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IA en carreras de Administración para impulsar emprendimientos femeninos: su inclusión y uso en una muestra de universidades públicas mexicanas

AI in Business Administration programs to promote female entrepreneurship: its inclusion and use in a sample of Mexican public universities

Inteligência Artificial em programas de Administração de Empresas para promover o empreendedorismo feminino: sua inclusão e uso em uma amostra de universidades públicas mexicanas

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Resumen

Las herramientas de Inteligencia Artificial (IA) contribuyen a mejorar la eficiencia de los emprendimientos femeninos. En el mercado laboral mexicano, con altos niveles de informalidad y precariedad, las estudiantes de Administración se enfrentarán a estas condiciones al egresar, lo que posiciona al emprendimiento como una alternativa importante. El objetivo de esta investigación fue en primer lugar revisar si los planes de estudio (PE) de Administración de una muestra de universidades públicas mexicanas incluían asignaturas relacionadas con emprendimiento e IA. Posteriormente se buscó determinar si las alumnas de Administración conocían herramientas de IA y sabían cómo utilizarlas en un emprendimiento. La investigación fue cualitativa, de alcance exploratorio-descriptivo; se realizó investigación documental y posteriormente se analizaron los PE de una muestra de universidades. También se realizaron entrevistas semiestructuradas a una muestra de alumnas de la carrera de Administración para determinar si conocían y sabían cómo podrían utilizar herramientas de IA en un emprendimiento. Los resultados muestran que 100% de las universidades analizadas aún no incluyen asignaturas relacionadas con IA y en todos los programas revisados, se incluyen una o dos asignaturas de emprendimiento. También se encontró que 100% de las alumnas entrevistadas utilizaban diversas herramientas de IA, aunque solo como apoyo para realizar actividades académicas. Además, reconocieron que no sabrían cómo utilizarlas al emprender. La investigación concluye con recomendaciones sobre la manera como se pueden incorporar estos conocimientos a los PE de Administración para impulsar emprendimientos liderados por mujeres.

Palabras clave: Administración, educación superior de la mujer, igualdad de género, inteligencia artificial, emprendimiento.

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Abstract

The Artificial Intelligence (AI) tools contribute to improving the efficiency of women-owned businesses. In the Mexican labor market, characterized by high levels of informal employment and a precarious job market, female Business Administration students will face these conditions upon graduation, which positions entrepreneurship as an important alternative. The objective of this research was, firstly, to review whether the Business Administration curricula (BAC) of a sample of Mexican public universities included subjects related to entrepreneurship and AI. Subsequently, the study sought to determine whether female Business Administration students were familiar with AI tools and knew how to use them in entrepreneurial ventures. The research was qualitative and exploratory-descriptive in scope. Documentary research was conducted and subsequently, the BAC of a sample of public universities were analyzed. Semi-structured interviews were also conducted with a sample of female Business Administration students to determine if they were familiar with and knew how to use AI tools in entrepreneurship. The results show that 100% of the universities analyzed still do not include AI-related courses in their Business Administration programs. On the other hand, all the programs reviewed include one or two entrepreneurship courses. Furthermore, the interviews revealed that 100% of the female students interviewed used various AI tools, although only to support their academic work. They also acknowledged that they would not know how to use them in entrepreneurial ventures. The research concludes with recommendations on how this knowledge can be incorporated into the BAC to promote women-led entrepreneurship.

Keywords: Administration, higher education for women, gender equality, artificial intelligence, entrepreneurship.

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Resumo

As ferramentas de Inteligência Artificial (IA) contribuem para o aumento da eficiência de empresas lideradas por mulheres. No mercado de trabalho mexicano, caracterizado por altos níveis de informalidade e precariedade, as estudantes de Administração de Empresas enfrentarão essas condições após a graduação, o que torna o empreendedorismo uma alternativa significativa. O objetivo desta pesquisa foi, primeiramente, verificar se os currículos de Administração de Empresas de uma amostra de universidades públicas mexicanas incluem disciplinas relacionadas a empreendedorismo e IA. Posteriormente, buscou-se determinar se as estudantes de Administração de Empresas estão familiarizadas com ferramentas de IA e sabem como utilizá-las em um empreendimento. A pesquisa foi qualitativa, com escopo exploratório-descritivo; foi realizada pesquisa documental, seguida de análise dos currículos de uma amostra de universidades. Entrevistas semiestruturadas também foram conduzidas com uma amostra de estudantes de Administração de Empresas para determinar seu conhecimento sobre ferramentas de IA e como elas poderiam utilizá-las em um empreendimento. Os resultados mostram que 100% das universidades analisadas ainda não incluem disciplinas relacionadas à IA, e todos os programas revisados incluem apenas uma ou duas disciplinas de empreendedorismo. Constatou-se também que 100% das estudantes entrevistadas utilizavam diversas ferramentas de IA, mas apenas para auxiliar em seus trabalhos acadêmicos. Além disso, reconheceram que não saberiam como utilizá-las ao iniciar um negócio. A pesquisa conclui com recomendações sobre como esse conhecimento pode ser incorporado aos cursos de Administração de Empresas para promover o empreendedorismo feminino.

Palavras-chave: Administração de Empresas, ensino superior feminino, igualdade de gênero, inteligência artificial, empreendedorismo.

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Introduction

Women's participation in the business world has changed internationally, moving beyond nascent necessity-driven entrepreneurship to assume leadership roles in projects utilizing disruptive technologies such as AI (Daza et al., 2024). Currently, in addition to increased female participation across various sectors, AI is increasingly present in almost all activities, leading to the consideration that it should be incorporated into universities, where research and innovation are fostered and major social changes originate (Pedreño et al., 2024).

According to Cabanelas (2019), AI is "the ability and capacity of a computer, network of computers […] to perform the tasks commonly associated with intelligent human beings" (p. 5).

Based on the above, it is necessary to point out that women have not had as many opportunities as men in the use of technology and therefore, not everyone in the world is preparing to be part of the so-called Industry 4.0 or fourth Industrial Revolution, which includes biotechnology, energy storage systems, nanotechnologies, robots and AI and which according to the Autonomous University of Madrid (2021), is a concept that was coined in 2016 by Klaus Schwab, founder of the World Economic Forum, who points out that this will generate "a world in which virtual and physical manufacturing systems cooperate with each other in a flexible way at a global level" (para. 1).

Based on the above, in the Mexican context, it is important that, in careers such as Administration, where most of the students are women and receive training to become entrepreneurs, they are also provided with training skills to use AI and its tools in a future venture.

In 2023, Mexico ranked among the five countries with the lowest rates of women-owned businesses, with only 2.7% of all businesses nationwide belonging to women (Global Entrepreneurship Monitor [GEM], 2024). A study conducted in the United States involved women entrepreneurs who received support through government-led policies aimed at providing them with technical assistance in using AI. After using these tools, the study found that "91% of respondents stated that AI had contributed to the success of their businesses" (Seibert , 2024, para. 2).

Additionally, it is important to consider that the situation of women in relation to AI is changing internationally. Women are beginning to participate even in AI-based ventures and "have led startups, founded companies and driven technological advances. Their

contributions have not only diversified the AI landscape, but have also brought unique perspectives" (Faster Capital, 2024, para. 2).

Therefore, the importance of incorporating AI into teaching and learning processes at all levels has been recognized. In this regard, Ruiz et al. (2025) point out that integrating AI into higher education will involve challenges, "particularly in areas such as administration, accounting, and law, where the efficient management of information and adaptation to digital environments are becoming increasingly relevant" (pp. 4-5). In the case of Mexico, this knowledge should be incorporated, as it will be of great use to all students, but particularly to female students of the Administration degree who have already prepared themselves to become entrepreneurs.

Furthermore, in the absence of training focused on the use of AI in entrepreneurship, female business administration students who become entrepreneurs will be at a disadvantage. As Zsarnoczky (2017) points out, AI and its various applications in robotics and automation are being used in multiple industries because they can contribute to improving the quality and efficiency of their processes. In this regard, Chang and Chinchay (2023) recommend the use of AI in order to "achieve customer satisfaction and, ultimately, strengthen the competitiveness of organizations" (p. 126).

Furthermore, it is worth mentioning that Mexico has a high rate of business closures or failures, with only 7% of new businesses surviving their first three years. The average lifespan for businesses employing between 0 and 2 people is 6.8 years, while for businesses employing between 3 and 5 people, the average lifespan is 8 years (Lima-Vázquez and Duana-Avila , 2020, p. 46). This underscores the importance of not only preparing female students to be entrepreneurs but also providing them with as many tools as possible to foster sustainable ventures—that is, businesses with a longer lifespan that can withstand the demands of a changing environment, comprised of "a set of external actors and forces that, being partially or totally uncontrolled, are likely to affect the business" (Olis et al., 2021, p. 94).

Therefore, the better their preparation, the better their chances of coping with job insecurity and unemployment. This is because, initially, a source of self-employment is generated, and as the project grows, jobs are created, thus boosting economic growth and contributing to local development.

Given this situation, this research posed the following questions: Do the Business Administration programs at Mexican public universities already include courses related to

entrepreneurship and AI? As a concrete example, are female students in the Bachelor of Science in Business Administration (LCE) program at the Technological University of the Mixteca (UTM) in Mexico familiar with AI tools and how to use them in entrepreneurship? Based on the above, the objective of this research was to examine whether the Business Administration programs at a sample of public universities in Mexico included courses related to entrepreneurship and AI. It also sought to determine whether students in this field were familiar with AI tools and knew how to use them in entrepreneurship.

This research consists of five sections in addition to this one. First, there is the Methodology, which describes the type of research and the activities carried out for its development, as well as the Theoretical Framework, which explains the concepts that underpin this work. Next, there are the Results, which detail the specifics of the documentary and field research. Then, in the Discussion, the contribution of this research is analyzed in comparison with other similar works that were reviewed. Finally, in the Conclusions and Recommendations, some ideas are described on how to include AI knowledge in Business Administration programs to promote sustainable female entrepreneurship.

Methodology

This was a qualitative, exploratory-descriptive study, as the topic had not been previously studied in the Mexican context with regard to female students in Business Administration programs . The study sought to understand the current state of AI content inclusion in Business Administration curricula. Furthermore, it aimed to determine whether these students were familiar with AI tools and knew how to use them in entrepreneurial ventures.

The first part of the documentary research aimed to integrate the theoretical framework and analyze how AI tools can be used both in existing businesses and in those planned by business administration students. Indexed scientific articles, theses, and reports from international organizations were analyzed, with an emphasis on research published in the last five years.

In the second part of the documentary research, the PEs of a non-probabilistic intentional sample of ten Mexican public universities were reviewed, in order to consider universities from different regions of the country.

The universities were selected according to the regionalization used in various studies (INEGI, 2004, 2011, 2020) for the analysis of information from the entire country. This way

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of sectioning the territory for analytical purposes has also been adopted "from the territorial division into five meso-regions of the National Development Plan, 2001-2006" (INEGI, 2004, p. 45) and from the "National Development Plan 2007-2012" (INEGI, 2011, p. 85). The five regions are: Northwest (Baja California, Baja California Sur, Sonora, Sinaloa and Chihuahua), Northeast (Coahuila, Nuevo León and Tamaulipas), West (Nayarit, Jalisco, Colima, Michoacán, Aguascalientes, Zacatecas, Guanajuato and Querétaro), Central (San Luis Potosí, Hidalgo, State of Mexico, Mexico City, Morelos, Puebla, Tlaxcala, Guerrero and Oaxaca) and South-Southeast (Veracruz, Tabasco, Chiapas, Campeche, Yucatán and Quintana Roo).

From each region, two public universities were selected that offer a Bachelor's degree in the area of Administration or its equivalent (Bachelor's degree in Administration, Bachelor's degree in Business Sciences or Bachelor's degree in Business Administration), and that had their PE available on the Internet in order to review them and determine if they were including subjects of entrepreneurship and AI.

The next stage of research consisted of conducting semi-structured interviews with a sample of female students from the LCE at UTM, which was one of the universities included in the previous sample to review its PE.

This was a purposive, non-probability sample. This criterion sampling method was used, considering the following: that the students be female, in their sixth, eighth, or tenth semester of the Bachelor of Science in Education program, as they had already passed the core and purely theoretical courses, and that they were willing to participate in the research. The sample consisted of 37 students from the following semesters: 32% sixth, 38% eighth, and 30% tenth.

This university was selected because its Bachelor of Science in Business Administration (LCE) program received Level I accreditation from the Interinstitutional Committees for the Evaluation of Higher Education (CIEES), and its graduates have achieved outstanding results on the General Exit Exams (EGEL) administered by the National Center for Higher Education Evaluation (CENEVAL) in the field of Administration. This was considered an indicator of academic quality, meaning that the program meets the expected content standards in this area of knowledge. The objective of the interviews was to determine if its students are familiar with AI tools and, if so, which ones they use and for what purpose. Additionally, the interviews sought to ascertain whether they know how to apply these tools in a business venture.

Finally, the results obtained from the previous stages were analyzed, the discussion section was developed, and subsequently the conclusions and recommendations for the incorporation of AI in the PE of Administration were formulated.

Theoretical Framework

This section presents some concepts that are the basis of this research, such as durability, which according to Castillo (2018), allows identifying important aspects for the success of a company, which is the one that remains and "only those organizations that have individuals with characteristics of adaptability and learning will be the durable ones […] it has been observed that changes both in the environment and internally, in part are what motivate the prosperous development of companies" (p. 8).

On the other hand, Vélez (2010) recognizes that society benefits from the permanence of companies, and that these will only be able to endure and continue their operation if they adapt to changes in the environment and identify those elements that give them organizational stability.

Women entrepreneurs and AI

Alecchi (2020) acknowledges that female entrepreneurship has been increasing, but the percentages of female entrepreneurs are still low worldwide, especially in Latin America.

Women have historically "faced and overcome various challenges. These challenges include gender discrimination, lack of access to financing and resources, and limited networking opportunities " (Faster Capital, 2024, para. 4).

When reviewing the history of AI, some trace its origins back to humanity's desire to create machines that perform certain tasks for a given community, such as the Greek myth of Talos, a giant bronze automaton created by Hephaestus that protected the island of Crete. Another important reference point was the development of Alan Turing's test, as shown in Table 1, which aimed to determine whether an intelligence indistinguishable from human behavior could be identified. Years later, the term AI was coined, and logical reasoning was automated and used to solve mathematical problems. Subsequent work simulated the decision-making process, leading to the development of predictive, communicative, and generative tools. In 2022, ChatGPT , an open-source AI language model developed by OpenAI , was presented. It is capable of holding conversations with humans and generating coherent responses. Subsequently in 2024, AlphaFold 3 was created , an AI model developed

by Google DeepMind , capable of predicting the three-dimensional structures of biological molecules, including proteins, DNA, RNA and other compounds (Coursera, 2025).

Table 1. Relevant aspects in the history of AI

Year	Event
1943	McCulloch and Pitts introduce a model of artificial neural networks.
1950	Alan Turing formulated the Turing Test Turing test to assess whether a machine can exhibit intelligent behavior indistinguishable from human behavior.
1956	John McCarthy and some colleagues coined the term *Artificial Intelligence* at Dartmouth.
1966	Weizenbaum develops the first *chatbot* (ELIZA), based on natural language processing.
1997	Computational model developed with Deep Blue surpasses world chess champion (Kasparov).
2012	AlexNet is revolutionizing computer vision with deep learning architectures.
2022	OpenAI presents *ChatGPT* , a generative transformer pre-trained with deep learning techniques and large amounts of text to generate coherent responses in natural language.

Source : Prepared by the author based on Coursera (2025) and Garduño et al. (2025)

AI in Education to boost female entrepreneurship

AI has evolved, profoundly transforming education, particularly at higher levels, but it is necessary to consider that in the activities of the teaching-learning process that require human intelligence, such as reasoning or decision-making, AI constitutes a strategic tool that must be incorporated along with a critical reflection on its ethical, social and pedagogical implications (Aznarte , 2020).

Bolaño and Duarte (2024) state that “the use of artificial intelligence (AI) in education has received increasing attention in recent years” (p. 51), but they acknowledge that its implementation can be accompanied by challenges and limitations, since it is not enough to simply spark students' interest; they also need to acquire certain technical knowledge. Therefore, it is important to examine how female Business Administration students can be provided with the knowledge that will allow them to use AI to boost their entrepreneurial ventures.

By the middle of the third decade of the 21st century, one of the most significant challenges facing women entrepreneurs will be the integration of AI into various organizational processes, both for existing projects and for future ventures by female university students. In this regard, Chang and Chinchay (2023) point out that the integration of AI could generate substantial advantages for companies, improving "the customer experience and, ultimately, strengthening the competitiveness of organizations" (p. 126).

Challenges and opportunities for women entrepreneurs integrate AI into their activities

The Royal Spanish Academy (RAE, 2025a) defines the word "reto" (challenge) as "an objective or endeavor that is difficult to accomplish and therefore constitutes a stimulus and a challenge for the person who faces it" (para. 1). Thus, it refers to an activity that is not easy to achieve, but which, if viewed as a stimulus, serves as motivation to strive and reach a goal, and to do so, there must be a development of skills.

Below are some of the most important challenges that women entrepreneurs are currently facing with the incorporation of AI into their ventures , as well as some opportunities they can take advantage of by using its tools in a current or future venture.

First, there is concern about the potential for job losses associated with AI. While some authors (Perea et al., 2024; Seibert , 2024) acknowledge that some jobs may indeed be lost in the coming years, and that some people may even need to change careers, they also see opportunities. According to their estimates, many more jobs are likely to be created. Furthermore, entrepreneurs could incorporate AI tools and train their staff to adapt to these new ways of operating.

Cybersecurity, understood as the "set of elements, measures, and equipment designed to control the computer security of an entity or a virtual space" (RAE, 2025b, para. 1), is a central aspect of using AI. Therefore, it has been noted that the use of AI can present a challenge, since the programming structure of AI tools can sometimes contain errors that jeopardize user security. This is why, if entrepreneurs use these tools, they should seek to have specialized cybersecurity personnel to address aspects such as customer identity verification and constant monitoring to detect potential vulnerabilities.

In response to this situation, international efforts are underway, such as those undertaken by the United Nations Educational, Scientific and Cultural Organization (UNESCO), which established the *Women4Ethical AI platform in 2023* to promote

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government and business efforts to ensure the equitable representation of women in the design and implementation of AI (UNESCO, 2023). At the national level, a survey was administered to a sample of Higher Education Institutions (HEIs) associated with ANUIES to identify priority challenges in AI, and the main strategies defined were : a gender perspective and the inclusion of competencies for innovation and the use of AI (Véliz et al., 2024).

Based on the above, it is considered that, for universities, " gender inclusion represents an important challenge and an opportunity to improve equity in the development and application of AI in higher education since only 22% of AI specialists are women" (Pedreño et al., 2024) , which indicates a gender inequality in the field and the underrepresentation of women in AI research and in Science, Technology, Engineering and Mathematics (STEM) fields.

It is also useful to identify and publicize the unique perspectives and experiences that women entrepreneurs can bring to the field of AI, recognizing that there are challenges and opportunities and that "diversity and inclusion in AI entrepreneurship can lead to more innovative and comprehensive solutions" (Faster Capital, 2024, para. 17).

Results

The research findings are presented below and divided into three parts. First, a brief review of how AI can be used in women-led entrepreneurship is presented. These findings are derived from a literature review, followed by a classification and synthesis process to identify specific AI applications that can be used in entrepreneurship. Second, the results of an analysis of the curricula of a sample of Mexican universities offering Business Administration degrees are presented to determine whether they have incorporated entrepreneurship and AI courses. Finally, the results of semi-structured interviews with 37 Business Administration students are presented to determine their familiarity with AI tools, which ones they use, their purpose, and whether they know how to use them in entrepreneurship.

AI tools in female-led businesses

Women who start businesses after completing their university studies in Business Administration in Mexico have access to various AI tools that they can incorporate into their companies' operations to improve efficiency. This is because they can reduce lead times and standardize product quality as a result of the process standardization that these tools can automate . Table 2 describes some of the most frequently cited uses in the literature.

Table 2. Uses that female entrepreneurs can give to AI in their ventures

Author	Uses of AI tools in entrepreneurship
Seibert (2024)	Optimization and automation applicable to inventory management and control, market analysis, and the billing process.
Chang and Chinchay (2023)	Design of plans or strategies aimed at achieving collaboration among those who make up the digital marketing team.
Cárdenas (2024)	Use of visual recognition tools to locate objects or people, create and synthesize documents, as well as natural language recognition systems to translate and answer questions.
Zsarnoczky (2017)	Automated programming for searching and retrieving information, for example, from social networks.
Wu and Wang (2025), Fossen et al. (2024) and Uriarte (2025)	Depending on the stage of the business, there are different AI tools that can be useful. Initially, they can be used to generate innovative ideas, and later to create business strategies.

Source: Own elaboration based on Wu and Wang (2025), Fossen et al. (2024), Uriarte (2025), Chang and Chinchay (2023), Cárdenas (2024), Zsarnoczky (2017) and Seibert (2024)

These results show only a part of the great diversity of AI tools that can be used in entrepreneurship and with which Business Administration students should become familiar during their university training, due to the benefits they can provide.

Results of the Review of Management Programs in Mexican Universities

The following presents the results of a review of a sample of ten public universities analyzing whether their Business Administration degree programs include entrepreneurship and AI courses (See Appendix 1). Two universities were analyzed from each of the regions into which the country has been divided, as mentioned in the methodology section, to facilitate the analysis, reporting, and comparison of information.

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Table 3 shows that the universities analyzed in the Northwest region do not offer AI-related courses, although they do offer courses related to Information and Communication Technologies (ICT), computer science, and business software. It was also found that the two universities reviewed in this region do offer entrepreneurship courses.

Table 3. Northwest Region. The HEIs analyzed are from Sonora and Baja California

University, state and Name of the Career	Subjects related to entrepreneurship	AI-related subjects
University 1 State: Sonora Bachelor's Degree in Administration	Business Training	No specific AI subjects were identified Yes, subjects related to Information and Communication Technologies (ICT) were identified. Administrative and Accounting Software and Computing
University 2 State: Baja California Bachelor's Degree in Administration	Entrepreneur Development	No specific AI subjects were identified Yes, ICT subjects, Information Systems and Electives such as Electronic Commerce and Internet Business Creation were identified

Source: Own elaboration

Regarding universities in the Northeast region, as shown in Table 4, no AI-related courses are offered, but courses related to computer science and data analysis are available. Furthermore, like universities in the Northwest region, courses related to entrepreneurship are also offered.

Table 4. Northeast Region. The higher education institutions analyzed are from Coahuila and Nuevo León.

University, state and Name of the Career	Subjects related to entrepreneurship	Subjects related to AI
University 3 State: Coahuila Bachelor's Degree in Business Administration	Innovations and Entrepreneur Development	No specific AI subjects were identified Yes, subjects from Computer Science I, II and III were identified
University 4 State: Nuevo León Bachelor's Degree in Administration	Leadership, entrepreneurship and innovation, Introduction to business and Business development	No specific AI subjects were identified Yes, subjects were identified in Applied Technologies in Business, Data Analysis and Data Analytics for Decision Making

Source: Own elaboration

In the Western region , as shown in Table 5, the first university analyzed (5) did not include AI courses, but did include an entrepreneurship course. On the other hand, university 6 in the state of Jalisco did not include AI-related courses, but did offer courses in technology applied to both Human Resources and Business. In addition, they offered two courses related to entrepreneurship linked to sustainability.

Table 5. Western Region. The HEIs analyzed are from Nayarit and Jalisco

University, state and Name of the Career	Subjects related to entrepreneurship	AI-related subjects
University 5 State: Nayarit Bachelor's Degree in Administration	Entrepreneurs	No specific AI subjects were identified
University 6 State: Jalisco Bachelor's Degree in Administration	Intrapreneurship and Entrepreneurship in Sustainable Innovation	No specific AI subjects were identified Yes, subjects of Technology Applied to Human Resources and Business were identified

Source: Own elaboration

Table 6 shows that, for the Central region, University 7 does not include any AI-related courses, although it does include a course related to Administrative Computing and another on entrepreneurship. University 8 also does not offer any AI courses, but it does include a

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course on digital marketing. Both universities have in common that they include courses related to entrepreneurship.

Table 6. Central Region. The higher education institutions analyzed are from San Luis Potosí and Oaxaca.

University, state and Name of the Career	Subjects related to entrepreneurship	AI-related subjects
University 7 State: San Luis Potosí Bachelor's Degree in Administration	Entrepreneurial Development	No specific AI subjects were identified Yes, subjects in Administrative Computing were identified.
University 8 State: Oaxaca Bachelor of Science in Business	Entrepreneurship and Business Development	No specific AI subjects were identified Digital Marketing subjects were identified

Source: Own elaboration

Finally, Table 7 presents the results for the two universities analyzed in the South-Southeast Region. It can be noted that University 9 also does not include AI-related content, only courses related to basic computer skills and administrative software. On the other hand, University 10 also does not include AI-related courses, but it does include courses related to ICT, information management, and digital marketing. These two universities also share the characteristic of including entrepreneurship courses.

Table 7. South-Southeast Region. The HEIs analyzed are from Veracruz and Yucatán.

University, state and Name of the Career	Subjects related to entrepreneurship	AI-related subjects
University 9 State: Veracruz Bachelor's Degree in Business Administration	Business creation	No specific AI subjects were identified Yes, subjects in basic computer science were identified and Business management software
University 10 State: Yucatán Bachelor's Degree in Administration	Entrepreneurial Culture	No specific AI subjects were identified Yes, subjects related to ICT and Information Management for Innovation were identified, as well as an elective related to Digital Marketing.

Source: Own elaboration

As can be seen, none of the public universities analyzed currently include AI subjects and 100% include subjects related to entrepreneurship.

Results of the application of semi-structured interviews

The following are the results obtained from the application of 37 semi-structured interviews to female students of the LCE of the UTM (See Annex 2), which was one of the public universities analyzed in the previous section.

The female university students interviewed are between 20 and 25 years old and are students in their sixth, eighth, and tenth semesters of the LCE program. Regarding their place of origin, 89% of those interviewed are from a town near the Heroic City of Huajuapan de León, Oaxaca, where their university is located, and 11% are from the City of Oaxaca de Juárez or from communities near the state capital.

When asked whether they attended public or private schools up to high school, 84% reported attending public schools. Furthermore, 81% of the students agreed that their greatest exposure to software, basic programming principles, and technology use occurred during high school and university, while 5% mentioned taking robotics workshops where they were also taught programming fundamentals.

The students acknowledged that they are taking two entrepreneurship courses as part of their degree program, and when asked if they know what *machine learning is* , most have a general understanding of the term, with 77% responding like interviewee No. 2, although

they have learned about it informally and are somewhat uncertain: " *I think it's related to Artificial Intelligence* ." Finally, 23% indicated that they had no idea what the term might be related to.

Regarding their knowledge of AI tools and whether they consider them different from software, the students gave responses like that of interviewee No. 11: " *I think software like Word or PowerPoint is different from the help we now have, which is ChatGPT , because I can ask questions or queries to that tool* ." Some compared the Office suite to AI tools like *Gemini* or *Copilot* , but 95% of the interviewees were able to distinguish between software and an AI tool. Also, 89% of the university students were able to identify that training an AI model primarily requires a large amount of data.

Despite these results, which are quite good considering they are Business Administration students who do not take AI courses, when asked how much they think they know about AI, 65% consider that they know little about the subject.

This shows that the interviewed students have some knowledge acquired informally. Therefore, when asked if they felt capable of explaining how a tool like ChatGPT works , none answered affirmatively. Furthermore, when asked if they knew of any AI tools that could be used in the activities or procedures carried out in a business venture, all gave responses similar to that of interviewee No. 1, who stated: " *The truth is, we did take entrepreneurship classes, but they didn't explain anything about Artificial Intelligence.* " In other words, most of the students gave similar answers, as was the case with interviewee No. 5, who stated: " *I remember we took entrepreneurship classes, but I don't remember anything about Artificial Intelligence. I can't think of how I can use what I know about Artificial Intelligence in entrepreneurship.* " Thus, 100% of the students answered that they did not know of any AI tools that could be useful in a business venture.

In another question, they were asked if they had used AI in any of their entrepreneurship courses. 92% indicated they had not, and the three students who answered affirmatively linked it to the Digital Marketing course or other marketing courses. Later, when asked to mention some AI tools that could be used in entrepreneurship, only 8% mentioned ChatGPT , explaining that it can be used to clarify doubts about certain procedures, to generate creative suggestions, or to support decision-making.

In relation to the above, they were asked to explain how interested they were in learning more about AI. To this question, 81% responded that they were very interested.

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On the other hand, when asked if they thought men had more knowledge of AI than women, 86% answered no, which shows that they do not have gender biases to consider that their male colleagues, simply because they are men, have more information than they do on the subject.

Similarly, when asked which AI tools they currently use and what they use them for, the results are shown in Table 8. Furthermore, when asked how frequently they use these tools, 51% answered that they do so several times a week.

Table 8. AI tools that the interviewees know and the uses they give them

AI Tool Name	The use that the interviewees make of the aforementioned AI tool
ChatGPT	Conduct searches, improve writing, ask questions, analyze and summarize documents
SCRL	Improve the photos
Gemini	Obtain summaries, make text corrections, and research various topics
Gamma	Give presentations and find information
Quillbut	Improve writing
Copilot	Search for concepts
DeepSeek	Search for information, make conversions, and resolve doubts
Perplexity	Research on various topics
InVideo	Generate videos
Galaxy	Multiple personal tasks
MetaIA	Create images

Source: Own elaboration

As can be seen, all the tools the students have used so far are related to their schoolwork or personal matters; that is, they use AI tools to perform very basic tasks. Based on this, it can be stated that the students lack knowledge of how to use these tools to address real-world situations that arise in entrepreneurship. This is easily corroborated by the other results, since when asked if they thought the AI tools they currently use could be used in a future venture, and then asked to specify which ones if they answered affirmatively, 78% answered no. This confirms that the interviewees cannot envision the usefulness of AI in current or potential ventures.

Finally, when asked if they believe AI can be applied in business to solve real-world situations or problems, 62% responded affirmatively. Their responses were very similar to that of interviewee No. 18, who stated: " *From what I know, AI can handle large amounts of data, and therefore it can greatly assist in decision-making, so I think it would be useful in business.* " However, they also foresee some dangers, as 54% agreed with the response of interviewee No. 34, who expressed the following: " *AI may be used in some areas of the company in the future, but we must be careful with data handling, due to information privacy and cybersecurity concerns, as this has caused many problems for companies and must be addressed* ." Furthermore, 65% of the students agree with interviewee No. 3 who stated: " *I believe that AI can be useful in companies, but only up to a point, since from what I know, it does not have the ability to resolve ethical dilemmas, therefore, there is a possibility that, if decisions are made with the support of AI, they may be detrimental to the company or commit injustices* ."

Discussion

The literature review did not identify any studies with this specific focus in the Mexican context. However, some research, such as that by Barrios et al. (2021), was found that aligns with the results of this study, primarily in recognizing gender inequality, evident in the fewer entrepreneurial opportunities available to women. Barrios et al. (2021), however, focuses on demonstrating the gender pay gap and differences in job positions, and suggests that AI, digital marketing, and websites can mitigate these problems. These findings help contextualize the results obtained in this research.

The results of this research demonstrate that AI tools have different applications in women-led businesses depending on the type of company and its stage of development. These results align with Camacho (2024), who identifies various applications of these tools for automating tasks and processes that previously consumed a significant amount of time for entrepreneurs. One difference with Camacho is that he does not focus specifically on women-led businesses. These findings highlight the importance of the present research, which centers on the application of AI tools, not in a general way, but with a gender perspective.

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The results of this research show that, although the female Business Administration students interviewed do not have much knowledge about AI tools and their application in entrepreneurship, they are interested in learning more about the subject and have approached it in an informal and self-taught way.

The results above align with the findings of Ruiz et al. (2025), whose research analyzed a sample comprised of 70% female students, primarily from the Business Administration program. In this sample, 85.4% expressed interest in taking AI-related courses and perceived that incorporating this type of content into their studies would have a positive effect on their education. However, Ruiz et al.'s (2025) research is primarily based on university students' perceptions of implementing these tools, while this study also analyzes the integration of these topics into the curricula of a sample of universities and emphasizes the importance of their inclusion in providing more resources to female students who decide to pursue entrepreneurship. Therefore, this research is important because it includes curriculum analysis and training recommendations.

The results of this research are important because, although there is a methodological limitation in that the sample only included ten universities to review their Business Administration degree programs, this does not weaken the research, since these universities are located in different regions of the country, which allows us to identify the need to make some changes in this type of program in other Mexican universities that offer them, to allow female Business Administration students to access knowledge related to technology, which is one of the areas in which there has historically been low participation of women.

The results of this study align with several investigations, such as those by Véliz et al. (2024); Cuello (2025); Murguía and Ronzón (2023); Hernández (2025); and De la O (2024), which recognize women's participation and leadership in entrepreneurship and technology use as crucial elements for promoting inclusive economic development, innovation, and ensuring a reduction in the gender gap. However, these authors have conducted research with a different approach than that used in this study, as explained below.

In the case of Cuello (2025), her research focuses on the initial stage of entrepreneurship and develops a program that integrates AI to guide women in transforming their ideas into viable and sustainable businesses with the support of various AI applications and tools. This differs from the present research, which addresses the potential application of such tools at any stage of entrepreneurship. Therefore, this research establishes a precedent that expands this field of study.

Furthermore, Murguía and Ronzón (2023) also recognize that supporting women's development and empowerment contributes to the achievement of several Sustainable Development Goals (SDGs), such as SDG 4) Education, SDG 5) Gender equality and women's empowerment, SDG 8) Decent work and economic growth, and SDG 10) Reduced inequalities within and among countries. Therefore, teaching AI to female Business Administration students is closely linked to achieving the SDGs.

Similarly, Hernández (2025) directs her research toward identifying effective strategies that contribute to reducing the digital divide among women entrepreneurs in Latin America. In contrast, De la O (2024) obtains her primary data from Costa Rica, so her research does not reflect the Mexican case. Furthermore, this author focuses her research on identifying the skills that women entrepreneurs will need to make optimal use of these technologies, foster collaboration, and create supportive ecosystems.

The results of this research also align with those of Felgueira et al. (2024), who concluded that women entrepreneurs need the support of higher education institutions (HEIs), which should promote entrepreneurship as a career path, provide practical education, and foster a work environment of trust, communication, and continuous learning. Finally, it is worth noting that the results of this research also coincide with those of Tello and Manrique (2024), who assert that with AI tools such as Whisper , ChatGPT , and Gemini, companies are transforming how they communicate with customers.

Conclusions

This research concludes that, according to various sources consulted, there are multiple business activities and processes where AI tools can be used in women-owned businesses . However, there is a need to increase women's training in the use of these new technologies. Therefore, the need for universities to contribute to reducing the gender gap is identified. This can be achieved if these institutions guide their female students to participate in the transformation of women-owned businesses toward a stage characterized by more competitive ventures based on innovation and the use of technology.

The results of this research show that in fields like Business Administration, which has a predominantly female student body, it is necessary to include courses that not only provide students with the entrepreneurial knowledge already taught at all the universities analyzed, but also complement it with topics that allow them to become familiar with the use of AI tools. This will enable their companies to operate more efficiently and save time on

repetitive tasks, which can contribute to greater business survival, leading to significant benefits for boosting economic development and promoting equality.

Furthermore, interviews conducted with a sample of female Business Administration students revealed that they have a very low level of knowledge about AI tools , as they only use them for school assignments and projects. However, they don't know how they could use them in a business venture.

These results are related to the fact that their degree program does not include courses on this topic. Therefore, it is necessary to teach them how to make optimal use of AI tools so they can connect what they have learned in each of the degree's subject areas—such as Finance, Human Resources, Administration, Marketing, or Entrepreneurship—with AI tools and how they can be used to create and develop a business.

This research may be useful for directors of higher education institutions that offer the Administration degree and for those who design public policies related to education and the creation of entrepreneurship opportunities, since it is important to expand the digital training of female students, as well as their skills and offer them an institutional and educational ecosystem that empowers them, especially in careers in which they are prepared to be entrepreneurs.

Recommendations

Training for teachers who currently teach Entrepreneurship subjects

It is suggested that as soon as possible, teachers who teach Entrepreneurship subjects should be trained in the use of AI tools, since, with their mastery of the subject, they will be able to easily identify which tools can be used in each of the stages of female entrepreneurship, from its creation to the design of business strategies to promote such projects.

The active learning model with a student-centered teaching approach is recommended. This is because, according to Fernández et al. (2025), it allows a shift from a traditional model in which the student is simply a passive recipient of knowledge, to one with broad participation "based on the idea that people learn best when they are actively involved in the construction of their own knowledge" (pp. 36-37).

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In this way, it is possible not only for them to learn about AI, but also for the new learning to be meaningful to them, to achieve a greater understanding, to develop their activities and to remain motivated , which will truly prepare them to apply such knowledge in the real world, that is, in their future ventures.

To train all professors who teach classes in the Administration PE

In a second phase, the training can be extended to the rest of the teachers so that each one, according to their area of expertise, can identify the AI tools that an entrepreneur can use. In this way, they will be able to teach their students how to perform the same processes that are currently carried out manually or only with the help of software, but now more efficiently, using AI tools.

Updating the Management PEs to include AI and entrepreneurship content

The third recommendation concerns updating the PE as soon as possible to incorporate either a) a subject in which, in the last semesters of the degree, students use different AI tools related to the different functional areas of a company, or b) the inclusion in the program of each subject of the PE of the use of AI tools applicable to each area of administration.

Support extracurricular activities

The inclusion of subjects or content related to AI should be complemented by another tool that could be useful, which is the performance of extracurricular activities.

Among these activities, the following are recommended: a) inviting female entrepreneurs to share their experience and explain which AI tools they have used before and how they have been useful to them, b) presenting success stories from some graduates who have started businesses and who also share their experience in general and explain how AI tools have helped them to boost their ventures, c) holding competitions that encourage the use of new AI tools and recognize the efforts of those who use them more and more creatively.

Additionally, continuous updating is essential, as new tools and updates to existing ones are added daily. Furthermore, the development of digital skills requires a commitment to ongoing self-directed learning on the part of both students and teachers.

Future lines of research

For future research, it is recommended to conduct documentary research to analyze a larger number of universities that offer the Administration degree to detect if they have already incorporated AI content and, if so, to retrieve any case studies, interviewing their students to assess to what extent they feel better prepared to undertake entrepreneurship.

Another future line of research is to analyze, through interviews with female graduates in Administration who have become entrepreneurs, what obstacles they faced due to a lack of preparation in the use of technology applied to the operation of their projects and, based on the results, generate other recommendations that strengthen the study programs of this degree in Mexico.

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ANNEX 1

ASPECTS REVIEWED IN THE TWO UNIVERSITIES ANALYZED IN EACH OF THE FIVE REGIONS

Objective of the documentary research of the analysis of the PE : To review the PE of a representative sample of universities (two for each of the five regions) to identify if they include subjects related to: Entrepreneurship and AI.

University, state and Name of the Career	Subjects related to entrepreneurship	AI-related subjects
University: State: Name of the Career:		
University: State: Name of the Career:		

ANNEX 2

INTERVIEW GUIDE ON KNOWLEDGE AND USE OF ARTIFICIAL INTELLIGENCE (AI) FOR STUDENTS OF THE BACHELOR'S DEGREE IN BUSINESS SCIENCES AT THE TECHNOLOGICAL UNIVERSITY OF THE MIXTECA

Words of thanks to the participants : Thank you for agreeing to participate in this AI research. The information you provide will be treated confidentially and used exclusively for academic purposes.

Objective of the interviews : To determine if the young women studying this degree are familiar with AI tools, if so, which ones they use, for what purpose, and finally if they know how they could be implemented in a business venture.

1. How old are you? And what semester are you currently in?
2. What is your place of origin?
3. Up to the high school level, did you study in public or private schools?
4. At what level of study have you had the greatest exposure to technology in general, and in particular to the use of software and the basic principles of programming?
5. Do you remember any course or workshop where you were taught programming tools or software? Which one?
6. If you hear two people talking and you notice they use the term *machine learning* , what topic do you think they are talking about and what topics would you relate it to?

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7. If you are given the following three names: Excel, ChatGPT , and PowerPoint , which one do you most associate with an AI language model?
8. If you compare yourself to your male classmates at university, who do you think knows more about AI?
9. Have you taken any specific courses or training on AI? (If yes, please ask them to mention where they took the course and what it was about).
10. Do you think AI tools are different from software?
11. Do you consider yourself self-taught when it comes to learning about AI?
12. Did you use any AI tools in your entrepreneurship courses?
13. Would you like to learn more about AI? (If yes, ask what you would like to learn about.)
14. Do you think men have more knowledge about AI than women? Explain.
15. What are the three AI applications you currently use most and what do you use them for?
16. Can you tell us how often you use each of them?
17. Could you mention some AI tools that could be used in a startup?
18. Do you think you would know how to use AI tools in your own business? (If so, ask for an example).
19. Do you think AI can be applied in business to solve real-world situations or problems?
20. Do you think AI can improve decision-making in relation to the management of a company?