the integration of Artificial Intelligence (AI) in the "Educational Research" course has shown a positive and significant impact. Students showed a high acceptance and positive valuation of AI, reflected in their outstanding academic performance, in the generation of innovative research proposals and in their active participation in applied practices. The effectiveness of this educational initiative was evaluated using quantitative methods, such as surveys and grades, and qualitative methods, including feedback and project evaluations. Within the benefits for Student Learning and Feedback on the Use of AI Tools in the course:

- Students significantly improved their ability to synthesize and organize large volumes of information, facilitating the understanding and management of relevant data.
- AI provided fast and efficient access to a wide range of information sources, enriching research proposals.
- AI tools provided valuable guidance in the research process, especially in areas unfamiliar or new to the students.
- The ability to perform predictive analyses and model possible outcomes strengthened the research hypotheses and methodologies.
- There was an improvement in the quality and relevance of research content and references.
- AI fostered a more critical and reflective approach by approaching research topics from different angles.
- Greater clarity and organization was observed in the research proposals.
- Students expressed gratitude for the course, highlighting the usefulness of AI in their learning and research processes.
- The efficiency of AI tools in reducing information gathering and analysis time was widely appreciated.
- Although most of the comments were positive, there were variations in experiences, including some neutral and some unspecified responses.

The use of AI tools in the course has provided significant benefits in terms of access to information, data analysis and enrichment of the learning process. Student feedback reflects a positive experience, highlighting the effectiveness of AI in improving the quality and efficiency of their



research.

The implementation of AI tools in the curriculum has led to notable advances in the development of research skills and in the quality of student work. However, areas of opportunity and improvements are identified to further optimize the use of these technologies in the future Padilla (2019).

Although the results at CECAR have been largely positive, there are key aspects that need attention to maximize the impact of AI in education:

- It is vital to provide students with more in-depth training in the use of AI tools, through detailed workshops and hands-on sessions that allow a full exploration of their functionalities.
- Integrating discussions and modules on ethics in research is crucial to ensure responsible and ethical use of AI, fostering originality and avoiding over-reliance on automated solutions.
- It is essential to emphasize the development of critical thinking and creative analysis, considering AI as a complement to these skills, not as a substitute.
- Broader Curricular Integration of AI: Broaden the integration of AI into the curriculum design, addressing not only technical aspects but also its application in solving complex research problems.
- Implement regular evaluation of the use of AI and collect feedback from students to make adjustments to the teaching-learning process.
- Preparing students to adapt quickly to new tools and emerging technologies is essential to their continued success.

The implementation of Artificial Intelligence (AI) technologies at the Corporación Universitaria del Caribe (CECAR) constitutes a transcendental milestone in the path towards modernization and digital transformation of education and research. This integration has played a crucial role in enriching the learning process, catalyzing a significant improvement in research and promoting a more analytical, critical and creative approach to education. The positive reception by the student body, reflected in their outstanding academic performance, unequivocally underscores the effectiveness of merging traditional teaching with advanced technological tools. However, it emphasizes the imperative need to maintain a balance that fosters the development of critical and ethical skills in parallel with technological efficiency, thus ensuring an integration of AI that complements and enhances human learning rather than replacing it.

Looking to the horizon of future educational applications, it is clear that AI opens up a range of unprecedented possibilities for the enrichment and personalization of the educational process, although it also poses distinctive challenges. It is essential that educational institutions such as CECAR continue to refine and adapt their pedagogical approach to ensure that the use of technology serves as a catalyst for learning, promoting the inclusion of essential skills of inquiry, critical analysis, and complex reasoning. According to Castañeda (2023), AI has the potential to unravel the complexities inherent in each student's learning process, thus providing a solid foundation for continuous improvement and educational innovation, as well as fostering collective imagination and the design of revolutionary educational experiences.

In this dynamic and constantly evolving context, the educational community is encouraged to explore and adopt AI tools, meticulously tailoring them to the specific needs of their pedagogical contexts and academic programs. Educators and administrators are also invited to immerse themselves in the in-depth study of AI applied to education, with the goal of staying abreast of emerging trends and contemplating how these technologies can be implemented ethically and effectively. Staying current, collaborating and sharing knowledge and experiences will build a community of innovative educators, deeply committed to pedagogical advancement and determined to make a positive and lasting impact on the education of future generations.

This call to action seeks not only to encourage the adoption of technological innovations, but also to instigate a continuous reflection on the role of education in society and how the conscious and strategic integration of AI can transform existing educational paradigms. In doing so, it is hoped that educational institutions, including Corporación Universitaria del Caribe (CECAR), will lead the way towards a future in which technology and pedagogy are harmoniously intertwined, thus forging an



educational ecosystem that is inclusive, equitable and capable of preparing students for the challenges and opportunities of tomorrow.

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