REVISTA CÁTEDRA

Artificial Intelligence and the Teaching Process for Economics Students

La inteligencia artificial y el proceso de enseñanza en estudiantes de Ciencias Económicas

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Abstract

Artificial intelligence drives knowledge, facilitates the comparison of diverse perspectives, and provides information tailored to student needs. In the teaching process, it promotes various strategies, tools, and methodologies that are revolutionizing the educational field. In this sense, within university settings, the teacher acts as a guide and facilitator, shaping a pedagogical and cognitive process. This approach is grounded in an ethical awareness that avoids excessive dependence, inequality, or misinformation. This study employed a quantitative approach with a non-experimental design. The research was cross-sectional, collecting data at a single point in time, and had an explanatory scope aimed at addressing the causes of social phenomena related to higher education and Artificial Intelligence (AI). The population consisted of 243 university students enrolled in the second and third semesters of the Statistics, Economics, and Finance programs at the Central University of Ecuador. To obtain a sample size of 149 students, simple random sampling (SRS) and proportional stratified sampling were used to ensure equitable representation according to

academic level (68 second-semester students and 81 third-semester students). The results show that, although students demonstrate a moderate level of ethical awareness, gaps remain in their comprehensive understanding of some theoretical constructs related to the ethical use of AI. This situation highlights the need to incorporate specific content into educational programs aimed at strengthening ethical considerations in the use of these technologies.

Keywords

Artificial intelligence, educational innovation, economic sciences, ethical awareness, academic performance.

Resumen

La inteligencia artificial impulsa el conocimiento, brinda facilidad para cotejar diversas perspectivas y brindar información conforme a las necesidades del estudiante. En el proceso de enseñanza promueve varias estrategias, herramientas o metodologías que revolucionan el campo educativo. En este sentido, en los entornos universitarios el docente es un guía y moderador, a fin de construir un proceso pedagógico y cognitivo. De este modo, se parte de una conciencia ética que no incurre en dependencia excesiva, desigualdad o desinformación. Este estudio se basó en un enfoque cuantitativo, con diseño no experimental. La investigación tuvo un corte transversal, recolectó datos en un solo momento, y un alcance explicativo para responder a las causas de los fenómenos sociales sobre la educación superior y la Inteligencia Artificial (IA). La población se conformó por 243 estudiantes universitarios matriculados en el segundo y tercer semestre de las carrereas de Estadística, Economía y Finanzas de la Universidad Central del Ecuador. Para obtener un tamaño de muestra de 149 estudiantes se utilizó un muestreo aleatorio simple (MAS) y un muestreo estratificado proporcional para garantizar una representación equitativa según el nivel académico (68 estudiantes de segundo semestre y 81 de tercer semestre). Los resultados evidencian que, aunque los estudiantes presentan un nivel moderado de conciencia ética, persisten vacíos en la comprensión integral de algunos constructos teóricos relacionados con el uso ético de la IA. Esta situación pone de manifiesto la necesidad de incorporar, dentro de los programas formativos, contenidos específicos orientados a fortalecer la ética en la utilización de estas tecnologías.

Palabras clave

Inteligencia artificial, innovación educativa, ciencias económicas, conciencia ética, rendimiento académico.

1. Introduction

The rapid technological evolution of recent decades has significantly transformed educational systems, generating new teaching and learning scenarios that demand the incorporation of innovative digital tools. In this context, according to Numa-Sanjuán et al. and Vera, AI has established itself as one of the emerging technologies with the greatest impact on 21st-century education, due to its capacity to process large volumes of information, personalize learning, and optimize pedagogical processes (Numa-Sanjuán et al., 2024; Vera, 2023). Its integration into higher education not only responds to a technological trend but also to the need to strengthen educational quality and prepare students to face the challenges of an increasingly digitalized academic and professional environment.

Several studies agree that AI offers significant opportunities to innovate traditional teaching methodologies by enabling the design of more dynamic, interactive, and student-centered learning environments (Baltazar, 2023; Peñaherrera et al., 2022). These tools facilitate the adaptation of content to learning paces and styles, promoting more meaningful and effective learning processes. In particular, Jardón et al. and Ludeña-Yaguana consider that higher education has shown significant progress in the use of virtual assistants, recommendation systems, and intelligent platforms that contribute to improving academic performance and student motivation (Jardón et al., 2024; Ludeña-Yaguana et al., 2025).

In the field of Economics, the incorporation of artificial intelligence is especially relevant, given that these disciplines require the constant analysis of data, informed decision-making, and the development of critical thinking. Recent research by Espinales-Franco, and Ribas and Provasi indicates that the strategic use of AI in this field fosters the understanding of complex content, the development of analytical skills, and the improvement of students' academic performance (Espinales-Franco et al., 2024; Ribas and Provasi, 2024). Similarly, Biggs states that AI enables the implementation of more formative assessments and the continuous monitoring of learning, aligning with student-centered pedagogical approaches (1987).

However, the integration of artificial intelligence into educational processes also presents significant challenges, especially regarding teacher training, ethics, and the responsible use of technology. Vera and Piedra-Castro et al. indicate that the teacher's role is transforming, shifting from a transmitter of knowledge to a pedagogical mediator capable of guiding learning through the critical and reflective use of AI (Vera, 2023; Piedra-Castro et al., 2024). In this sense, it is essential that educators develop digital competencies that allow them to leverage the potential of these tools without affecting the development of critical thinking or students' intellectual autonomy (Vélez-Rivera et al., 2024).

From an ethical perspective, various authors, such as Ruiz-Miranda and Vélez-Rivera, warn that the indiscriminate use of artificial intelligence can generate technological dependence, biases in information, and limitations in critical analysis if clear guidelines are not established for its application in the university setting (Ruiz-Miranda, 2023; Vélez-Rivera et al., 2024). Therefore, AI should be conceived as a means of supporting the educational process and not as a substitute for pedagogical judgment, always maintaining the teacher's central role in regulating knowledge and in the student's holistic development.

Within this framework, this research aims to analyze the relationship between artificial intelligence and the teaching-learning process in Economics students, considering its technological, pedagogical, cognitive, evaluative, and ethical implications. From a comprehensive perspective, the study seeks to provide empirical evidence that allows us to understand the real impact of AI in higher education and contribute to the development of innovative teaching strategies that strengthen the quality of the educational process.

Regarding the article's structure, Section 2 presents a review of the scientific literature on artificial intelligence and its impact on the teaching and learning process for Economics students. Section 3 describes the methodology used for the research, specifying the approach, design, population, sample, and instruments employed. Section 4 presents and analyzes the results obtained concerning the impact of artificial intelligence on the technological, pedagogical, cognitive, evaluative, and ethical dimensions of the educational process. Subsequently, Section 5 discusses the results, contrasting them with previous

studies and relevant theoretical contributions. Finally, Section 6 presents the conclusions, which are derived from the study's findings and allow for a comprehensive assessment of the contribution of artificial intelligence to the teaching of Economics.

2. Literature Review

2.1. AI in university environments and its impact on the teaching process

Artificial Intelligence (AI) is a revolutionary mechanism that marks a turning point in social spheres by providing specific assistance. In education, pedagogical paradigms are being reconstructed to achieve meaningful learning. Thus, “AI is defined as a branch of computer science that focuses on the development of intelligent agents capable of reasoning, learning, and making decisions autonomously” (Jardón et al., 2024, p. 5). Therefore, AI constitutes a process that focuses on large amounts of information, enabling problem-solving, teaching and learning, and decision-making. Its practical application lies in the didactics of teaching as a mechanism that transforms methodologies and proposes efficient tools that strengthen competencies.

At the same time, AI in university settings proposes a construction of thought that strengthens students' knowledge. It allows for machine learning, data analysis, and rapid information processing that provides feedback to the learning process. In this sense, “AI’s ability to personalize learning, adapting educational content to students’ individual needs, promises to significantly increase academic performance and student motivation” (Piedra-Castro et al., 2024, p. 123). Therefore, the implementation of this technology in university settings enhances knowledge and streamlines data processing through didactic and innovative explanations. However, it depends on the conditions or infrastructure of these spaces to establish a pedagogical focus that achieves teaching objectives.

Similarly, the substantial value of AI in university education lies in its ability to identify knowledge gaps, with the aim of improving academic performance. Furthermore, “AI can adapt the teaching-learning process to the individual needs and preferences of each student, offering learning resources and activities tailored to their level of knowledge, learning style, and pace of progress” (Vera, 2023, p. 20). Therefore, students benefit from an innovative methodology that meets their needs and learning styles. AI proposes student-centered activities, promoting autonomous learning. This contributes to teaching and reduces the teaching load, allowing teachers to redirect their time to lesson planning.

AI not only positively impacts student learning but also benefits teachers in administrative tasks. Educators consider this tool to be a valuable resource that contributes to didactic and pedagogical effectiveness. For this reason, "teachers highlight that AI reduces the workload in activities such as grading exams and managing attendance, allowing them to focus more on teaching" (Ludeña-Yaguana et al., 2025, p. 232). Consequently, teachers take a strategic position, becoming learning designers with technology that guarantees knowledge acquisition. This educational co-creation tool contributes to the design of teaching activities, aligns pedagogical objectives, and enables teaching with an educational purpose.

Thus, the impact of AI on the teaching process stems from an innovative transformation that provides dynamic, flexible, and personalized spaces for students. Meanwhile, “the primary advantages of implementing AI in teaching are the construction of algorithms that grade these forms, freeing up teachers more time to research, develop innovative teaching methodologies, and provide individualized attention to their students” (Peñaherrera et al., 2022, p. 407). The tool adapts content, activities, and assessments to suit the teacher's approach and ensure each student achieves the appropriate level of understanding. This

allows teachers to generate teaching materials, analyze each student's progress, consolidate individualized learning, and develop logical reasoning and motivation.

2.2. AI tools used for the teaching process of Economic Sciences: pedagogical and cognitive process

The revolutionary shift in the use of Information and Communication Technologies (ICTs) within university settings precedes a restructuring of the pedagogical process, as it offers solutions to educational challenges in the classroom. Artificial intelligence seeks to enhance the human capabilities of teachers, in order to provide instruction that fosters critical thinking and guarantees knowledge acquisition. Thus, AI "is a science that helps to accurately diagnose each student individually in order to design a series of activities that will lead to the improvement of their main weaknesses" (Numa-Sanjuan et al., 2024, p. 51). For this reason, the student's educational development fosters a conducive environment in which skills, knowledge, and values are integrated, aiding in the practice of Economic Sciences.

AI allows for the exploration of a range of information associated with innovative methodologies or strategies that facilitate the understanding of content. Similarly, the tools used in the teaching process are replacing traditional paradigms by implementing interactive environments that promote meaningful learning. The integration of AI in Economics facilitates the understanding of topics such as data processing, finance, statistics, and calculations, among others. Therefore, intelligent tutors have the ability to collect data, investigate trends, and assess economic aspects to strengthen students' knowledge.

In this sense, personalized teaching emerges in the pedagogical field, as it is a mechanism that identifies needs and reconstructs them to provide learning solutions. In particular, "chatbots are capable of providing a personalized and flexible learning experience, which could lead to an increase in academic performance and student satisfaction" (Ruiz-Miranda, 2023, p. 158). Consequently, this tool acts as a virtual assistant that offers coherent answers, with the aim of guiding specific learning processes. Teaching is student-centered, making the student the central figure in knowledge acquisition, allowing them to authentically appropriate it in their professional development. Similarly, the most used tool by students is ChatGPT, which has become a means to search for information or organize statistical data. In the pedagogical process, it allows for independent work, analysis of statistical tables, simulations, or practical cases in finance, administration, or business. For this reason, "the application of ChatGPT is not limited to independent learning, but can also be used in the classroom to encourage student participation and improve peer interaction, as well as interaction with the teacher" (Ruiz-Miranda, 2023, p. 158). The intended use of this tool in education allows for strategic, interactive, and teacher-assistive teaching, identifying difficult-to-understand content and making it didactic for knowledge retention.

The use of AI in the cognitive process enables independent learning to organize thinking, promotes reasoning, and designs learning situations. It involves processing information through content evaluation, concentration, and knowledge comprehension. In turn, "artificial intelligence systems have the potential to increase students' cognitive abilities, stimulating the generation of alternative perspectives" (Palma-Landirez et al., 2024, p. 4023). In this sense, the cognitive paradigm combined with AI encompasses the student's information processing. Thus, their learning process is recognized and integrated with strategies that should be used to acquire knowledge meaningfully.

Furthermore, within the cognitive process, Intelligent Tutoring Systems (ITS) stand out as an advantageous tool. Thus, "an intelligent tutor plays the role of a personalized tutor for each student, meaning it can identify their individual needs and the metacognitive processes required for their learning" (Baltazar, 2023, p. 8). Therefore, intelligent tutors offer continuous and evolving monitoring according to the learner's needs, guided problem-solving, and immediate feedback. They also strengthen attention, memory, and the development of logical-mathematical reasoning, among other skills that consolidate analytical competencies.

Next, Learning Management Systems (LMS) provide development of cognitive and metacognitive skills through interactive courses personalized to the student's needs. These platforms analyze learning styles and structure learning paths, resources, assessments, and tasks that encourage attention, memory, and comprehension. Thus, "AI-powered LMSs offer tools for tracking academic progress, allowing both students and teachers to monitor progress in real time and adjust the educational process as needed" (Rosero & Guevara, 2025, p. 6137). Therefore, these systems foster the development of critical thinking, active participation, performance monitoring, and stimulate cognitive processes (reflection, analysis, reasoning). In line with Economics, LMSs strengthen learner autonomy. For this reason, students self-regulate their learning through activities such as forums, assessments, and tasks related to accounting, economics, and administration, in order to develop their thinking through data analysis. The enhancement of logical thinking, quantitative analysis, and decision-making through these platforms catalyzes teaching and learning. In short, the system meets educational needs: on the one hand, teachers establish activities as knowledge guides; on the other hand, students seek alternatives to promote logical and methodical reasoning.

2.3. Ethical awareness in the use of AI

The usefulness of technology entails a responsibility of awareness and critical thinking to use it as a means to enhance skills. Ethical awareness in the use of AI takes into account risks such as dependency, data projection, biases, equity, and transparency in knowledge construction. Indeed, "ethics in educational AI is fundamental to protecting privacy, avoiding biases, and ensuring equity in access to and use of these technologies" (Lima et al., 2025, p. 6). Consequently, the use of AI in educational settings analyzes the benefits and risks associated with the indiscriminate use of this tool with respect to the development of analytical thinking. Likewise, ethical application integrates moral reflection when making decisions based on responsible, honest, and authentic values that support knowledge.

The combination of AI with higher education presents specific challenges stemming from the infrastructure and its ethical use. When integrating this tool into academic environments, it is essential to train educators and students to avoid disadvantages such as excessive dependency. Indeed, "it is necessary to establish clear policies and ethical regulations to guide the development, implementation, and use of AI in education, with the aim of ensuring that equity, inclusion, and the well-being of all students are promoted" (Espinales-Franco et al., 2024, p. 4734). For this reason, comprehensive and holistic training enables the proper functioning of AI in education, in order to implement it as a means of strengthening basic and transversal skills.

In this sense, AI in university settings depends on faculty regulation and the autonomy students have to understand its proper functioning. Ethical awareness responds to the need to establish values or principles for decision-making. Some of the ethical problems present are "the expansion of marginalization, inequality, inequity, injustice, and discrimination

existing in society, through the analysis and generation of biased, opaque, or inexplicable data" (Vélez-Rivera et al., 2024, p. 4). That is, AI should be used as a learning support tool, avoiding its replacement with knowledge. The teacher, as the primary guide, contributes to establishing limits that allow for transparency, responsibility, and critical thinking, while maintaining the pedagogical focus of teaching.

The information provided by AI generates a conglomeration of perspectives that can increase misinformation in academic cases. The indiscriminate use of this tool limits the reflective and analytical development of students, leading them to complacency or conformity in completing tasks. "In many cases, students may use these tools to generate content that is not original, which raises serious doubts about the value of learning and authorship in the academic sphere" (Ribas and Provasi, (2024, p. 5). Therefore, there is no policy development that guarantees the appropriate use of AI; however, the work of teachers allows them to raise awareness and sensitivity regarding the potential of these tools in academic use. Ultimately, ongoing training not only allows for the development of teaching methodologies but also provides a conscious understanding of the conflicts that arise in the teaching process.

3. Methods and materials

This research was conducted using a quantitative approach, which allowed for the objective measurement and analysis of the relationship between the use of artificial intelligence and the learning approaches adopted by higher education students. A non-experimental design was employed, as the study variables were not deliberately manipulated but rather observed as they occur in their natural context. This approach is relevant for analyzing educational phenomena associated with pedagogical practices mediated by emerging technologies.

The study was cross-sectional, with data collection occurring at a single point in time. This provided a snapshot of the current state of students' learning processes in relation to the integration of artificial intelligence in higher education. Furthermore, the research was explanatory in scope, aiming to identify and analyze the potential causes and relationships between learning approaches and educational dynamics influenced by the use of AI tools in the university setting.

The Study Processes Questionnaire (SPC), a widely validated instrument in educational research, was used for data collection. It consists of 42 items organized around three learning approaches: surface, deep, and high-performance or achievement. Each of these approaches assesses both the motives and strategies students employ during their learning process using a Likert-type scale. The questionnaire is based on Biggs' (1987) theory of learning approaches, which posits that university learning is explained by the interaction between student motivations and the cognitive strategies they use to tackle academic tasks. In the context of this research, the SPC allowed for the analysis of how these approaches manifest themselves in an educational environment influenced by the use of artificial intelligence.

The study population consisted of 243 university students enrolled in the second and third semesters of the Statistics, Economics, and Finance programs at the Central University of Ecuador. The selection of students from these academic levels was based on two main criteria: first, this is a key formative stage in the consolidation of learning habits and approaches; and second, the curricular proximity between semesters reduced academic variability and ensured greater homogeneity in the sample. Simple random sampling was

used to determine the sample size, supplemented by proportional stratified sampling, to ensure equitable representation of students according to their semester. The result was a sample of 149 students, distributed as 68 second-semester students and 81 third-semester students, allowing for a balanced comparative analysis between the two groups.

Data collection was carried out using the Google Forms platform, a tool that facilitated the efficient administration of the questionnaire and guaranteed the anonymity and confidentiality of the responses. Subsequently, the data obtained were processed and analyzed using IBM SPSS Statistics version 29.0, employing rigorous criteria for statistical analysis and hypothesis validation, with a significance level of 5% ($\alpha = 0.05$).

For the statistical analysis, descriptive techniques such as frequencies, means, and standard deviations were used to characterize students' learning approaches. Inferential tests were also applied to identify significant relationships and differences between the study variables, including Student's t-test, Pearson's correlation coefficient, and non-parametric tests such as Kendall's and Spearman's tau-b, selected based on the data distribution. These techniques enabled a deeper understanding of the impact of the AI-mediated educational context on teaching and learning processes in higher education.

4. Analisis and Results

Through the analysis of the tables and graphs shown below, the behavior of the study unit will be observed in order to gain a better understanding of the characteristics identified in the research.

Table 1 shows that the majority of surveyed students are from the Finance program (59.7%), followed by the Statistics program (24.2%) and the Economics program (16.1%). This distribution was relevant because the application and perception of AI can vary slightly among these disciplines within Economics. Furthermore, the sample distribution for this academic unit is concentrated in the area related to the social sciences (75.8%), while the applied statistics area represents 24.2% of the sample.

Major	Frequency	Percentage	Cumulative Percentage
Economics	24	16.1 %	16.1 %
Finance	89	59.7 %	75.8 %
Statistics	36	24.2 %	100.0 %
Total	**149**	**100.0 %**	

Cuadro 1. Distribución de los estudiantes según la carrera de estudio

According to Table 2, there is an even distribution between second- and third-semester students, with percentages of 45.6% and 54.4%, respectively. This distribution by academic level was intentional, allowing for control of variability in university experience and familiarity with the content of Economics. By concentrating the sample in these intermediate semesters, it was ensured that participants had a similar knowledge base, which is crucial for more accurately evaluating the influence of AI on their learning process, preventing differences in their level of academic progress from being a distorting factor.

Semester	Frequency	Percentage	Cumulative Percentage
Second semester	68	45.6 %	45.6 %
Third semester	81	54.4 %	100.0 %
Total	**149**	**100.0 %**	

Table 2. Distribution of students by semester

Table 3 shows the equitable gender distribution, with 51.0% women and 49.0% men in the total sample. This distribution ensured that the study results were not biased by gender, allowing us to infer that the impact of AI on the learning process was evaluated from a balanced perspective. Furthermore, this distribution ensured the external validity of the findings, as the sample reflects gender diversity, strengthening the generalizability of the conclusions.

Semester	Frequency	Men	Women	Percentage
Second semester	68	33	35	51.0 %
Third semester	81	40	41	49.0 %
Total	**149**			**100.0 %**

Table 3. Distribution of students by sex

Analysis of Table 4 reveals that the majority of surveyed students are between 18 and 21 years old, representing 73.2%. This concentration at early stages of university life is consistent with the second- and third-semester student population, resulting in a sample composed primarily of students who are actively engaged in their studies and have grown up in an increasingly digital environment.

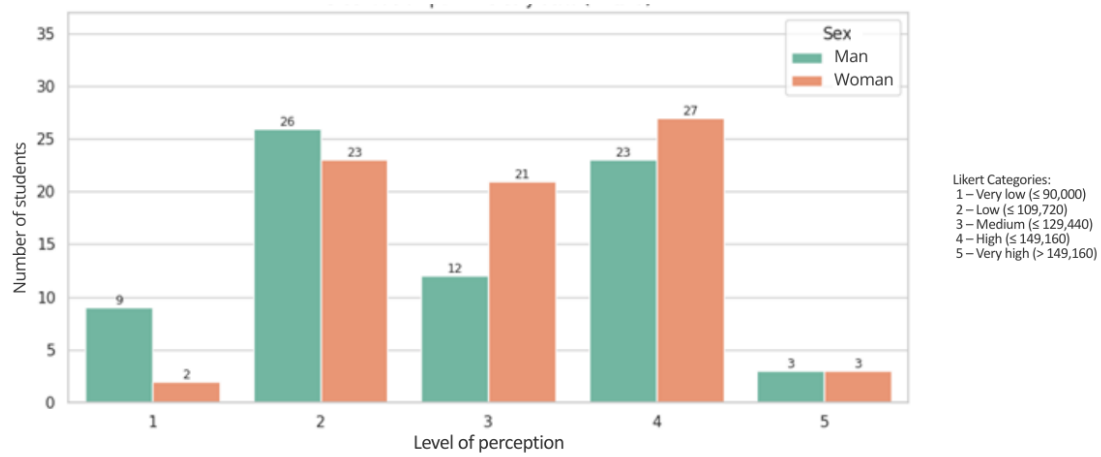
Age range	Frequency	Percentage	Cumulative Percentage
Between 18 y 19 Y. O	35	23.5%	23.5%
Between 20 y 21 Y.O.	74	49.7%	73.2%
Between 22 y 23 Y. O	26	17.4%	90.6%
Between 24 y 25 Y. O	7	4.7%	95.3%
Older than 25 Y. O	7	4.7%	100.0%
Total	**149**	**100.0%**	

Table 4. Distribution of students according to age range

To evaluate how artificial intelligence impacts the assessment dimension in Economics students, with particular emphasis on ethical awareness regarding the use of these technologies in the educational field, the following hypotheses are proposed for analysis:

- •Alternative hypothesis (Hi): Artificial intelligence positively influences the evaluation dimension, promoting greater ethical awareness and responsibility in its use by students.
- Null hypothesis (H0): Artificial intelligence has little impact on ethical awareness.

The descriptive analysis of the level of ethical awareness revealed that 41.6% of the students are in the low categories (1 and 2), while 58.4% reach the medium and high categories (levels 3 to 5), as shown in Figure 1.



	Level 1	Level 2	Level 3	Level 4	Level 5
Man	9 (12.3%)	26 (35.6%)	12 (16.4%)	23 (31.5%)	3 (4.1%)
Women	2 (2.6%)	23 (30.3%)	21 (27.6%)	27 (35.5%)	3 (4.0%)

Figure 1. Level of ethical awareness about the use of AI, distribution by levels and sex (n=149)

The results of the independent samples t-test (Table 5) indicated no statistically significant differences in ethical awareness or in the AI assessment dimension among the different demographic groups analyzed (all two-tailed p-values were greater than .05, for CPE_P1 p=.207, for Age p=.234). This suggests that, although most students have moderate ethical awareness, significant gaps remain in their in-depth understanding of ethical issues, and the impact of AI on assessment is uniform across groups.

Variable	F de Levene	p de Levene	T	Gl	p (bilateral)	Difference of means	Standard error
CPE_P1	0.863	.355	1.268	147	.207	0.231	0.183
Age	1.285	.259	1.194	147	.234	0.195	0.163
Semester	0.042	.837	0.103	147	.918	0.008	0.082
TICS_P1	1,791	.183	-0.665	147	.507	-0.025	0.037
Performance	2.029	.156	-0.298	147	.766	-0.039	0.130
Motivation	0.780	.379	0.390	147	.697	0.042	0.107

Table 5. Independent samples t-test on the influence of artificial intelligence on ethical awareness and the evaluation dimension

Note: Levene's test showed no significant differences (p > .05) in any case. CI = confidence interval; df = degrees of freedom.

The overall findings support the general hypothesis (Hi) that AI has a positive impact on the teaching-learning process of Economics students, with p-values < 0.001 for the main variables. For the specific hypotheses:

- Technological: It is confirmed that AI has a significant effect on students' use of technological tools, although the impact is based more on its pedagogical application than on direct access.
- Pedagogical: AI considerably enhances the educational aspect, increasing motivation and optimizing the perceived teaching process.
- Cognitive: AI has an indirect impact on the cognitive dimension, fostering motivation that affects academic performance.
- Assessment: AI promotes more individualized and continuous assessment, although its impact is equitable and does not vary according to demographic group.
- Ethical Awareness: AI promotes a moderate level of ethical awareness, although significant differences still exist in its critical understanding.

The results show that, although students demonstrate a moderate level of ethical awareness, gaps remain in their comprehensive understanding of some theoretical constructs related to the ethical use of AI. This situation highlights the need to incorporate specific content into educational programs aimed at strengthening ethical awareness in the use of these technologies.

Furthermore, the study's findings confirm the general hypothesis (Hi), which posits that AI has a positive impact on the teaching and learning process of Economics students at the Central University of Ecuador in 2024. This assertion is supported by highly significant p-values ($p < 0.001$), demonstrating that the averages obtained for the main variables significantly exceed the reference value. Consequently, the null hypothesis (H0) is rejected, reaffirming that the impact of AI is not a random effect, but rather a real and beneficial one.

Regarding the specific hypotheses, solid evidence was obtained that allowed for their confirmation. In the technological sphere, it was found that AI is applied and understood by students, supporting the acceptance of the corresponding alternative hypothesis. In the educational aspect, the results indicate that AI significantly influences student motivation, promoting active participation in the teaching-learning process. From a cognitive perspective, it was determined that AI fosters the development of meaningful learning and stimulates critical thinking, fundamental aspects for strengthening academic skills and abilities. Regarding the evaluation process, the results show that AI facilitates task assessment and the immediate generation of error reports, enabling systematic and continuous feedback on learning.

Finally, it is important to highlight that no significant differences were identified based on the students' gender, age, or semester. This finding suggests that the influence of AI is uniform and equitable, regardless of the participants' demographic characteristics or geographic location.

5. Discussion

The results obtained in this research show that the level of ethical awareness in the use of artificial intelligence is in the average range, a significant finding when triangulating empirical data with existing theoretical contributions. This suggests that, while students recognize the importance of responsible AI use, gaps in their training still exist, limiting a solid and critical ethical understanding. This result coincides with the findings of Gómez-Cárdenas et al., who warn of the urgent need to incorporate digital ethics as a cross-cutting theme in the university teaching and learning process (2024). Along the same lines, Espinosa-Vallejo et al. emphasize that educational transformation should not focus exclusively on technological adoption, but rather on comprehensive and holistic academic training capable of developing ethical awareness and critical thinking in students (2025).

By correlating these findings with levels of competence in artificial intelligence, the results show that greater familiarity with and academic use of AI are associated with a greater ethical awareness and responsibility in its application, reinforcing the arguments of Morocho-Pintag et al. (2025). These authors maintain that AI should not be conceived solely as an instrumental resource, but as a tool with the potential to transform learning processes, provided its integration is accompanied by clearly defined pedagogical and ethical criteria.

From the perspective of Economics, artificial intelligence has proven to be a key tool for process automation, the analysis of large volumes of data, and predictive decision-making. However, the results of this study reveal that its educational impact requires the explicit incorporation of competencies such as programming, predictive analytics, computational thinking, and algorithmic ethics. This finding aligns with the views of González-Alarcón and Melguizo (2023), who point out that the training of future professionals must respond to the new demands of the labor market without neglecting the ethical dimension. Likewise, this need is consistent with the arguments of Lamas-Lara et al., who maintain that critical and reflective thinking should be a fundamental pillar of university education (2025).

Triangulating the results with previous studies reveals that the inclusion of artificial intelligence in the educational process faces structural obstacles, such as institutional limitations, insufficient teacher training, and inadequate curricular adaptation. These findings confirm the observations of Rochina et al., who emphasize that the successful integration of emerging technologies depends not only on technological advancement but also on teacher training and curricular coherence (2024). Despite this, the study's results demonstrate that AI has high potential to increase motivation and optimize academic performance, which aligns with the findings of Sánchez-Salazar et al. (2024).

In this context, Ponce-Tituaña et al. (2025) emphasize the need to strengthen digital education from a holistic perspective, incorporating not only technical skills but also ethical foundations and an understanding of its operation. This view is triangulated with the results obtained in the study and with the proposals of Menacho-Ángeles et al., who highlight the importance of training critical, responsible, and conscious users of artificial intelligence-based technologies (2024). On the other hand, although the study did not identify statistically significant differences in the perception and use of AI according to gender or academic semester, this result should not be interpreted as evidence of equitable access to technology. As Rodríguez-Martínez et al. point out, digital divides are due to social, cultural, and structural factors (2025), which are not always directly reflected in the variables analyzed. In this regard, Armijos et al. highlight that AI has the potential to personalize

content according to the student's learning pace and style (2025); however, the results of this study show that such personalization has not yet been fully achieved due to insufficient pedagogical integration and limited teacher training.

Finally, when correlating the empirical results with technology adoption models, it is observed that the perception of usefulness and ease of use continues to be a determining factor for the acceptance of AI in educational settings. As Pita-Briones et al. maintain, the effectiveness of artificial intelligence in education depends not only on the technology itself, but also on the institutional environment, educational policies, and teacher training (2025), elements that are consistently reflected in the study's findings. In summary, the triangulation of the results allows us to conclude that artificial intelligence constitutes a strategic resource for strengthening the teaching-learning process in Economics students, provided that its integration is carried out in a planned, ethical, and pedagogically sound manner. AI-based tools not only enhance key technological competencies for professional training, but also contribute positively to academic performance and the development of a responsible ethical awareness in the use of emerging technologies.

6. Conclusions

The triangulation of empirical results, statistical analysis, and scientific literature allows us to conclude that artificial intelligence (AI) has a positive and significant influence on the teaching and learning process of Economics students. Correlational analyses revealed a direct relationship between the level of AI competence and variables associated with academic performance, motivation, and student participation, confirming that AI, when used for pedagogical purposes, contributes to revitalizing traditional educational practices and improving the understanding of complex content specific to these disciplines.

From an educational perspective, the results show that the integration of AI fosters autonomous and personalized learning, allowing for the adaptation of content, activities, and assessment processes to students' learning paces and styles. This personalization correlates with the strengthening of key cognitive skills in Economics, such as data analysis, logical reasoning, and informed decision-making. Triangulation with previous studies confirms that these benefits are enhanced when AI is integrated in a planned manner and aligned with curricular objectives.

Regarding the ethical dimension, the statistical results showed a positive and significant correlation between the level of competence in artificial intelligence and ethical awareness in its use, allowing us to accept the proposed alternative hypothesis. However, the average level of ethical awareness achieved indicates that this aspect is not yet fully consolidated in university education. Comparing these findings with the literature reaffirms the need to incorporate digital ethics as a cross-cutting theme in the educational process, avoiding uncritical or technology-dependent practices.

Likewise, the correlation between the use of artificial intelligence and the perception of its pedagogical utility confirms that teacher mediation is a determining factor for its effectiveness. Triangulation of the results shows that AI does not replace the teacher's role, but rather redefines it, assigning them a strategic function as a guide and regulator of learning. In this sense, teacher training and instructional planning emerge as essential conditions for AI to contribute to the development of critical thinking and the active construction of knowledge. Finally, based on the correlational analysis and theoretical discussion, it is concluded that, although no significant differences were identified in the use

and perception of AI according to sociodemographic variables, structural and institutional limitations persist that hinder its effective integration. The triangulation of the findings allows us to affirm that the positive impact of artificial intelligence in higher education depends not only on its technological availability, but also on an educational ecosystem that integrates curriculum, ethics, teacher training, and institutional policies. Consequently, artificial intelligence is consolidated as a strategic resource for higher education in Economics, provided that its implementation is carried out in a critical, ethical, and pedagogically sound manner.

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Declaration of the use of artificial intelligence

The authors declare that they did not use Artificial Intelligence (AI) tools for any part of the manuscript. All material was reviewed and validated by the authors, who are responsible for its accuracy and rigor.