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Perspectives on Artificial Intelligence Adoption among Business Administration Engineering Students at ITES Los Cabos, Mexico

Perspectives on the Adoption of Artificial Intelligence in Management Engineering Students at ITES Los Cabos, Mexico

Perspectives on the adoption of artificial intelligence among non-ITES business administration engineering students Los Cabos, Mexico

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Resumen

La inteligencia artificial juega un papel preponderante en diversas áreas y disciplinas, entre ellas la educación superior. Este estudio tiene como objetivo evaluar la satisfacción de los estudiantes de Ingeniería en Administración del ITES Los Cabos con la inclusión de la inteligencia artificial en su entorno académico. Se llevó a cabo un estudio transversal, relacional y cuantitativo con una muestra no probabilística de conveniencia de 100 estudiantes, 39 de segundo semestre y 61 de octavo semestre. Se aplicó un cuestionario de nueve ítems, basado en una escala Likert, sobre la experiencia de aprendizaje, el rendimiento académico y las habilidades requeridas. Los datos se analizaron mediante estadística descriptiva y la prueba U de Mann-Whitney. Los resultados sugieren un alto nivel de aceptación del uso de la IA, con diferencias significativas ($p < 0.05$) entre los semestres en seis de los nueve ítems evaluados. Los estudiantes de octavo semestre mostraron mayor satisfacción y familiaridad con el uso de la IA que los de segundo semestre. Se identificaron preocupaciones relacionadas con experiencias negativas y aspectos éticos del uso de la IA. Se concluye que los estudiantes experimentan una adaptación progresiva a las herramientas de IA a lo largo de la carrera, sugiriendo la necesidad de mejorar la formación en IA y de abordar desafíos relacionados con infraestructura, capacitación y consideraciones éticas.

Palabras clave: enseñanza superior, inteligencia artificial, satisfacción estudiantil, tecnología educativa, Ingeniería en Administración.

Abstract

Artificial intelligence plays a predominant role in various fields and disciplines, including higher education. This study aims to evaluate the satisfaction of Management Engineering students at ITES Los Cabos with the inclusion of artificial intelligence in their academic environment. A cross-sectional, relational, and quantitative study was conducted with a non-probabilistic convenience sample of 100 students: 39 from the second semester and 61 from the eighth semester. A nine-item questionnaire using a Likert scale was administered to assess learning experience, academic performance, and required competencies. The data were analyzed using descriptive statistics and the Mann-Whitney U test. The results indicate a high level of acceptance of AI use, with significant differences between semesters in six out of the nine evaluated items. Eighth-semester students showed greater satisfaction and familiarity with AI use than second-semester students. Concerns regarding negative experiences and

ethical aspects of AI use were identified. It was concluded that there is a progressive adaptation to AI tools throughout the undergraduate career, suggesting the need to improve AI training and address challenges related to infrastructure, training, and ethical considerations.

Keywords: artificial intelligence, higher education, student satisfaction, educational technology, management engineering.

Resumo

A inteligência artificial desempenha um papel preponderante em várias áreas e disciplinas, incluindo o ensino superior. Este estudo tem como objetivo avaliar a satisfação dos estudantes de Engenharia de Gestão do ITES Los Cabos com a inclusão da inteligência artificial no seu ambiente académico. Foi realizado um estudo transversal, relacional e quantitativo com uma amostra não probabilística de conveniência de 100 estudantes, 39 do segundo semestre e 61 do oitavo semestre. Foi aplicado um questionário de nove itens, baseado numa escala de Likert, sobre a experiência de aprendizagem, o desempenho académico e as competências necessárias. Os dados foram analisados utilizando estatísticas descritivas e o teste U de Mann-Whitney. Os resultados sugerem um elevado nível de aceitação da utilização da IA, com diferenças significativas ($p < 0,05$) entre semestres em seis dos nove itens avaliados. Os alunos do oitavo semestre demonstraram maior satisfação e familiaridade com o uso da IA do que os alunos do segundo semestre. Foram identificadas preocupações relacionadas com experiências negativas e aspectos éticos da utilização da IA. Conclui-se que os estudantes experimentam uma adaptação progressiva às ferramentas de IA ao longo do seu curso, o que sugere a necessidade de melhorar a formação em IA e de enfrentar os desafios relacionados com as infra-estruturas, a formação e as considerações éticas.

Palavras-chave: ensino superior, inteligência artificial, satisfação dos estudantes, tecnologia educativa, engenharia de gestão.

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Introduction

The advent of information and communications technologies (ICTs) has facilitated remote collaboration between students and teachers. Furthermore, ICTs have given way to intense real-time interaction, overcoming geographical barriers. Physical limitations are overcome through technological communication formats. The integration of digital tools such as videoconferencing, forums, and social media has radically transformed education, enabling the creation of virtual learning communities. This new dynamic has enriched the educational process by facilitating knowledge exchange and collaboration between students and teachers, regardless of their geographic location (Hervás-Gómez et al., 2019). Likewise, the variety of digital resources has revolutionized the way we teach and learn, making content more engaging and participatory (Molinero and Chávez, 2019). This environment has led to artificial intelligence (AI) being perceived as a promising tool to address the challenges in the emerging field of ICT use.

The purpose of artificial intelligence is to create systems capable of performing tasks that require human intelligence, such as understanding natural language, recognizing patterns, and solving complex problems (Lobo, 2019). The ability of a machine to imitate human intelligence (Álvarez-Herrero, 2024) represents perhaps the greatest technological revolution of the 21st century (Ruiz and Velázquez, 2023). Due to technological advances in the last 10 years, this field has experienced a significant increase. Researchers have managed to find solutions for a variety of areas of knowledge, such as finance, commerce, transportation, agriculture, climate, health, or education (Sambola, 2023).

AI is impacting educational transformation; education is undergoing a process of digitalization, which has led to significant changes in teaching and learning methods. One of the main benefits of AI is that teaching methods will be completely revamped, adapting to the individual needs of each student (Moreno, 2019, p. 3). Learning will be more personalized and accessible, and training will become more flexible and efficient. Tools such as chatbots, automated decision-making systems, and virtual tutors are already revolutionizing the classroom (Moreno, 2019; Zhang & Aslan, 2021).

The implementation of these applications requires the integration of sophisticated technologies such as machine learning, natural language processing, the semantic web, and business intelligence, enabling in-depth analysis of large data sets (Lai et al., 2023; Park et al., 2022). Several educational technology studies that have used AI in different areas of education have shown that it contributes to student academic progress (Balderas et al., 2023).

One of the fields in which AI has a particularly promising influence is higher education (Ponce &Castañeda de León, 2023).

In the field of university education, Oyarvide et al. (2024) establish the importance of highlighting the notion of academic and professional competence. As a result of education and experience, it is essential for individuals to navigate an increasingly complex and competitive world. Universities, as agents of change, have the responsibility to train students with the skills necessary to face these challenges and contribute to the development of society (Casimiro Urcos et al., 2019).

AI-based educational technologies cover diverse approaches such as Intelligent Tutoring Systems (ITS), Learning Management Systems (LMS), educational robots and massive open online courses (MOOCs), all of them supported by educational data analysis (*Learning analytics*). These tools, although they implement AI in different ways, share the common goal of improving the educational process, and as Tavares et al. (2020) point out, they offer promising potential to enrich both the student experience and the teaching work in the educational field.

From an educational application perspective, AI plays a variety of roles, such as being an intelligent tutor, a learner, a learning tool, or a policy expert. Research indicates that studies on AI in education can generally be classified into four roles (Urquilla, 2022): first, ITSs that personalize and adapt learning according to the student's needs; second, intelligent tutelage, a rare modality where systems not only teach but also allow the student to perform tutoring roles; third, intelligent learning tools or companions, which, under a constructivist approach, facilitate student-centered learning; and finally, educational policy advisors, who use AI to guide the development of regulations and rules in the education sector.

AI primarily impacts higher education, both at the undergraduate and graduate levels (Tramallino & Marize, 2024). In this regard, Vicari (2018) states that the implementation of AI in educational institutions opens the door to an area of research that involves the use of technologies in systems that seek to improve teaching and learning. However, despite the increase in research to understand the implications of AI in education, along with the need to facilitate students to become familiar with and adopt this technology through practical experiences, there is still a need to study this field.

The objective of this work was to evaluate the satisfaction of undergraduate students of the Administration Engineering program at the Institute of Higher Studies of Los Cabos (ITES Los Cabos) regarding the inclusion of AI in their academic environment. The question

addressed in this work is as follows: How does the integration of artificial intelligence in educational environments affect students' learning perception, academic performance, and study practices, considering aspects such as satisfaction, effectiveness, motivation, ethical challenges, and technological competencies?

State of the art

Regarding the use of AI in university education, there are favorable opinions indicating that this technology allows for a better understanding of the topics covered; however, prior preparation is required before entering university (Paiva, 2024). On the other hand, a high percentage of interviewed students have been found to consider it inappropriate to implement such a tool as part of their teaching activities (García, 2023a). This study found that, in relation to the use of ChatGPT, students perceive that teachers lack the capacity to adequately integrate these pedagogical tools into their practice. In relation to this same tool, Choque-Castañeda & Morales (2023) point out that it can be promising to enrich learning, encourage student participation, and improve the quality of teaching. On the other hand, Ngo (2023) found that students had a favorable opinion about the ChatGPT application and its use. The benefits included saving time, providing information in various areas, providing personalized tutoring and feedback, and illuminating ideas in writing. The same author reports that the most worrying problems for students when using ChatGPT were the inability to evaluate the quality and reliability of sources, to cite sources accurately, and to replace words and use idioms accurately.

Other studies have identified an overall positive perception of ChatGPT among students (Yilmaz et al., 2023). Students most commonly rely on ChatGPT when searching for information and working on language-related tasks such as text editing and enhancements. Findings suggest high satisfaction among students in Business, Engineering, and Information Technology majors, including working on homework and assignments, as well as a positive attitude toward this tool in promoting the quality of learning (Pavlenko & Syzenko, 2024).

In the training of nursing students, it was found that the advantages of using ChatGPT were slightly greater than the disadvantages, indicating that their perception of the use of the tool during their professional training is partially favorable (Estrada-Araoz, León-Hancco, & Avilés-Puma, 2024). Likewise, Crespo, Vicente, & Valmorisco (2023a) point out that students admitted to having used different AI applications, such as assistants for academic

work, homework, information searches, plagiarism identification, spelling correction, or text translation. The information analyzed above is in line with the ideas about the debate on the use of AI tools for university teaching. Those surveyed pointed to dependence on technology, incorrect use, superficiality of the knowledge acquired, and low quality or erroneous learning as the main factors to take into account.

AI applications, particularly chatbots, have emerged as primary tools in education, according to Okonkwo and Ade-Ibijola (2021), fulfilling three essential roles: teaching assistants, study buddies, and personalized tutors. Jung et al. (2020) note that these functions intertwine to enhance the educational process, while Deng & Yu (2023) highlight their positive impact on key aspects such as critical thinking, reasoning, academic performance, information retention, and student motivation.

Machine learning (ML) is a branch of AI that builds mathematical models from recorded data to make predictions or decisions by emulating human intelligence without the need for pre-programming (Zhang, 2020). Students have been found to find this tool useful, engaging, and easy to use.

In this regard, Sekeroglu et al. (2019) point out that AI can be used as a predictive tool for academic performance and as a support for didactic planning. It also facilitates the adaptation of teaching methodologies to student progress, allowing for the renewal of both content and training activities. This perspective is supported by Rodríguez-García et al. (2021), who implemented ML in a virtual learning environment with students aged 10 to 16 during the pandemic period. Their study revealed that participants not only improved their understanding of the fundamental principles of ML but also valued the tool as practical, engaging, and accessible.

In Mexico, numerous studies have found that higher education students have a divided perception regarding the use of AI. In this regard, García's study (2023b) revealed that only 33% of students use ChatGPT in academic activities, while 75% do not consider it appropriate for training tasks and 79% do not perceive that it improves their research skills. Notably, only 4% rely on this tool for their assignments, and 83% doubt teacher preparation to implement it effectively. These findings suggest that educational institutions should carefully evaluate the incorporation of AI into teaching, considering student concerns.

Chao-Rebolledo and Rivera-Navarro (2024a) highlight that students use some AI tools to complete their schoolwork. The most used tool by this group is ChatGPT, followed by Dall-E2. Students incorporate the tools regularly (at least once a week) as academic

support, for research, starting projects, and developing schoolwork. They also use them to generate creative ideas and facilitate the understanding of academic content. It is interesting to note that their use for entertainment is limited, and only a small fraction admits to using them to evade their academic responsibilities.

AI has been incorporated into teaching at all levels, and in the case of universities, it is being used in various fields of knowledge. This situation requires higher education institutions to update their technological infrastructure to become more competitive in their educational processes. The academic community must adapt its educational approaches to current demands. Thus, technology and the use of AI can be an ally in raising levels of understanding of subjects considered difficult.

Method

A survey composed of nine items related to learning experience, academic performance, and required skills was administered. Responses were assessed using a five-option Likert-type scale (Toro et al., 2021; Núñez, Garduño, & Esparza, 2024), where 1 represents 'strongly disagree,' 2 'disagree,' 3 'neither agree nor disagree,' 4 'agree,' and 5 'strongly agree' (see Table 1). The questionnaire was designed by the authors based on existing literature. A panel of experts was formed to assess content validity, achieving a good level of agreement between raters (Friedman test, $p = 0.251$). Likewise, a good level of internal consistency was obtained (Cronbach's $\alpha = 0.81$).

Table 1. Study items

Item	Description
1	Are you satisfied with your experience using AI for learning?
2	Has AI helped you learn more effectively?
3	Has there been any improvement in your academic performance thanks to the use of AI?
4	Has AI motivated you to learn more about a particular topic?
5	Have you had any negative experiences with AI in your educational environment?
6	Are you concerned about ethics or privacy when using AI for learning?
7	Do you have the skills to use AI effectively?
8	Are you comfortable using AI tools during your learning process?
9	Has AI changed the way you learn?

Source: Own elaboration

Non-probability convenience sampling was used, with a sample of 39 second-semester students and 61 eighth-semester students. Participants completed the survey voluntarily, anonymously, and without external influence, after being informed of the research purpose.

An exploratory descriptive statistics analysis was performed (Quispe et al., 2019; Ravid, 2024) and comparison groups were established based on the students' semester of enrollment. Means, standard deviations, variance, and coefficient of variation of the Likert scale responses were calculated. To determine whether there were differences in the level of agreement or disagreement between second and eighth semester students, the nonparametric Mann-Whitney U test was applied, appropriate for data that do not follow a normal distribution (Lizasoain, 2024) . All statistical tests were performed with a significant level of 5%. The data were analyzed in Excel and Minitab.

Results

The Likert scale values for each item applied to second-semester students are presented in Table 2. Item 5 had the lowest mean (2.18 ± 1.10) and a coefficient of variation of 50%, indicating a high dispersion in responses. Students ranged from neither agree nor disagree to strongly disagree, indicating negative experiences with the use of AI in their educational environment. The remaining items showed mean values between 3.44 ± 1.10 and 3.62 ± 0.99 and coefficients of variation between 32% and 27%, which means that the responses are relatively homogeneous. Students mostly fell between the options neither agree nor disagree and agree, reflecting a generally positive attitude towards the use of AI in their educational environment.

Table 2. Mean and standard deviation of the Likert scale for each item applied to second semester students

Variable	Average	OF	Variance	CV
Item-1	3.54	1.17	1.36	33%
Item-2	3.54	1.10	1.20	31%
Item-3	3.49	0.94	0.89	27%
Item-4	3.49	0.88	0.78	25%
Item-5	2.18	1.10	1.20	50%
Item-6	3.44	1.10	1.20	32%
Item-7	3.51	1.02	1.05	29%
Item-8	3.62	0.99	0.98	27%
Item-9	3.49	1.07	1.15	31%

Source: Own elaboration

Table 3 presents the absolute frequency and corresponding percentage of responses on the Likert scale for each item applied to second semester students. In item 1, 3 students (7.69%) responded that they strongly disagreed and 4 (10.26%) that they disagreed. In contrast, 15 (38.46%) indicated that they agreed and 8 (20.51%) strongly agreed.

For item 2, 2 (5.13%) responded in total disagreement, 5 (12.82%) in disagreement, 9 (23.08%) neither agreed nor disagreed, 5 (12.82%) agreed and 2 (5.13%) in total agreement. In item 3, no one responded in total disagreement, 7 (12.82%) showed that they disagreed, 11 (17.95%) neither agreed nor disagreed, 16 (41.03%) said they agreed and only 5 (12.82%) responded in total agreement.

For item 4, no students stated that they strongly disagreed; 5 (12.82%) responded that they disagreed, followed by those who neither agreed nor disagreed, which were 15 (38.46%), 14 (35.90%) said they agreed, and 5 (12.82%) said they strongly agreed. For item 5, 13 (33.33%) responded that they strongly disagreed; 11 (28.21%) responded that they disagreed. Neither agreed nor disagreed were 12 (30.77%), 1 (2.56%) and 2 (5.13%) agreed and strongly agreed.

For item 6, 2 (5.13 %) said they totally disagreed, 4 (12.56%) responded that they disagreed, 16 (41.03%) neither agreed nor disagreed, and those who responded that they agreed and totally agreed were 9 (23.08%) and 8 (20.51%) respectively. For item 7, 1 (2.56%) said they totally disagreed, 4 (20.26%) disagreed, 16 (41.03%) responded that they neither agreed nor disagreed, 10 (25.64%) said they agreed, and 8 (20.51%) totally agreed.

In item 8, 1 (2.56%) responded that they strongly disagreed, 3 (7.69%) disagreed, 14 (35.90%) neither agreed nor disagreed, 13 (33.33%) agreed, and 8 (20.51%) strongly agreed.

Finally, for item 9, 1 (2.56%) responded that they strongly disagreed, 6 (15.69%) disagreed, 13 (33.33%) neither agreed nor disagreed, 11 (28.21%) agreed, and 8 (20.51%) strongly agreed.

Table 3. Absolute frequency and percentage of students in the second semester who responded to each applied item.

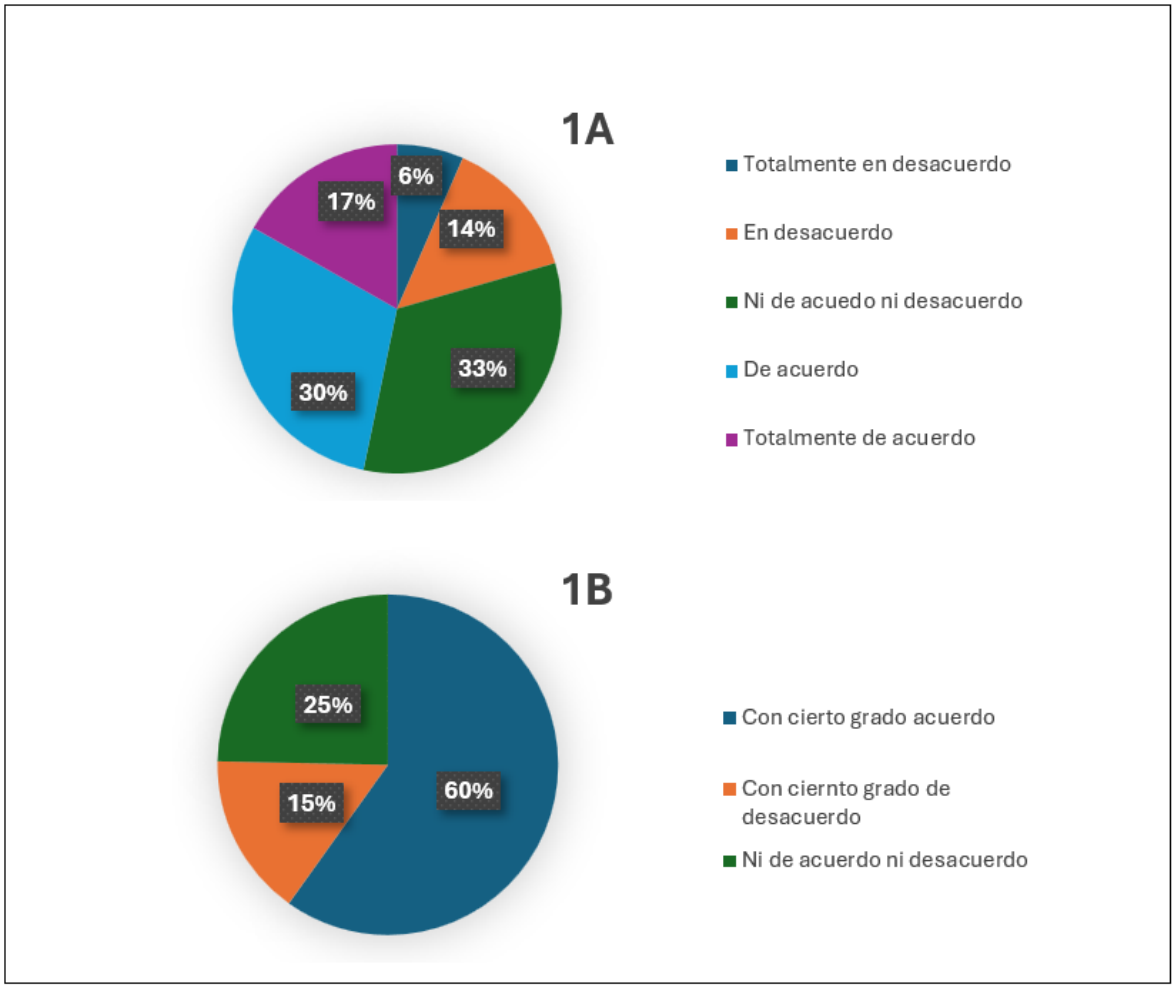
Item	Likert scale				
	1	2	3	4	5
1	3(7.69%)	4(10.26%)	9(23.08%)	15(38.46%)	8(20.51%)
2	2(5.13%)	5(12.82%)	9(23.08%)	16(41.03%)	2(5.13%)
3	0(0%)	7(17.95%)	11(28.21%)	16(41.03%)	5(12.82%)
4	0(0%)	5(12.82%)	15(38.46%)	14(35.90%)	5(12.82%)
5	13(33.33%)	11(8.21%)	12(30.77%)	1(2.56%)	2(5.13%)
6	2(5.13%)	4(12.26%)	16(41.03%)	9(23.08%)	8(20.51%)
7	1(2.56%)	4(20.26%)	16(41.03%)	10(25.64%)	8(20.51%)
8	1(2.56%)	3(7.69%)	14(35.90%)	13(33.33%)	8(20.51%)
9	1(2.56%)	6(15.38%)	13(33.33%)	11(28.21%)	8(20.51%)

Source: Own elaboration

Overall, 23 students (6%) indicated that they strongly disagreed with the use of AI, 49 (14%) disagreed, 115 (33%) neither agreed nor disagreed, 105 (30%) agreed, and 59 (17%) strongly agreed (Figure 1A). When grouping the responses regarding having some degree of disagreement and some degree of agreement, 72 (21%) responded that they had some degree of disagreement and 279 (79%) responded that they had some degree of agreement.

Those who remained neutral, that is, neither disagreeing nor agreeing, accounted for 115 (25%) (Figure 1B). The responses in which students show some degree of agreement with the respondents (60%) were combined, while those who neither agreed nor disagreed reached (25%). The remaining percentage corresponds to those who disagreed to some degree (15%).

Figure 1. Likert scale responses expressed as a percentage of second semester students



Source: Own elaboration

Regarding the absolute frequency and percentage of Likert scale responses for each of the items, they are presented in Table 4. For item 1, with the highest number of students and highest percentage, 26 (42.6%) showed that they totally agreed, in contrast, those who answered that they disagreed and totally disagreed were 1 (1.64%) in each case. For item 2, those who totally agreed stood out with 23 (37.7%) and 21 (34.4%) who agreed. Only 1 (1.64%) showed that they disagreed and totally disagreed in each case. For item 3, 22 (36.07%) and 21 (34.4%) responded that they totally agreed and agreed respectively. Those who totally disagreed and disagreed were 1 (1.64 %) and 2 (3.3%) respectively. For item 4, 3 (4.9%) responded that they strongly disagreed, 2 (3.28%) disagreed, 23 (37.7%) said they strongly agreed, 20 (32.8%) agreed. For item 5, those who strongly agreed were 3 (4.9%), those who agreed were 9 (14.7%), those who neither agreed nor disagreed were 16 (26.2%). 14 (22.9%) and 19 (31.1%) responded that they disagreed and strongly disagreed.

For items 6, 5 (8.2%) and 8 (13.1%) responded that they strongly disagreed and disagreed. 15 (24.6%) neither agreed nor disagreed, 11 (18%) agreed and 22 (36.1%) responded that they strongly agreed. Regarding item 7, 1 (1.64%) responded that they strongly disagreed, 2 (3.28%) agreed and 21 (34.4%) neither agreed nor disagreed, 22 (36%) agreed and 15 (24.6%) said they strongly agreed. Item 8, those who strongly disagreed were 2 (3.28%), no students responded that they disagreed, 10 (16.4%) neither agreed nor disagreed, 21 (34.4%) agreed and 28 (45.9%) strongly agreed. For Item 9, 2 (3.3%) strongly disagreed, none agreed, 12 (18.03%) neither agreed nor disagreed, 29 (47.55%) agreed and 18 (29.5%) strongly agreed.

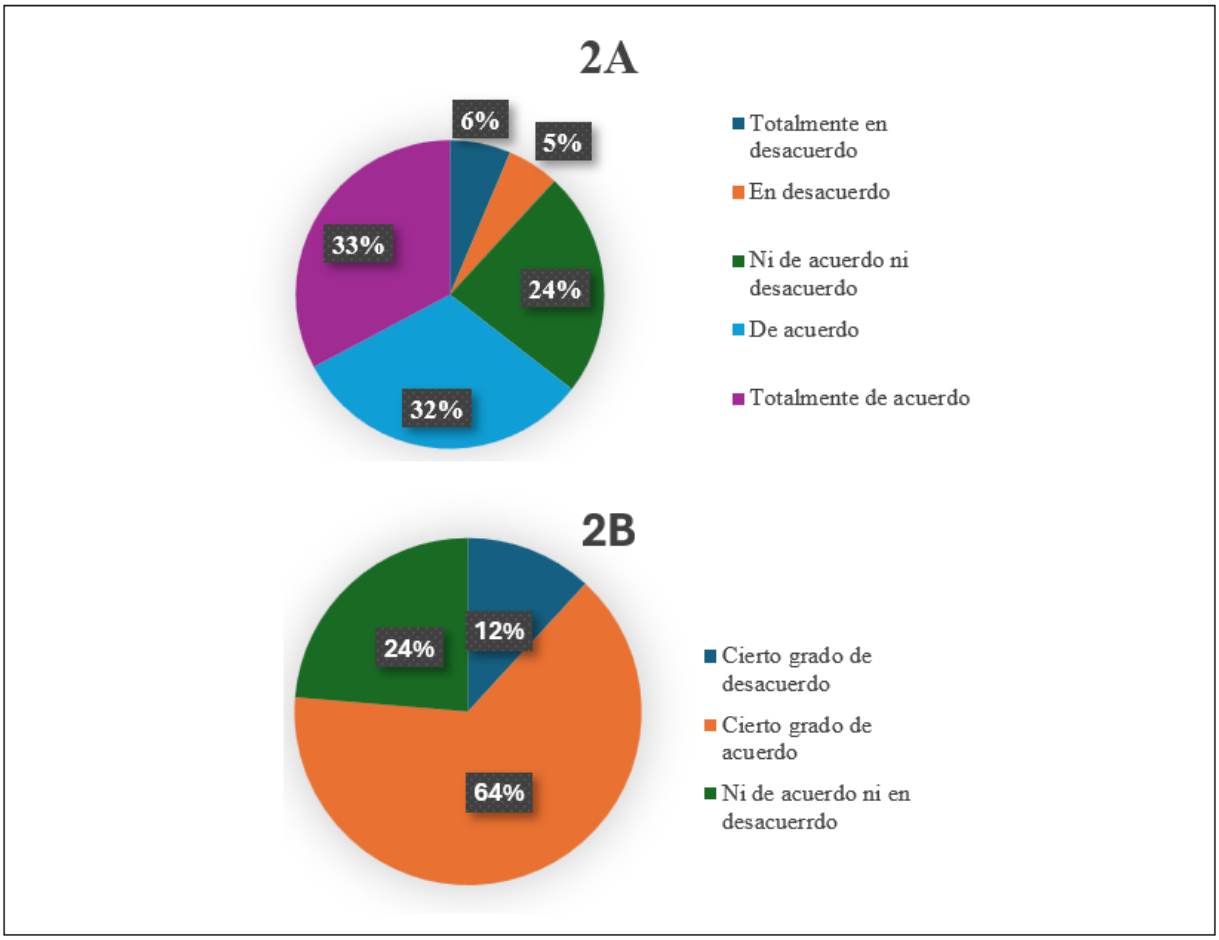
Table 4. Absolute frequency and percentage of responses on a Likert scale for each of the items applied to eighth semester students

			Likert scale		
Item	1	2	3	4	5
1	1(1.64%)	1(1.64%)	13(21.3%)	20(32.8%)	26(42.6%)
2	1(1.64%)	1(1.64%)	15(24.6%)	21(34.4%)	23(37.7%)
3	1(1.64%)	2(3.3%)	15(24.6%)	21(34.4%)	22(36%)
4	3(4.92%)	2(3.3%)	13(21.3%)	20(32.7%)	23(37.7%)
5	19(31.4%)	14(22.9%)	16(26.2%)	9(14.7%)	3(4.92%)
6	5(8.2%)	8(13.1%)	15(24.6%)	11(18.03%)	22(36%)
7	1(1.64%)	2(3.3%)	21(34.4%)	22(36%)	15(24.6%)
8	2(3.3%)	0(0%)	10(16.39%)	21(34.4%)	28(45.9%)
9	2(3.3%)	0(0%)	12(18.03%)	29(47.5%)	18(29.5%)

Source: Own elaboration

When grouping the responses with respect to the total number of students who responded to the nine proposed items, 35 (6%) responded that they totally disagreed, 30 (5.4%) disagreed, 130 (24%) neither agreed nor disagreed, 174 (32%) agreed, and 180 (33%) totally agreed (Figure 2A). Of the responses grouped with respect to having some degree of agreement and some degree of disagreement, 489 (88%) responded that they had some degree of agreement, while 65 (12%) responded that they had some degree of disagreement (Figure 2B).

Figure 2. Likert scale responses expressed as a percentage of eighth semester students



Source: Own elaboration

To determine whether there were differences in the level of satisfaction between second- and eighth-semester students, the nonparametric Mann-Whitney U test was applied to the Likert scale responses. The results indicated significant differences ($p < 0.05$) in items 1-4 and 8-9; that is, second-semester students stated they neither agreed nor disagreed, while eighth-semester students responded that they agreed. In items 5, 6, and 7, no significant differences ($p > 0.05$) were found between the groups, indicating that students from both semesters presented similar perceptions about the use of AI in their academic environment (Table 5).

Table 5. Comparison of the means of the Likert scale responses for each item of the second and eighth semester students

	Second semester	Eighth semester	Significance
Variable	Mean (SD)	Mean (SD)	
Item-1	3.53(1.17)	4.13(0.92)	p = 0.014< (0.05); there are differences
Item-2	3.53(1.1)	4.04(0.92	p = 0.029< (0.05); there are differences
Item-3	3.48(0.94	4 (0.95)	p = 0.012< (0.05); there are differences
Item-4	3.49(0.88)	3.95(1.09	p = 0.012< (0.05); there are differences
Item-5	2.18(1.10)	2.39(1.21)	p = 0.416> (0.05); no differences
Item-6	3.43(1.10)	3.60(1.32)	p = 0.402> (0.05); no differences
Item-7	3.51(1.02)	3.78(0.91)	p = 0.180> (0.05); no difference
Item-8	3.61(0.99)	4.19(0.95)	p = 0.003< (0.05); there is a difference
Item-9	3.48(1.07)	4(0.89)	p = 0.016< (0.05); there is a difference

Source: Own elaboration

Students in more advanced semesters (eighth) showed greater levels of agreement on most of the items assessed, particularly on six of the nine items analyzed (1-4 and 8-9), where the differences were significant. However, it is notable that in aspects related to items 5, 6, and 7, both groups maintained similar levels of agreement, suggesting that there are certain aspects of AI in the student environment where academic experience does not significantly influence students' perceptions.

Discussion

Overall, there is an acceptance of the use of AI tools among second- and eighth-semester students in the Management Engineering program. Although second-semester students appear to be unfamiliar with the use of AI and prefer traditional education, they are expected to acquire the technical knowledge offered by ICTs over time and incorporate these tools into their learning.

Regarding whether AI has helped them learn more effectively, 16 (41.03%) of second-semester students responded that they agreed and only 2 (5.4%) strongly agreed. To the same question, 21 (34.4%) of eighth-semester students answered that they agreed and 23 (37.7 %) strongly agreed. These responses seem to indicate that higher-level students are convinced that AI has facilitated their academic training. In relation to the above, Crespo, Vicente, and Valmorisco (2023b) report that, when social science students at the Complutense University of Madrid were asked about their level of knowledge in AI, 40.8% stated that they had a

moderate level, while only 2% reported a high level; the rest were located between little and very little knowledge.

Regarding the question about improvements in their academic performance thanks to AI, the majority of students in both semesters responded in agreement and even strongly in agreement, which suggests that they are aware that this tool is useful to them. This coincides with Ríos et al. (2024a), who conducted a study on Latin American students' perceptions of the use of AI in higher education. Respondents in this study perceived AI as a tool with a positive impact on the quality of higher education, with 80% responding favorably.

To assess potential negative impacts of AI use in academic training, students were asked if they had had any negative experiences with this technology in their educational setting. In this case, eighth-semester students overwhelmingly responded that they had not, although more than second-semester students reported having had negative experiences.

Faced with the challenges of the "digital generation," educational institutions must design appropriate strategies to help students develop digital skills throughout their education. Although AI is recognized as a potential tool in university settings, challenges remain (Laínez et al., 2024).

The development of AI-based tools has led to the creation of applications capable of generating textual, visual, and audiovisual content based on specific instructions (Salmerón et al., 2023). In this context, both higher education institutions and technology developers have intensified their efforts to adapt these solutions to educational needs.

The inclusion of AI in higher education presents challenges that must be addressed. One of the fundamental conditions for its implementation is having adequate infrastructure, including specialized hardware and software. Furthermore, trained personnel are needed to design, implement, and maintain AI systems in educational settings where educational inclusion is considered.

AI applied to education has great potential to drive the digital transformation of the education system. Although this change is perceived as imminent in the context of the digitalization of HEIs and society (García-Peñalvo, 2021; García-Peñalvo, Llorens-Largo & Vidal, 2024), it has not yet fully materialized (Area & Adell, 2021). It is crucial to ensure that AI systems are non-discriminatory and do not reflect stereotypes and social prejudices (Tapia et al., 2023). Thus, it is confirmed that, as UNESCO (2021) points out, AI contributes to the achievement of the fourth Sustainable Development Goal (SDG 4) proposed by the United

Nations (UN) by promoting inclusive, equitable, and quality education that also prepares them to face the current and future requirements of society.

The study by Ríos et al. (2024b) on the opinions and perspectives of Latin American students regarding the implementation of AI in the university environment shows that respondents reveal a predominantly positive perception: 80% of respondents consider that it improves the quality of education and 70% value its capacity to personalize learning. This favorable perception is consistent with other research on the subject; Idroes et al. (2023) document a positive attitude toward the integration of AI in education. Similarly, Chao-Rebolledo and Rivera-Navarro (2024b) report that 74% of students consider that AI enhances learning, 66% believe that it facilitates academic life, and 81% recognize its positive impact on their educational experience.

It is undeniable that HEIs must prepare to integrate AI into their curricula, ensuring that students at all levels and disciplines have access to this advanced technology. This will allow them to be better prepared to contribute to society. In this regard, Crespo, Vicente, and Vicente (2023c) point out that in their study, 73.4% of the students interviewed find it interesting or very interesting for AI to be more present in the curriculum. Chávez et al. (2020) found that university students in Mexico maintain a direct relationship between the time spent reading online and the time spent reading printed sources. This suggests that, despite being digital natives, they continue to show a preference for printed academic sources, reflecting established reading habits.

Conclusions

Based on the results, it is concluded that there is a high level of acceptance of the use of AI tools among Management Engineering students, both in their second and eighth semesters. However, a significant difference is observed between the two groups, given that students in advanced semesters show greater familiarity and satisfaction with the use of AI in their academic training. The results indicate a high level of acceptance of the use of AI tools among Management Engineering students, both in their second and eighth semesters.

Most students, especially those in advanced semesters, perceive that AI has had a positive impact on their learning process, helping them learn more effectively and improving their academic performance. Although some negative experiences with the use of AI were documented, these were rare, especially among eighth-semester students. Overall, study

participants recognize AI as a valuable tool that positively contributes to the quality of higher education and the personalization of their educational process.

However, despite general acceptance, there is a need to strengthen AI training so that students can use it with greater confidence and responsibility. Furthermore, the integration of AI into higher education poses significant challenges in terms of infrastructure, staff training, and ethical considerations that require attention.

Future lines of research

For future research, we recommend conducting longitudinal studies that analyze the evolution of AI perception and use throughout the university career. It would also be valuable to expand the study to other disciplines to identify differences in AI adoption and perception by area of knowledge. Studies are needed to analyze the long-term impact of AI use in higher education, considering its influence on academic performance and job market readiness, as well as the ethical challenges of its implementation in education, in order to develop frameworks for its management. It is necessary to design educational strategies that effectively integrate AI into curricula, addressing the specific needs of each level, as well as the training area, and to evaluate digital competencies in terms of the use of the aforementioned tool and student development based on tools developed for this purpose.

Limitations

Studies on the implementation of AI in higher education are still incipient, especially in aspects related to accessibility and the skills necessary for its effective use. However, existing studies have shown positive aspects in the training process of university students (Tinoco Placencia, 2023). Students recognize the impact of AI and show a willingness to expand their training in this field; however, their current knowledge is limited due to a lack of specific training. It is essential to expand and improve AI education (Almaraz-López, Almaraz-Menéndez & López-Esteban, 2023), especially by incorporating realistic use cases and considering technological limitations, so that students use AI with confidence and responsibility in their professional future.

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