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ECORFAN Journal-Republic of El Salvador

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Scientific Objectives

Support the international scientific community in its written production Science, Technology and Innovation in the Field of Social Sciences, in Subdisciplines of international migration law, human rights-diplomatic and consular protection, migrant population in a vulnerable situation, public policies and projects from a country perspective.

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ECORFAN Journal-Republic of El Salvador is a Journal edited by ECORFAN-Mexico S.C in its Holding with repository in Republic of El Salvador, is a scientific publication arbitrated and indexed with semester periods. It supports a wide range of contents that are evaluated by academic peers by the Double-Blind method, around subjects related to the theory and practice of international migration law, human rights-diplomatic and consular protection, migrant population in a vulnerable situation, public policies and projects from a country perspective with diverse approaches and perspectives , That contribute to the diffusion of the development of Science Technology and Innovation that allow the arguments related to the decision making and influence in the formulation of international policies in the Field of Social Sciences. The editorial horizon of ECORFAN-Mexico® extends beyond the academy and integrates other segments of research and analysis outside the scope, as long as they meet the requirements of rigorous argumentative and scientific, as well as addressing issues of general and current interest of the International Scientific Society.

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Instructions for Scientific, Technological and Innovation Publication

Knowledge Area

The works must be unpublished and refer to topics of international migration law, human rights-diplomatic and consular protection, migrant population in a vulnerable situation, public policies and projects from a country perspective and other topics related to Social Sciences.

Presentation of the Content

In this issue, is presented an article *Correlation between personal financial risk tolerance and financial literacy,* by Galaviz–Zamora, Marisol, Murillo-Félix, Cecilia Aurora, Galván-Corral, Alberto and Amarillas-Ibarra, Priscilia Rossel, with adscription at Instituto Tecnológico de Sonora, in the next article *Training plan for the staff of the commercial sub-directorate of SOSAPAMIM,* by Guerrero-Martínez, Adulfa, with adscription at Universidad Tecnológica de Izúcar de Matamoros, in the next article *Motivation in a competency-based group in a hybrid model of veterinary medicine teaching,* by Medina-Lerena, Miriam Susana, De la-Rosa-Arana, Jorge-Luis, Villanueva-Ochoa, Andrés and Núñez-Hernández, Alfonsina, with adscription in the Universidad de Guadalajara and Universidad Nacional Autónoma de México, in the next article, *Meaning of experiences during the holidays of residents of Cajeme* by Clark-Mendivil, Yessenia, Esparza-García, Irma Guadalupe and Espinoza-Castelo, Luz María with adscription in Instituto Tecnológico de Sonora and Universidad tecnológica de San Luis Río Colorado, in the next article, *Gender equity as a key factor in personal evolution and experiential learning* by Sánchez-Rivera, Lilia, Espericueta-Medina, Marta Nieves, Ramos-Jaubert, Rocio Isabel and Herrera- Zuñiga, Dulce Karina with adscription in In Universidad Autónoma de Coahuila, in the next article, *The Doubt as an ethical competence in the face of artificial intelligence: a documentary analysis of human skills and responsibility* by Cejas-Leyva, Luz María, Lazcano Franco, Maura Antonia, Fernández-Mojica, Leticia and Salas-Name, Sagrario Lizeth with adscription in Universidad Juárez del Estado de Durango, in the last article, *Sociocultural and Academic Factors Associated with Engineering Career Choice among Female University Students in Northern Mexico* by Escobar-Olguín, Héctor, Cárdenas-González, Víctor and Benitez-López, Guillermo with adscription in TecNM/ITS San Pedro, Universidad Autónoma de Nuevo León and TecNM/ITS of Naranjos

Content

ECORFAN Journal-Republic of El Salvador 11[19]1-7: e11119107
Article

Correlation between personal financial risk tolerance and financial literacy

Correlación entre la tolerancia personal al riesgo financiero y la educación financiera

Galaviz–Zamora, Marisol *[a], Murillo-Félix, Cecilia Aurora [b] and Galván-Corral, Alberto [c] and Amarillas-Ibarra, Priscilia Rossel [d]

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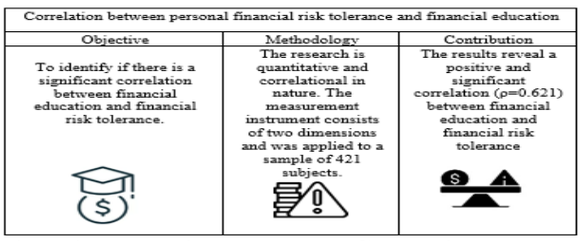
Abstract

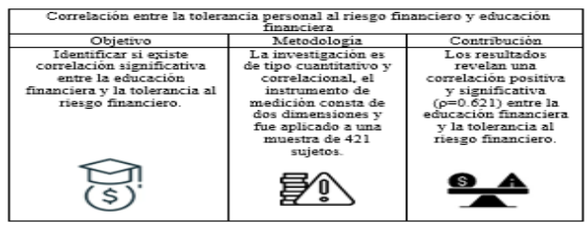
This study investigates the relationship between financial education and risk tolerance in 421 workers from southern Sonora, Mexico, using a quantitative, correlational approach. The results reveal a significant positive correlation [ρ=0.621] between both variables, indicating that individuals with greater financial knowledge tend to show a higher willingness to take investment risks. The sample, predominantly male and with high incomes, showed moderate to high levels in both financial education and risk tolerance. The study concludes that promoting financial education is key not only for managing personal finances but also for positively influencing investment behavior, providing relevant evidence for the Latin American context.



Financial Education, Tolerance, Correlation

Resumen

Este estudio investiga la relación entre la educación financiera y la tolerancia al riesgo en 421 trabajadores del sur de Sonora, México, mediante un enfoque cuantitativo y correlacional. Los resultados revelan una correlación positiva y significativa [ρ=0.621] entre ambas variables, indicando que individuos con mayor conocimiento financiero tienden a mostrar una mayor disposición para asumir riesgos de inversión. La muestra, mayoritariamente masculina y con ingresos elevados, presentó niveles moderados a altos tanto en educación financiera como en tolerancia al riesgo. El estudio concluye que fomentar la educación financiera es clave no solo para la gestión de finanzas personales, sino también para influir positivamente en el comportamiento de inversión, aportando evidencia relevante para el contexto latinoamericano.



Educación Financiera, Tolerancia, Correlación

Area: Advocacy and attention to national problems

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Introduction

Financial education has established itself as a determining factor in individuals' ability to properly manage their financial resources and make informed investment decisions.

According to the Organisation for Economic Co-operation and Development [OECD 2017], financial education is defined as a process that enables consumers or investors to increase their understanding of financial products, concepts and risks and, through impartial information, teaching or advice, to acquire the skills and confidence necessary to act as informed consumers and make responsible financial decisions.

Furthermore, Houston [2010] complements this idea by stating that financial education involves the management and understanding of finance-related issues, as well as the analysis of how financial skills and knowledge can change attitudes towards risk.

The importance of financial education lies in the fact that it provides people with the necessary foundations to make conscious decisions in their daily lives on monetary issues, as well as promoting habits such as saving, responsible consumption and economic planning from an early age [Higuera & Serrano 2009], who also mention that a better level of financial education encourages people to make more informed financial decisions.

Córdova & Martínez [2022] broaden the perspective on financial education by arguing that:

1. It optimises decision-making by deepening understanding of financial concepts.
2. It reduces over-indebtedness, avoiding mistakes due to lack of knowledge.
3. It benefits the national economy by increasing savings and investment in productive activities.
4. It drives innovation in the financial sector, as better-informed users demand more tailored services.

In a context where the promotion of financial education is becoming increasingly important, financial risk tolerance emerges as a critical factor that shapes economic behaviour and the willingness to take risks.

Financial risk tolerance is defined as a person's willingness and ability to cope with uncertainty and accept potential financial losses when making investment decisions [Grable & Lytton, 1999]. For their part, Weber, Blais, & Betz [2002] describe it as a person's level of psychological preparedness to be willing to accept the possibility of partial or total loss of their investment.

Several global studies have addressed the correlation between financial education and financial risk tolerance. In this context, Naiwen, Wenju, & Mohsin [2021] conducted an analysis in Punjab [Pakistan] to examine the impact of financial literacy and risk appetite on investment decisions.

Their findings revealed a positive association between the two variables, highlighting that individuals with greater financial skills tend to exhibit a greater willingness to take economic risks. This relationship suggests that households with a command of fundamental financial concepts have a more favourable attitude towards higher-risk investments.

In another relevant study, Mahat & Lau [2023] conducted research focused on examining the association between financial education and willingness to take financial risks. Their results showed that there is a moderate correlation between the two variables, reaching statistical significance only at the 10% level.

This finding suggests that, although there is a certain link between the two variables, the effect of financial education on risk tolerance is not decisive in all the contexts analysed.

A study by Hermansson & Jonsson [2020] revealed empirical evidence showing that both financial education and interest in economic issues are associated with a greater willingness to take financial risks. However, comparative analysis of the data showed that financial interest has a significantly stronger correlation with risk tolerance than the level of financial literacy.

These results suggest that, although both variables have a positive relationship with risk appetite, the intensity of this association is considerably greater in the case of financial interest than in that of formal financial education.

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Research on the relationship between financial literacy and risk appetite has developed significantly in the American context.

A relevant contribution in this field is the study by Crable & Rabbani [2023], conducted with the support of the University of Missouri.

Their findings demonstrate a statistically significant positive correlation between mastery of financial concepts and greater risk tolerance, particularly in individuals with higher levels of education. This evidence suggests that the effect of financial education on risk appetite is intensified when it coexists with more advanced academic training.

In Latin America, research on the relationship between these variables is more limited. However, data from the OECD [2013] reveal a significant association between the level of financial literacy and the responsible adoption of financial products, suggesting that this knowledge influences more informed risk management.

Methodology

This study employs a quantitative approach, based on the systematic collection and analysis of data. It is descriptive in nature, as it determines the level of financial education and risk tolerance in a sample of consumers and investors in southern Sonora, Mexico. It also adopts a correlational design, examining the possible statistical relationship between these two key variables.

It follows a non-experimental design, since the variables of interest, financial education and risk tolerance, will be observed in their natural context, without manipulation by the researcher. Likewise, the research adopts a cross-sectional approach, as data collection and variable analysis will be carried out at a single point in time [Asti Vera, 2015].

The questionnaire is organised into two main sections. The first section collects sociodemographic data from participants, including variables such as age, gender, and income level. The second section incorporates a standardised instrument developed and validated by Hernández, Topa & Herrador [2019], which assesses two key dimensions: 1] financial literacy and 2] financial risk tolerance.

The following table identifies the units of measurement for each of the variables, in order to ensure that the model is consistent with regard to the measurement elements.

Box 1

Table 1

Study Variables

Variable	Unit of measurement
Financial Education	Likert scale Items 1 to 4
Financial Risk Tolerance	Likert scale Items 5 to 8

Source: Own elaboration

The sample was determined for the convenience of the research. This is a type of sampling in which participants are selected for their accessibility and immediate availability, rather than for random or representative criteria of the population. The sample size was 421 subjects who are part of the economically active population of southern Sonora, Mexico.

Results

The first part of the results details an analysis of the 421 participants surveyed, detailing their gender, age, and weekly income level. Table 2 shows the data obtained for the gender variable: the majority of respondents are male [63.2%], while women represent 36.8%. With regard to age, most participants are in the 23 to 30 age range [54.2%], followed by the 31 to 40 age group [32.5%].

Participants under 22 and over 50 are a significant minority, with 0.7% and 2.6% respectively [see Table 3]. Finally, the income level variable shows the weekly income level, with the distribution concentrated in the highest income brackets. Just over half of respondents earn between $7,001 and $10,000 [51.3%] per week, and a considerably high percentage, 45.4%, earn more than $10,000 per week. Only a small fraction [0.7%] have incomes between £1,000 and £2,000 [see Table 4].

Box 2

Table 2

Gender	Frequency	Percentage
Feminine	155	36.8
Male	266	63.2
Total	421	100.0

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Box 3

Table 3

Age

	Frequency	Percentage
Under 22 years old	3	.7
23 to 30 years old	228	54.2
31 to 40 years old	137	32.5
41 to 50 years old	42	10.0
Over 50 years old	11	2.6
Total	421	100.0

Box 4

Tabla 4

Income level.

Income per week	Frequency	Percentage
De $1000 à $ 2000	3	.7
De 4001 à 7000	11	2.6
De 7001 à 10000	216	51.3
Plus de 10000	191	45.4
Total	421	100.0

The second part of the results presents descriptive statistics of the means for Financial Risk Tolerance and Financial Literacy for the 421 participants. In the financial risk tolerance dimension, the overall mean is 3.61, suggesting that respondents have a moderate to high willingness to take risks in their investments.

The item with the highest mean is 'I am willing to take substantial risks to obtain financial gains from investments' [Mean: 3.72], indicating a clear inclination to take significant risks for greater gains, while the item 'I am willing to put part of my savings into less secure investments that allow me to obtain greater gains' [Average: 3.50] has the lowest average response, although it is still relatively high, suggesting that the idea of investing in something 'less secure' could generate slight caution compared to the other statements [see Table 5].

Regarding the financial education dimension, the overall mean is 3.51, indicating that participants have a moderate to good level of financial knowledge. The item with the highest mean is 'I have concepts related to investments for savings' [Mean: 3.97], suggesting that participants have a good understanding of basic investment concepts, while the item with the lowest response average is 'I understand the difference between needs and wants when I spend money' [Average: 3.18], suggesting that, although there is a knowledge base, there could be room for improvement in the practical application of spending and consumption decision-making [See Table 6].

Box 5

Table 5

Descriptive statistics: Ascending averages Financial Risk Tolerance.

	N	Media
I am willing to put some of my savings into less secure investments that allow me to earn higher returns.	421	3.50
It is very important for me to have an interest guarantee and state insurance on my savings.	421	3.55
I am willing to lose some money on my investments if they ultimately outperform inflation over the long term.	421	3.67
I am willing to take substantial risks in order to obtain financial returns on investments.	421	3.72
N valid [per list]		
Media General		3.61

Source: Own elaboration

Box 6

Table 6

Descriptive statistics: Moving Averages Financial Education.

Ítem	N	Media
I understand the difference between needs and wants when I go to spend money	421	3.18
I know the key questions to ask when I buy	421	3.24
I understand the cost of buying on credit	421	3.66
I have concepts relating to savings investments [bonds, shares, treasury bills].	421	3.97
N valid [per list]		
Overall average		3.51

Source: Own elaboration

The final phase of the results presents the degree of correlation between the variables, a process that was based on:

1. The application of normality tests to assess the distribution of the data.

2. The selection of the appropriate statistical test based on the results obtained.

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Table 7 shows the results of two normality tests, Kolmogorov-Smirnov and Shapiro-Wilk, applied to two variables: Financial Risk Tolerance [FRT] and Financial Education [FE]. Since the significance values [p-values] for both tests [Kolmogorov-Smirnov and Shapiro-Wilk] are less than 0.05 for both variables [Financial Risk Tolerance and Financial Education], it is concluded that neither of the two variables follows a normal distribution, therefore, to establish the correlation between the variables non-parametric tests were applied.

Box 7

Table 7

Normality test.

Kolmogorov-Smirnov[a]			
	Statistician	gl	Sig.
TRF	.114	421	.000
EF	.103	421	.000
Shapiro-Wilk			
	Statistician	gl	Sig.
TRF	.945	421	.000
EF	.961	421	.000

Source: Own elaboration

The results of Spearman's Rho test correlation analysis reveal a significant positive relationship [of high magnitude] between the financial risk tolerance and financial literacy variables. This finding suggests that individuals with higher financial literacy skills tend to manifest a greater willingness to take risks in their investment decisions.

Box 8

Table 8

Spearman's Rho correlation test.

			TRF	EF
Rho de Spearman	TRF	Correlation coefficient	1.000	.621**
		Sig. [bilateral]	.	.000
		N	421	421
	EF	Correlation coefficient	.621**	1.000
		Sig. [bilateral]	.000	.
		N	421	421

Source: Own elaboration

Discussion

The results of this research show that there is a statistically significant positive relationship between financial literacy and financial risk tolerance among the working population of southern Sonora, Mexico.

This main finding indicates that people with a greater understanding of financial concepts tend to be more open to taking risks when investing. This conclusion coincides with the findings of various international studies.

Similar to the findings of Naiwen, Wenju, and Mohsin [2023] in Pakistan and Grable and Rabbani [2023] in the United States, our study supports the notion that better financial education is linked to greater acceptance of uncertainty in pursuit of potentially higher returns. The averages obtained for financial risk tolerance [3.61] and financial literacy [3.51] on a Likert scale suggest that the population analysed has a moderate-high level in both variables, which supports the idea that a solid financial foundation favours greater openness to risk.

Although studies such as that by Mahat and Lau [2023] found a less significant relationship, and Hermansson and Jonsson [2020] pointed out that 'financial interest' could have a greater influence than financial education, our results highlight a clear association between financial education and risk tolerance in Sonora.

The coefficient obtained [ρ=0.621] suggests that, in this context, mastery of financial concepts plays a key role in attitudes towards risk. This is reinforced by the observation that the item with the highest score in financial education ['I have knowledge about investment options for saving,' Mean: 3.97] coincides with a greater willingness to take risks for gains [Mean: 3.72], showing a consistent connection between knowledge and action.

However, these findings should be interpreted with caution due to certain limitations. The non-experimental and cross-sectional design of the study allows associations to be identified, but not causality to be determined. In other words, it cannot be assured that financial literacy causes greater risk tolerance; it could also be that people with a greater predisposition to risk seek more financial literacy, or that another unmeasured factor [such as personality, income, or socioeconomic context] influences both variables.

Conclusion

This study aimed to determine the relationship between financial education and financial risk tolerance in a sample of the economically active population in southern Sonora, Mexico.

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The main conclusion is that there is a positive and statistically significant correlation between the level of financial education and financial risk tolerance. Individuals who reported greater knowledge and understanding of financial concepts also showed a greater willingness to take risks in their investment decisions. This result confirms the central hypothesis of the research and is in line with the empirical evidence from multiple international studies, lending validity to the construct in the Mexican context.

The research contributes significantly to the field of study in Latin America, where the literature on this topic is still limited. The findings underscore the importance of promoting financial literacy not only to improve everyday decision-making and savings, but also to influence individuals' investment behaviour, which has direct implications for the development of capital markets and the national economy.

It is recommended that future research use probabilistic sampling to increase the representativeness of the results. In addition, it would be valuable to conduct longitudinal studies that can track individuals over time to analyse how changes in their financial education affect their risk tolerance, thus allowing causal relationships to be established with greater certainty.

Declarations

Conflict of interest

The authors declare that there are no conflicts of interest. They have no competing financial interests or known personal relationships that could have influenced their participation in this article.

Contribution of the authors

The contribution of each researcher to the different aspects developed in this research was defined as follows:

*Galaviz-Zamora, Marisol***:** Contributed the project idea, the research method, part of the data analysis and systematisation of the results, the conclusions, the recommendations and the writing of the article.

*Murillo-Félix, Cecilia Aurora***:** Drawn up the conclusions and recommendations, and assisted in the writing of the article.

Galvan-Corral, Alberto: Contributed to part of the data analysis and systematisation of the results, as well as assisting in the writing of the article.

Amarillas-Ibarra, Priscilia Rossel: Carried out the systematisation of the research background and assisted in the writing of the article.

Availability of data and materials

The data obtained in this research are available upon request to the corresponding author.

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Abbreviations

OECD	Organisation for Economic Co-operation and Development

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Antecedents

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Differences

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Discussions

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Article

Training plan for the staff of the commercial sub-directorate of SOSAPAMIM

Plan de formación para el personal de la Subdirección Comercial de SOSAPAMIM

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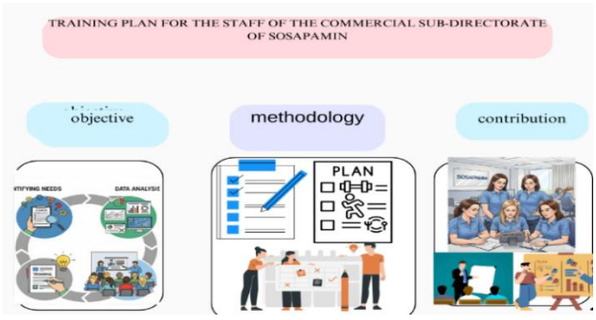
Abstract

A training plan for the staff of the Commercial Subdirectorate of the Drinking Water and Sewerage Services Operating System of the Municipality of Izúcar de Matamoros [SOSAPAMIM] is a key strategy designed to strengthen the skills of the team that has direct contact with users. The purpose is to improve efficiency in commercial management and raise the quality of customer service, as this department is the face of the organization in the community. A Training Needs Assessment was conducted through a survey, and a training plan was subsequently presented. The implementation of this training plan would result in tangible benefits for the organization, such as a decrease in the number of complaints, increased collection efficiency, a more motivated, competent, and professional work team, and a significant improvement in SOSAPAMIM's public image, consolidating it as an efficient and citizen-centered entity.



Diagnosis, Training, Implementation

Resumen

Un plan de capacitación para el personal de la Subdirección Comercial del Sistema Operador de los Servicios de Agua Potable y Alcantarillado del Municipio de Izúcar de Matamoros [SOSAPAMIM] es una estrategia clave diseñada para fortalecer las habilidades del equipo que tiene contacto directo con los usuarios. El propósito es mejorar la eficiencia en la gestión comercial, elevar la calidad del servicio al cliente, ya que este departamento es el rostro de la organización ante la comunidad. Se realizó un Diagnóstico de Necesidades de Capacitación a través de una encuesta, posterior se presenta un plan de capacitación, la implementación de este plan de capacitación resultaría un beneficio tangible para el organismo, disminución en el número de quejas, incremento en la eficiencia de la recaudación, equipo de trabajo más motivado, competente y profesional, mejora significativa en la imagen pública del SOSAPAMIM, consolidándolo como una entidad eficiente y centrada en el ciudadano

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Introduction

In today's globalized and competitive market, companies must begin to focus on strategies that ensure the quality of both the products they offer and the services they provide. Therefore, it is necessary to start working within the company, beginning with the employees who give the company its purpose.

It is of utmost importance to give workers access to the knowledge and tools necessary to improve their job performance, in addition to fostering their attitudes so that they carry out their work properly and thus enhance their competencies. When employees feel that their superiors care about their personal and professional growth, they put in greater effort to meet the company's objectives, which they consider important because they feel a part of it.

For this to happen, companies need to start with a Training Needs Assessment [TNA], as this provides the necessary information for an organization's managers to know the situation of their workers in relation to their positions. With this, they can make decisions regarding any lack of skills, attitudes, or knowledge that an employee has to perform their job correctly.
Once the assessment is finalized, a training plan is developed based on the detected needs, and finally, the required course or courses are delivered.

Understanding the importance of an assessment and training in the company, the application of this assessment has been considered of great importance in the Operating System of Water and Sewerage Services of the Municipality of Izúcar de Matamoros [SOSAPAMIM], which is dedicated to providing drinking water, drainage, sewerage, and sanitation services in the municipality.

1. Training Needs Assessment [TNA]

It is an evaluation that identifies the knowledge areas in which employees need to improve. It functions as a guide for acquiring more knowledge and improving in daily tasks. [rankmi, 2023]

The TNA focuses on identifying areas of opportunity and the individual's current skills, so that they can obtain the necessary training and improve their performance.

"It is a process through which companies can identify their team's areas of opportunity for knowledge and skill development. It allows for the evaluation of collaborators' training needs by identifying their current level of competence or knowledge and comparing it with the standard capacity required for their positions within the organization." [Training & Consulting, 2018]

Objectives of the TNA

In his book *Capacitación y Desarrollo de personal* [Training and Personnel Development], Jaime Grados indicates the following specific objectives that a training needs assessment aims to achieve: [Espinoza]

- "Determine the problematic situations of a company, classify the symptoms that appear, and investigate the causes that originated them.
- Gather the necessary information to specify the ideal situation in which the institution should operate [determine what should be done in the company].
- Determine the potential of human resources.
- Determine the situation in which the company and its collaborators actually perform their functions [determine what is actually done].
- Conduct a comparative analysis between what should be done or happen and what is actually done or happens, specifying the differences.
- Define and describe who needs training, in what areas, and when.
- Establish plans and programs to carry out the activities, according to the assigned priorities."

Types of Needs

According to [Espinoza] in his book *Capacitación y desarrollo de personal* [Training and Personnel Development], there are different types of needs:

"Overt Needs: These are those that indicate a problem whose cause is detected at a glance, for example:

- Newly hired personnel
- Fewer employees than required
- Workers about to retire
- When leaves or transfers occur
- For personnel promotion

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- Changes in work procedures, methods, administrative systems, policies, and rules

Covert Needs: These are those that indicate a problem whose cause is not detected at a glance, but rather requires a thorough analysis to find its origin, for example:

- **In productivity:** programs are not being met.
- **In the institution's organization:** total or partial absence of policies, unclear objectives, favoritism, lack of internal regulations, deficient activity programming, and poor or defective communication at some or all levels of the institution.
- **In behavior:** negative attitudes, excessive duplication of responsibilities, high levels of absenteeism and tardiness, and interpersonal problems."

All on-the-job training should cover three areas of development, as he assures.

Techniques for Developing a TNA

To understand the real situation of the organization, one investigates what it is and what is currently done in the organization. For this, some techniques are proposed that allow for the collection of data used to detect the required training needs, which, although not applicable in every context or to all workers, are adaptable: [Correa, 2018]

Observation: Observation takes place where the work is performed, and it is advisable to take written notes. Its execution requires that the worker does not feel uncomfortable with the analyst's presence, so that they perform their activities as naturally as possible.

This method allows for the collection of direct information but should not be used exclusively, as it is not sufficient, such as in cases where the worker performs periodic or occasional activities that are not carried out at the time of observation. It is necessary to observe all the operations the employee performs; it is advisable to chat with them informally, appearing friendly during the observation, so that our presence does not bother them.

Interview: This consists of obtaining information about the elements related to the job being analyzed, through verbal contact with the person performing the work, with their direct supervisors, or with both.

The objective is to obtain information that cannot be gathered through observation and to verify and complete the data collected via observation.

Survey: It is used to inventory operations, measure employee attitudes, or to foresee the effects of long-term plans. The survey can cover a section of the company or its entirety; it can be limited to one type of information or a combination of data. It is not conducted unless there is a real need, as it is a very costly method.

This technique is used to gather data from a considerable number of employees through a questionnaire, which must be designed to be understandable while allowing the desired data to be obtained. To obtain valid and reliable information, it is most advisable to use all the mentioned techniques.

Tools for Developing a TNA

The tools for comparing what is with what should be vary greatly from one organization to another. It is the trainer's responsibility to work with what the company has. Currently, companies have incorporated documented processes and procedures that are useful for ensuring the TNA is more accurate. However, not all companies have all the material, so other mechanisms must be used. [Gonzalez, 2016]

Complaints and Suggestions: Complaints are a constant source of knowledge about the problems that exist in the company. If a formal procedure for complaints and suggestions is established, personnel can express their concerns and dissatisfactions in writing regarding aspects of vision, policy administration, operational processes, etc. In this way, valuable information can be obtained that helps detect the needs of both the workers and the company. In some institutions, it is customary to place a complaints and suggestions box in strategic places, such as hallways or break rooms, where personnel can use cards.

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Job Analysis: This is the procedure that studies the job position through the direct activities of the worker, to reflect what they do, how they do it, what requirements the job execution demands, and the conditions under which it is performed.

Job analysis is the technique that helps achieve these objectives by determining the elements that make up the position. It is an investigation aimed at knowing and defining its content and requirements; the fundamental part is the separation and ordering of the elements that compose a job.

Performance Evaluation: This consists of comparing a person's performance against the standards established for their position; it makes it possible to know the areas in which training is needed to increase the employee's performance level.

Questionnaire: This is a printed form containing a list of specific questions aimed at gathering information on knowledge, skills, and opinions about aspects of the work performed by the person or the company.

Job Description: This is a document that defines the objectives and functions that constitute and differentiate a position from others in the organization. It specifies what the person occupying the position must do, as well as the frequency with which they do it, how they do it, and why they do it.

Job Profile: This establishes the personality characteristics, job competencies, experience, and training that the person must have.

Inventory of Needs: This is an assessment based on timely information, which must be grouped systematically, while other information is available from line manager

Skills inventory: It is a system that identifies skills to determine processes and performance standards.

Human resources inventory: It constitutes a constant source of information about problems that exist among the company's personnel.

Customer satisfaction survey: It is a tool that measures a consumer's level of satisfaction with a company's products, services, and experience.

2. TRAINING

Training is a topic that many companies talk about today with the goal of becoming more productive and efficient. Therefore, some definitions from authors on the topic of training are presented here:

Training:

"An action aimed at increasing the skills and knowledge of a worker for the purpose of preparing them to efficiently perform a specific and impersonal work unit." [Espinoza]

[Chiavenato, 2007] defines it as: "Training is the short-term educational process, applied systematically and in an organized manner, through which people acquire knowledge, develop skills, and competencies based on defined objectives."

[Keith, 2008] states: "Training is the development of technical, operational, and administrative skills for all levels of personnel."

Objective of Training

According to [Chiavenato, 2007], the main objectives that training should focus on are the following:

- Prepare people for the immediate performance of various job tasks.
- Provide opportunities for continuous personal development not only in their current positions but also for more complex and advanced roles.
- Change people's attitudes, either to create a more satisfactory climate among them or to increase their motivation and make them more receptive to new management trends.

Importance

Training offers multiple benefits and is the ideal opportunity for the workers who make up an organization to continue expanding their knowledge.

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Training activities, in any of their versions, allow people to update their knowledge and acquire new skills, strengthen their ability to respond to changes in the environment or their job requirements, increase their performance within the institution, and be better prepared for daily life.

This will give them greater personal confidence to develop other attitudes and aptitudes.

Job training seeks to ensure that tasks are performed with quality, productivity, stability, permanence, and in a good work environment. Training has the duality of being both a right and an obligation: it offers development and demands commitment; it allows people to stay up-to-date and requires time and space from those who receive it to learn new realities. [Trabajo, 2018]

Areas of Development

All on-the-job training must cover three areas of development, as stated by [Espinoza]:

"Cognitive Area: This includes intellectual processes that influence the performance of tasks, such as attention, memory, analysis, abstraction, and reflection. This area promotes a critical understanding of the surrounding world, the information, and the organized relationships that a person must master. When training courses are given, we modify the cognitive area, and this translates into knowledge.

Psychomotor Area: This is the mastery of specific skills, habits, and mental, verbal, and movement dexterity that people must acquire and develop. When training courses are given, we modify the psychomotor area, and this translates into an increase in their skills.

Affective Area: This constitutes a set of individual attitudes, values, and opinions that generate tendencies to act for or against people, facts, and structures; of course, these tendencies intervene in work performance. When development courses are given, we modify the affective area, and this translates into changes in attitude."

Types of Training

Currently, there are different types of training depending on the objective of the organization. [Cofide, 2020]

On-the-Job Training

This is the most well-known type of training. It is responsible for improving and developing the skills and capabilities of workers through courses or training programs. It focuses on instructing workers so they can perform a specific task, which will help them grow personally and professionally and allow them to achieve their own goals and those of the company.

It is usually given to people who are new to a company so they can learn how the company works and the processes that are carried out daily. The main objective is for new workers to have a clear vision of their future activities so they can perform their role efficiently.

In-House Training

This training seeks the comprehensive growth of each worker, taking into account their aptitudes and abilities through different activities.

It aims to make the training process dynamic and not opt for methodical and boring ones, as these often do not yield good results and only end up wasting money. The important thing here is for workers to understand why they need to be trained and to realize that what they are learning is linked to their area of work.

Experiential Training

This allows workers to feel, see, understand, and learn in a non-traditional way, as it goes beyond what is rational or academically intuited.

Through experience and lived practice, it is possible for work teams to deeply understand what true teamwork means and strengthen values such as leadership, commitment, and empathy, among others.

Formal Training

This type of training has a duration that varies; it can be hours or even months. It can be provided through courses, seminars, workshops, and more.

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The goal is to acquire the skills and knowledge needed to apply them for the benefit of both the individual and the company.

Training Process

For training to be provided, it must stem from a need, a deficiency, or a desire for improvement. The important thing is that there is a reason for the training, but this is not easily detected.

It is necessary to conduct a study or an investigation to fully understand the problem and design the ideal training program.

According to the corresponding process, the phases for properly implementing a training program are detailed below [GRADOS J. A., THE TRAINING PROCESS].

3. Planning

Planning determines what to do and consists of three main elements: training needs analysis [TNA], setting objectives, and establishing plans and programs.

The **TNA** identifies areas of inefficiency that can be corrected through training, determines who the training is for, and in what order it will be given. The objectives serve to select problems and must be detected in a way that is feasible and quantifiable.

This phase also sets the controls the training program should have to ensure it is carried out as planned. In the **plans and programs**, training priorities are established, along with the thematic content of each course, materials, instructors, and the budget, which is usually prepared annually.

Organization

While planning answers the question "what to do," organization implements "how to do it." This involves arranging the technological, human, and physical elements for its execution.

The organization is structured with the following elements:

Structures and systems: A good training requires physical spaces, organizational dependency, authority, responsibility, and a delimited formal scope within the company's official structure.

Integration of people: Like all company functions, managing training requires prepared people, as well as instructors who will lead the courses defined in the plan or program.

Integration of material resources: To run the scheduled courses, you need classrooms, tables, chairs, projectors, whiteboards, instruction manuals, and various physical and instructional resources for their execution.

Training of internal instructors: The preparation of internal instructors, both skilled and specialized, is perhaps the fundamental point for conducting training that meets specific needs and for saving resources by using staff as needed.

Execution

Execution is the implementation of the plan; it is the action itself, the realization, and the phase where the established plans are carried out.

Instructional materials and support: Courses require manuals, instructional guides, and visual and filmic teaching materials, as well as other supports that must be scheduled and provided at the appropriate time.

Contracting services: Even if the plan is largely carried out with internal resources, various external services are needed, sometimes for instruction and almost always for film and teaching materials.

Course coordination: This includes everything from prior work agreements with the instructor, scheduling, invitations, and group confirmation, to services like classroom setup, materials, diplomas, etc. In general, all supervision and assistance activities before, during, and after the course.

Evaluation and Follow-up

Evaluation is the verification or confirmation of what has been achieved compared to what was planned. It is used to take corrective measures.

Follow-up is the evaluation of the activities that participants perform once their training is complete. It translates to observing the transfer of training to the job, and the review and overcoming of obstacles to applying the new skills, knowledge, and aptitudes acquired in a course.

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4. TRAINING PLAN

Once the main topics for immediate attention were decided, work began on a training plan to deliver the course as soon as possible, in accordance with the timelines stipulated for this project.

What Is a Training Plan?

According to [Chiavenato, n.d.], a training plan is "a short-term process applied systematically and in an organized manner, through which people acquire knowledge, aptitudes, and skills based on defined objectives." A training plan is made up of a series of actions designed as a complete training itinerary, with the objective of providing guidance and training to improve your employability. [Training plan, n.d.]

Training plans are a way to improve the skills of team members.

5. Legal Framework for Training in Mexico

Political Constitution of the United Mexican

States, Article 123. Every person has the right to dignified and socially useful work. To this end, the creation of jobs and the social organization of work will be promoted, in accordance with the law.

Federal Labor Law

Article 25. The document containing the working conditions must include:

VIII. An indication that the worker will be trained or instructed in accordance with the plans and programs established or to be established in the company, as provided by law.

Chapter III BIS

On the Productivity, Training, and Instruction of Workers

Article 153 of the Federal Labor Law:

Training and Instruction

Article 153 establishes the obligation of employers to provide their workers with training or instruction to raise their standard of living, their labor competence, and their productivity.

Sections of Article 153

A. Employers are obligated to provide all their workers, and workers have the right to receive, training or instruction in their jobs.

B. Training must be provided through plans and programs that must be current and authorized by the Secretariat of Labor and Social Welfare [STPS].

C. Companies must form Joint Training and Instruction Commissions, made up of an equal number of representatives from the workers and the employer.

D. The objective of training is for the worker to acquire and improve their knowledge to increase their productivity and safety at work, as well as to access better job opportunities.

E. Training and instruction seek to update and perfect workers' knowledge, prevent workplace risks, improve their skills, and in general, raise their quality of life and productivity.

F. Training programs can be taught by the employer themselves, by institutions, schools, specialized organizations, or by workers who have the necessary experience.

G. Workers have the right to receive training and are obligated to attend the courses punctually and to obey the instructors' instructions.

H. Training must be provided during working hours, unless a different schedule is established by mutual agreement.

I. Workers who do not attend or comply with training without a justified cause may be subject to corresponding penalties by the employer, according to what is established in the internal work regulations.

J. The effects of a lack of training are established, as well as the right of workers to have their skills evaluated and, where appropriate, certified.

K. The accreditation of the knowledge and skills acquired by workers is of great importance for the employer and for the worker's professional development.

L. Failure to comply with training obligations can result in sanctions for the employer, in accordance with what is established by law.

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M. The Secretariat of Labor and Social Welfare [STPS] is the authority responsible for monitoring compliance with this obligation and for penalizing employers who do not comply.

N. Employers are obligated to issue certificates of labor competence or skills to those who pass the training.

O. Training must be free for the worker, and in no case can it involve a cost or a reduction in their salary.

P. Training is an employer's obligation and an inalienable right of the worker.

Q. The joint training commissions are responsible for creating the annual training program.

R. The commissions' functions are: to prepare the diagnosis of training needs, to prepare the annual program, and to monitor its compliance.

S. Training plans and programs must be aimed at improving worker performance and company productivity.

T. Training plans must be registered with the Secretariat of Labor and Social Welfare.

U. The STPS and local labor authorities have the power to supervise and monitor compliance with the provisions of this article.

V. Employers must keep a record of their workers' skills certificates.

6. Methodology

This research is of an exploratory quantitative type. It creates a theoretical and practical framework that seeks to identify areas for improvement and then work on possible solutions. In this case, the goal is to understand the training needs of the staff in the Commercial Sub-directorate of SOSAPAMIM to develop a training plan that strengthens the knowledge, skills, and aptitudes of the employees.

An instrument [TND] was applied to understand the employees' opinions regarding the areas for improvement they believe need to be strengthened to enhance their performance.

The study population consists of the workers in the Commercial Sub-directorate of the Potable Water and Sewerage Services Operating System of the Municipality of Izúcar de Matamoros, which includes a total of 5 employees responsible for customer service.

It is worth noting that in this case, the population used were all women.

An important point to consider about the application of this instrument is that the employees' perception may vary due to their different positions: commercial sub-director, customer service representative, and cashiers.

The instrument was administered at the SOSAPAMIM facilities and given to the employees to analyze at their leisure.

In the same way, a customer satisfaction survey was conducted to determine the level of satisfaction with the services provided and their perspective on what the system is lacking. The sample used consisted of 25 users from the cashier area and 25 users from the customer service area.

The perception may vary as the survey was applied to users of different ages, including: senior citizens, young people between 20 and 30 years old, and adults between 30 and 50 years old. The survey was conducted at the organization's facilities.

7. Objectives

General Objective

To identify the training needs of the staff in the Commercial Sub-directorate of SOSAPAMIM.

Specific Objectives

- To design and apply the tool to gather information on the training needs of the staff.
- To elaborate the training plan.

8. Training Needs Diagnosis [TND]

The instrument used to conduct the training needs diagnosis was chosen for the primary reason of understanding the needs of the staff in the commercial department.

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The instrument consists of a total of **6 questions**, mostly open-ended. It includes personal data such as how many years they have been working and their current position. It also asks about their main activities, their perceived weaknesses, topics they feel need to be reinforced both personally and for the organization, and what topics they would like to be trained on, among other things. Furthermore, these questions give them the opportunity to classify their perceived skill level as **advanced**, **medium**, or **low**.

Survey

To understand and compare the perceptions of both service users and employees, a customer satisfaction survey was designed. This survey was administered to users to get their feedback on the service they receive from the staff.

The survey consists of **5 closed-ended questions** and **one open-ended question** for users to provide comments or suggestions.

Likert Scale

To better understand the instrument, the Likert scale was used, as it is one of the most common and easy-to-understand measurement scales.

This scale was managed in the following way:

9. Results

Derived from the diagnostic tool, which included open-ended questions aimed at understanding what internal clients [employees] feel they need to perform their activities efficiently, we decided on a format that would allow the surveyed population to freely express their opinions on both personal needs and those of the department or organization as a whole.

After applying the tool, and to analyze the results, we found that because the questions were open-ended, it was not possible to create graphs. The responses were too varied.

Therefore, we created a table to accurately transcribe the information obtained. This table includes all the questions asked, followed by the responses from the 5 surveyed employees. This approach allows us to analyze the data by observing which situations or responses are most frequent or where opinions are shared.

Below is the table containing the responses from the employees in the SOSAPAMIM commercial department

Box 1

Table 1

Responses from the employees

Questions	Obtained answers				
	worker 1	worker 2	worker 3	worker 4	worker 5
Describe the main tasks you perform in your job	Question for activity knowledge				
Indicate the main weaknesses in terms of knowledge, skills, and abilities that you consider you have for better performance in each of your tasks.	Normas y leyes Rules and laws	Lack of coordination and communication with the operational area	Expression and acting	Quality of work	Assertiveness in communication
	Commercial System Domain (SISCOM)		Patience	Initiative	Empathy
				Flexibility	Responsibility
	Finance formats		Communication	Dedication	Honesty
				Planning and organization	Courtesy
Indicate other skills, knowledge, abilities or attitudes that, if acquired or deepened, would help you improve the quality, speed and accuracy of your work.	Platform proficiency	Mastery of the new system, which tracks payments, agreements, and user work.	Dialogue and cordiality	Teamwork	Efficiency
				Technical Skills	Interest
	Correct way to make a payment agreement		Speed	Managing Pressure and Stress	Courtesy
				Communication	Effectiveness
	Empathy with the user		Empathy	System Knowledge	Understanding
If there is the possibility of more specific training, indicate which topics you are interested in developing to strengthen your own skills.	Time management	Recovery of overdue portfolio	Customer Service,	Learn about the new system changes	Teamwork
	Customer support		Expression and how to provide solutions		There is no communication
	Office suite management		Time management to avoid making users wait		
Indicate in which topics you consider that training within the company should be strengthened.	Customer Service	Coordination between areas	Customer service for the entire organization	Teamwork	Teamwork
	Management TIC'S	There is no communication	User satisfaction		
			Service quality		
Please provide any comments you consider appropriate regarding training gaps that you believe exist in your area or company.	Improve friendliness and wait times	Unanswered	Teamwork	Unanswered	Unanswered
			Knowledge of tools to develop skills		

Analysis of the Training Needs Diagnosis [TND]

The table above shows the results from the instrument applied to the employees of the SOSAPAMIM commercial department. We can highlight the following key points:

- The staff who participated in the diagnosis are all women and all have direct contact with the user.
- The staff has been working in their positions for 1, 3, 5, and 17 years.

From the responses, we have identified the main problem areas [areas for improvement] according to the commercial department employees:

Waiting times: Users wait too long to be served.

Lack of customer service [for the user].

Difficulties with using the new system.

Lack of communication between different areas of the system.

Lack of skills in handling platforms and Office suite

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Lack of stress tolerance

Lack of social skills [empathy, initiative, tolerance, respect, friendliness, negotiation or conflict resolution, expression, etc.].

Lack of teamwork

Based on the problems [areas for improvement] identified above, a list of courses is suggested as a proposed solution to the detected needs:

- **Time management** course.
- **Customer service** course.
- **Effective communication** course.
- **Computer or Office suite** courses [must be taught by trained personnel in the field].
- **Stress management and working under pressure** course.
- **Social skills** course.
- **Conflict management and negotiation techniques** course.
- **Teamwork** course.

Based on the information above, we can clearly see the areas for improvement within the department, according to the opinions and needs expressed by the internal clients [employees].

The suggested courses are directly related to the detected areas for improvement, such as user attention, time management, teamwork, and social skills, among others.

Box 2

Table 2

Training plan

TRAINING PLAN FOR SOSAPAMIM			
Prepared by:		Position:	
Approved by:	Eng. Gabriela Hernández Martínez	Position:	General Director

Need:	Improve customer service and strengthen teamwork within the commercial area.
Objetive:	Train the personnel of the commercial area according to the areas of opportunity detected.

Courses	Objective:	Date and Time	Course Description	Trainer
1. Time Management and Productivity	Provide participants with the necessary tools and strategies to optimize their time, improve productivity, and achieve their goals more efficiently, both professionally and personally	To the organization's planning, proposed date of the training plan 2026	Modules: 1. Fundamentals of Time Management 2. Strategic Planning and Prioritization 3. Advanced Productivity Techniques 4. Digital Tools and Optimization 5. Handling Interruptions and Delegation 6. Well-being and Sustainable Habits	According to the instructor catalog and instructor profiles, the final decision rests with SOSAPAMIM
2.Customer Service	Provide participants with the necessary tools and strategies to optimize their time, improve productivity, and achieve their goals more efficiently, both professionally and personally		1. Fundamentals of Customer Service 2. Effective Communication with the Client 3. Handling Difficult Situations and Complaints 4. Service Across Multiple Channels 5. Customer Loyalty and Retention 6. Personal Care for Service Agents	
3.Effective Communication	Develop and improve participants' communication skills, both interpersonally and in professional environments. The goal is to enhance clarity, assertiveness, and empathy to foster more productive relationships and better understanding		1. Fundamentals of Communication 2. Verbal Communication and Active Listening 3. Nonverbal Communication and Empathy 4. Assertive Communication and Conflict Management 5. Communication in Professional Settings 6. Personal Improvement Plan in Communication	
4. Stress Management and Working Under Pressure	Equip participants with the necessary tools and strategies to identify, manage, and prevent stress. Focuses on building resilience and maintaining productivity and well-being, even in high-demand situations.		1. Understanding Stress and Pressure 2. Stress Management Techniques 3. Time Management as an Anti-Stress Strategy 4. Communication and Interpersonal Relationships 5. Resilience and Personal Care 6. Personal Action Plan	
5.Computing and Microsoft Office Package	Provide workers with essential skills for using computers and common office tools such as Word, Excel, and PowerPoint. The goal is to increase efficiency, productivity, and safety in the workplace.		1. Fundamentals of Computing 2. Microsoft Word (Word Processor) 3. Microsoft Excel (Spreadsheet) 4. Microsoft PowerPoint (Presentations) 5. Collaboration and Productivity	

Conclusions

This thesis was conducted with the purpose of providing knowledge and support for an important aspect of the organization. In this case, the **Potable Water and Sewerage Services Operating System of the Municipality of Izúcar de Matamoros [SOSAPAMIM]** was interested in understanding the areas for improvement among the employees of its commercial department, in order to address them.

Therefore, this entire project was carried out, covering everything from the **Training Needs Diagnosis** to the delivery of the training course. We can conclude that the general and specific objectives have been satisfactorily met, as all planned activities were completed.

Based on the results, we can see that the **Potable Water and Sewerage Services Operating System** has been proactive in improving the areas of opportunity that were detected. It is recommended that they continue to address the remaining areas to keep improving service for users and, of course, to provide growth opportunities for employees, supporting them not only in their professional lives but also in their personal and daily lives.

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Article

Motivation in a competency-based group in a hybrid model of veterinary medicine teaching

La motivación en un grupo por competencia en el modelo híbrido de la enseñanza de medicina veterinaria

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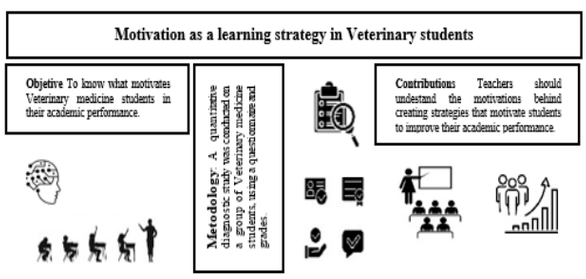
Abstract

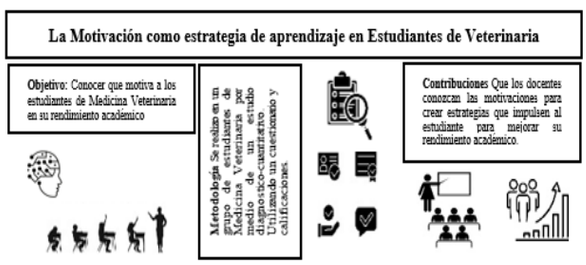
Motivation as a teaching strategy motivates students to achieve their academic goals. The objective was to determine what motivates students to achieve academic performance during the Veterinary Medicine course. A diagnostic-quantitative study was conducted with a first-semester MSBA I group using a questionnaire. The questionnaire included compliance with a values regulation and its relationship to academic performance with final grades. Among the intrinsic and extrinsic motivations found were teachers, family members, good grades, professional training, personal interests, work, professional success, and success in life. The study showed that there is a relationship between men and women in academic performance, but it is not associated with the regulations. It is concluded that there is greater intrinsic motivation, with men obtaining better grades. Teachers should implement extrinsic motivations as strategies to improve academic performance with resources, activities, and interesting didactic tasks.



Motivation, Students, Strategies, Values

Resumen

La motivación como estrategia didáctica incentiva al estudiante a alcanzar sus propósitos académicos. El objetivo fue conocer que motiva a los estudiantes a tener un rendimiento académico durante el curso de Medicina Veterinaria. Se realizó un estudio tipo diagnóstico-cuantitativo a un grupo de primer semestre de MSBA I por medio de un cuestionario. Se incluyó el cumplimiento de un reglamento de valores y si tiene relación al desempeño académico con las calificaciones finales. Entre las motivaciones intrínsecas y extrínseca encontradas: profesores, familiares, buenas notas, formación profesional, intereses personales, trabajar, éxito profesional y triunfar en la vida. El estudio mostro que entre hombres y mujeres existe relación en el rendimiento académico, pero no está asociado al reglamento. Se concluye que existe una mayor motivación de manera intrínseca, los hombres obtuvieron mejores calificaciones. Implementar motivaciones extrínsecas por docentes como estrategias para mejorar el rendimiento académico con recursos, actividades, tareas didácticas e interesantes.



Motivación, estudiantes, rendimiento académico.

Area: Dissemination and universal access to science

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Introduction

In recent years, there has been a significant social change that directly affects education. This change has transformed the way teachers work, forcing them to take greater responsibility for the failures of the education system and, in particular, for student learning [Martínez-Luque et al., 2017].

In the field of education, motivation refers to each student's willingness to learn. In theory, a motivated student will achieve more satisfactory academic results, demonstrating high-quality professional performance in the construction of knowledge [Briceño, 2020].

On the other hand, motivation as a teaching strategy stems from various learning models, the aim of which is to encourage students to achieve their academic goals with the least possible effort. This teaching strategy focuses on eliminating mechanical and traditional teaching methods and transforming them into motivational skills that encourage students to seek new knowledge [Vargas, 2021].

From the teacher's point of view, there are many possibilities for motivating students, which does not imply lowering the level of teaching, but rather entertaining and interesting the student in order to keep them motivated and fulfil the objective of teaching meaningful knowledge. There are three factors at the classroom level that can be used as motivational guidelines: the structure of the task, the reward mechanism, and the way authority is exercised [Polanco, 2005].

Lack of motivation is one of the important causes that must be assessed in student failure, especially when interest in the subject is lost and, on the other hand, because of hybrid models, which often result in distance and poor participation when teaching an online class.

It can often be observed that the teacher-student relationship in the university context is generally distant, and the impersonality that is conceived does not allow attention to be focused on the learner, but rather university education tends to identify the fundamental point of learning in the system, between the teacher and the content [Polanco, 2005].

Motivational factors in students play a significant role in the control, organisation, and direction of behaviour in meaningful learning, as they contribute to developing their abilities, overcoming their limitations, and attending to their interests. On the other hand, demotivation towards learning activities tends to become a commitment and obligation rather than a motivation [Briceño, 2020].

The results derived from activities, tasks, and fieldwork are part of a performance-based grade; in other words, they are the reward for constant and remunerated work, adding to the contribution of cooperation and teamwork used in the teaching of university students. Teamwork should be carried out with the aim that each member researches, discusses, comments and finally delivers the best results in a well-structured, high-quality piece of work, which produces greater satisfaction in terms of student motivation and is reflected in a reward that contributes to greater emotional stability in students [Polanco, 2005].

The way in which teaching is organised in the classroom and the attitude of the teacher will be decisive in developing student motivation and achieving the greatest effectiveness in the learning objectives set, together with the assessment methods and teaching materials, as well as the time devoted by teachers to preparing their classes [Briceño, 2020].

Prior and new knowledge contribute to achieving what is known as ‘meaningful learning.’ Therefore, teachers must get to know their students and understand their interests, needs, and prior knowledge, building on what is already known to provoke meaningful learning that will endure in students, encouraging them to continue striving and improving their academic performance.

The teaching materials used by the teacher should be explanatory, moving from the simple to the complex, from the broadest to the most specific, from the general to the particular, until knowledge is achieved.

Knowing and identifying what motivates students in their daily work through individual assessment will make it possible to identify their motivation to learn, through which they approach new knowledge.

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The aim is to find new and better motivation strategies so that students can acquire knowledge and at the same time be part of the improvement of the teaching-learning process in the course taught for the Animal Health and Welfare Management competence of the Bachelor's Degree in Veterinary Medicine and Animal Husbandry in the new hybrid system plan.

The objective of the study was to identify and analyse the types of intrinsic and extrinsic motivation and whether compliance with a set of values is related to academic performance in a group divided into two subgroups of male and female first-semester veterinary medicine students in the Animal Health and Welfare Management I course in a hybrid model.

Materials and methods

This study was conducted with a group of students enrolled in the Bachelor's Degree in Veterinary Medicine and Animal Science at the University Centre for Biological and Agricultural Sciences [CUCBA] of the University of Guadalajara [UDG]. The group was made up of a population of men and women between the ages of 18 and 23 who were enrolled and active in the Animal Health and Welfare Management I [MSBA I] course.

There was a population of 43 students enrolled in the Veterinary Medicine course during the B cycle. A diagnostic-quantitative study was conducted to determine how each student is motivated. In addition to finding out whether academic performance is related to the values of the MSBA I group regulations.

To obtain the information, a questionnaire was administered in the first class to find out how the students in particular were motivated to study. They were also asked to mention what study strategies they used in order to learn and motivate themselves. From the first day, a set of values was implemented to grade every day of class. On the other hand, academic performance was collected from the final grades of the competency subunits, which were evaluated individually at the end of the school year.

These are divided into four grades, which are listed below:

T1= Individual activities and tasks
T2= Team activities
T3= In-person field practice
T4= Departmental exam evaluation

The treatments are weighted from 0 to 100 points and are graded individually and as a team using the following rubric:

T1 = Individual platform
T2 = Team integration project
T3 = Visit to the practice site with individual final assessment
T4=Departmental examination prepared and administered by the Academy of Epidemiology and Zoonoses to which the MSBA I Competition belongs

For the results of each of the subunits of the competition, a data analysis was performed using ANOVA in Excel® to compare the treatments of the group and to average and find significant differences in the evaluations obtained from the study group. Each of the competency subunits of the Animal Health and Welfare Management I course was evaluated. To comply with regulations and grading, the chi-square test was applied to see if there were any differences between treatments.

The questionnaire data was sent to the academic mailbox so that the information could be entered into the EPI info® programme. The results sought were the types of student motivation that could be associated with increasing their academic performance at university, both intrinsic and extrinsic.

Results

The study obtained results from 43 questionnaires completed by all active students of Animal Health and Welfare Management I. Men and women with an average age of 19 years.

Box 1

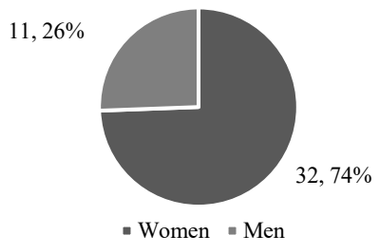

Figure 1
MSBA I group used in the research
Source: Own

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The group results were averaged independently divided between males and females. The group average was obtained for each learning sub-unit as shown in the following table.

Box 2

Table 1

Academic performance averages of Veterinary Medicine students in the MSBA I Competition.

Group	Sex	T1	T4	T3	T4
MSBA* I	Men n=11	91	91	96	89
	Women n=32	84	85	89	78

*MSBA= Animal Health and Welfare Management
T1= Individual activities and tasks, T2= Team activities and tasks, T3= Field practicals and T4= Departmental evaluation.

Source: Own

The results show that there are differences between the averages [P≤0.05]. The best average was achieved by T3, considered the highest average, while T4 was the worst of the treatments. Meanwhile, men obtained better averages in academic performance.

The results revealed that the best treatment was field practice. The questionnaire mentioned that going out into the field to practise and carry out activities is much more beneficial than just receiving theory and assignments in the classroom. This is because students improve their skills and abilities acquired in the field. On the other hand, they mention that by working with animals, they can learn about the risks that a veterinary surgeon might face in the field and would know in advance when they do so as a professional in the future. The results show that in the subgroup of men, the majority of students perform well.

Box 3

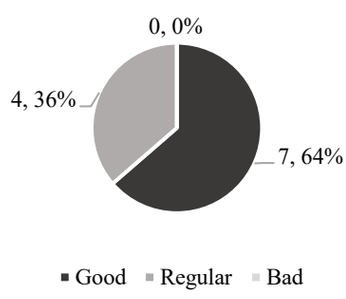

Figure 2

Academic performance of MSBA I males used in the research

Within the female subgroup there is a high percentage of students with a fair academic performance.

Box 3

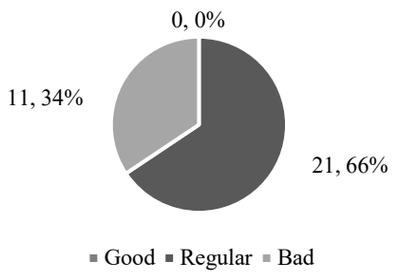

Figure 3

Academic performance of MSBA I women used in the research

There are differences among the MSBA I group, as non-performance is associated with non-compliant females in this group. Therefore, compliance is a distractor variable that does not affect students' performance.

Box 5

Figure 4

Compliance with regulations vs. academic performance of the MSBA I group used in the research

Source: Own

Extrinsic and intrinsic motivational factors were found to motivate students in their academic performance. One of the extrinsic motivational factors mentioned was the teacher's role in introducing them to different species, working with them when visiting new places, and allowing them to do practical work related to the topics covered in previous classes at the Livestock Production Units. They also expressed that there are motivational factors, among the most important ones found in students are learning, being valued by their teachers, parents or peers, obtaining various types of rewards, achieving success and avoiding failure.

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It was found that 100% of the students are positive about being motivated in their learning because it makes them feel better. The students mention that part of their extrinsic motivation comes from their teachers and, to a greater extent, from their parents or guardians, including their immediate family members. Among the things that motivate them, 90% mention that getting good grades and receiving rewards, as well as reaffirming their knowledge, is a good way to motivate themselves to achieve a good grade point average and graduate. Five per cent mention that their greatest motivation is to have their own veterinary hospital and/or clinic and to make their teachers and parents proud.

Meanwhile, 3% are motivated to study in order to be recognized as a good veterinary surgeon and to avoid failure. The remaining 2% mention that their motivation is to be able to do a master's degree and a doctorate that will help them achieve success. Meanwhile, 1% mention being able to go and work in another country, valued and motivated by their parents.

Therefore, there are factors When asked about how they perceived the activities of other competencies, 90% mentioned that sometimes they did not understand the teacher's explanations, that the methodology was inadequate and there were too many activities, and that a poor relationship with the class group also influences demotivation. 8% mentioned that teamwork is demotivating when teammates do not want to work, and the remaining 2% mentioned that the lack of practical work in other subjects makes the topics boring as they are only receiving theory in class.

It is important to mention that most students mention that having a teacher who motivates them creates a good student-teacher relationship, that they feel confident in criticizing the classes they receive inside and outside the classroom, thus making learning more exciting.

The results revealed that there are numerous factors that motivate students, one of the main ones being a good relationship between students and teachers, which builds trust and motivates them to continue learning in a disciplined, organized and responsible manner, where all the elements of the skill are present to learn meaningful knowledge and thus obtain better grades.

On the other hand, the data reveal that 30% of students compete with their peers to get good grades. It was found that students set specific goals when acquiring knowledge based on the programs they will see in each subject, which ensures that they can meet the expectations they have before starting any course. It was found that 10% claim that a grade does not reflect the percentage of knowledge that has been acquired.

Ninety-eight per cent stated that understanding most of the topics in class is more satisfying and motivates them to continue learning outside of class with the help of readings and activities related to the assigned topic.

Meanwhile, the remaining 2% stated that it is better to clarify any doubts that arise during the theoretical class and not do homework, as work or family issues prevent them from managing their time as they would like. The majority agree that the materials and activities should be well designed and easy to understand, as in other competitions the materials are often obsolete and boring. It is therefore a good option to continue improving the design of the activities so that students continue to learn in the best possible way in order to have better professionals in the field of veterinary medicine.

Discussion

The results obtained in this research agree with Moreno [2021], who found that academic motivation is conceptualised as the process by which a student uses different cognitive, affective, volitional, and behavioural resources that lead them to achieve an academic goal. The study identified factors that influence academic motivation, which can be classified into personal factors and environmental factors, as was the case in the study conducted on MSBA I students [Moreno, 2021].

Motivational factors play an important role in organising and directing positive student behaviour in the learning process, as motivation contributes to developing their abilities, overcoming their limitations and addressing their interests. The essential task of the teacher is to keep the student motivated so that they carry out tasks for their own satisfaction rather than for a grade, that is, they do their tasks because they are interested in them [Sellan, 2017].

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On the other hand, the results obtained are consistent with the study by Briceño [2020], which mentions that motivational factors involve feelings related to personal growth, professional recognition, and self-actualisation needs that depend on the tasks that the individual performs, and that learning is the main source for achieving personal and societal development. It should be noted that the results of the research show that students need the teacher to be a support and guide, as mentioned by Briceño, where the teacher must offer relevant direction and guidance towards academic tasks [Briceño, 2020].

Authors such as Sellan [2017] mention that there are factors that influence academic motivation, which can be classified into personal factors and environmental factors, the latter including the family context as well as the school context.

On the other hand, he also mentions that when the teacher is faced with a motivated student, the student in turn reflects greater attention and willingness towards their studies, consequently an improvement in their academic performance is observed, which reduces maladaptive behaviours and conflicts with teachers and peers, establishing better interpersonal relationships and manifesting optimal self-esteem, leading to greater confidence and satisfaction in themselves and in what they are doing [Sellan, 2017].

González-Benito et al. [2021] mention in their study that the only factor positively associated with academic performance is the feeling of self-sufficiency, which is consistent with some of the reasons found in the study, making it necessary to consider motivation as a strategy for achieving the objectives of meaningful learning [González-Benito et al., 2021].

According to the results of Boza and Toscano [2012], they found that the goals that motivate students to study are linked to achieving a better future, life security, professional competence, economic and personal success, as well as the satisfaction of knowledge [Boza and Toscano, 2012]. Similar to the results obtained in the study conducted on veterinary medicine students, there are motivational factors of interest that influence academic performance and discipline for a successful future.

According to Moreno, who mentions that little importance is attributed to the motivational factor despite its significant influence on the learning process and academic performance of students, it is considered urgent to give greater attention and importance to motivation in the school environment [Moreno, 2021]. Therefore, teachers must show interest and/or concern in order to motivate their students, serving as a support and guide to help them exceed the teacher's expectations. Furthermore, it was found that the relationships between teachers and students are also an influencing factor [Ceballos, 2025].

Conclusions

It is important that future research studies academic motivation involving students and teachers in order to improve the quality of education and meaningful learning. Motivation should be considered a determining and positive factor on the part of teachers towards their students for academic purposes, especially the development of their skills and academic performance. Students should value their collaboration in activities and tasks in order to obtain good grades and, at the same time, develop their teaching-learning process, transcending into meaningful and quality learning.

Motivation in student academic performance must be positively encouraged within the academic and personal spheres. Support materials and activities should be educational and interesting, avoiding being boring, obsolete, and monotonous. Among the motivations found were good grades, professional training, being someone in life, personal interests, continuing to study, being able to work, and achieving professional success for a successful future. There are differences among the MSBA I group, as poor performance is associated with non-compliant women in this group. Compliance with regulations is a distracting variable that does not affect student performance.

However, implementation and compliance establish better interpersonal relationships, as well as increasing discipline, responsibility, honesty, empathy, and collaboration, among other things. It was found that student motivation is individual.

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Nevertheless, it is important for teachers to consider creating strategies that boost students' confidence in their own abilities, motivating them to improve their academic performance in order to become better professionals who are successful in life.

Declarations

Conflict of interest

The authors declare that they have no conflict of interest. They have no known competing financial interests or personal relationships that could have appeared to influence the article reported in this article.

Contribution of the authors

Medina-Lerena, Miriam Susana: Contributed to the project idea, method, research technique, research development, data analysis, review, and editing.

Villanueva-Ochoa, Andrés and Núñez-Hernández Alfonsina: Contributed to the research development and data capture on the platform for analysis, review, and editing.

De la Rosa-Arana, Jorge Luis: Contributed to the development of the research, data analysis, review, and editing.

Availability of data and materials

The data from this research are available directly from the corresponding author upon reasonable request.

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Abbreviations

ANOVA	Analysis of variance
CUCBA	University Centre for Biological and Agricultural Sciences
MSBA	Animal Health and Welfare Management
EPI info	Epidemiology Programme

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Article

Meaning of experiences during the holidays of residents of Cajeme

Significado de experiencias en las vacaciones de residentes de Cajeme

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Abstract

People who travel seek new experiences and cultural encounters, moments, and pleasure in discovering events that will provide them with a memory that they can express with enthusiasm. The goal of this research is to identify the main experiences that travelers seek. A quantitative, descriptive study was conducted. The participants were 146 subjects residing in Ciudad Obregón, with the characteristic that they had taken a vacation outside their residence in the last year. The sampling was non-probabilistic for convenience, and an online survey was used for data collection. The analyses were conducted using JASP software. The results indicate that; in the first dimension, the item with the highest value was "I have emotionally recharged," in the second dimension the item with the highest score was "I was thinking," and finally, in the last dimension, the item with the highest score was "All my senses were stimulated."

Objectives	Methodology	Contribution
The objective is to identify the main experiences sought by people traveling through the application of an instrument in order to contribute to the proposal of tourism in Mexico for the benefit of society. 	1] Quantitative, descriptive research. 2] The participants were 146 subjects residing in Ciudad Obregón.3] The sampling was non-probabilistic for convenience.4] An online survey was applied for data collection. 	There is an issuing market that requires the offer of travel packages and services.It is an area of opportunity for the destination to promote and offer wholesale travel agencies that can market their tourist products in these regions. 

Experiences, Tourism, Residents

Resumen

Las personas que viajan van en busca de nuevas experiencias y vivencias culturales, momentos y placer por descubrir acontecimientos que les dé un recuerdo y puedan expresarlo con entusiasmo. El objetivo de esta investigación es identificar las principales experiencias que buscan las personas que viajan. Se realizó una investigación cuantitativa, descriptiva. Los participantes fueron 146 sujetos residentes de ciudad obregón con la característica de que, en el último año hayan salido de vacaciones fuera de su residencia. El muestreo fue no probabilístico por conveniencia y para la recolección de datos se aplicó una encuestan en línea. Los análisis fueron con software JASP. Los resultados indican que; en la primera dimensión, el ítem con mayor valor fue el "Me he recargado emocionalmente", en la segunda dimensión el ítem con mayor puntuación fue "Estuve pensando" y, por último, la última dimensión, el ítem con mayor puntaje fue "Todos mis sentidos fueron estimulados".

Objetivo	Metodología	Contribución
Objetivo es identificar las principales experiencias que buscan las personas que viajan a través de la aplicación de un instrumento con el fin de contribuir a la propuesta del turismo en México en beneficio de la sociedad. 	1]Investigación cuantitativa, descriptiva. 2] Los participantes fueron 146 sujetos residentes de ciudad obregón. 3] El muestreo fue no probabilístico por conveniencia. 4] Para la recolección de datos se aplicó una encuestan en línea. 	Existe un mercado emisor que requiere de la oferta de paquetes y servicios de viaje. Es un área de oportunidad del destino para promover y ofertar agencias de viaje mayoristas que puedan comercializar sus productos turísticos en estas regiones. 

Experiencias, Turismo, Residentes

Area: Advocacy and attention to national problems

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Introduction

In ancient times, during the Middle Ages, civilisations such as Greece and Rome were the first to practise religious festivities, undertaking the first sacred journeys, where hundreds of pilgrims travelled from their places of origin to a temporary location to fulfil their mandate or promise, motivated by their faith.

Likewise, the Olympic Games practised since that time displaced large movements of people, which is attributed to the beginnings of tourism and holidays [Lois and López 2015].

Since holidays are linked to time off work, people took time off from their jobs to devote themselves to religious celebrations. These great civilisations discovered new motivations for their travels and began to colonise new territories, search for food and satisfy their curiosity to discover and explore new places.

Then came the Industrial Revolution, which brought about many changes in workers' rights and improved working conditions with the implementation of the first rest laws.

As workers gained more rights, holidays began to take hold. European countries were the pioneers in obtaining these benefits, giving rise to the promotion of tourism and the development of beaches and recreational sites.

Given these changes, which brought benefits to the population of Mexico since 1931 when the first federal labour law was enacted, the foundations were laid for Mexican workers to have the right to 'rest days', i.e. holidays, where initially six days of rest were granted per year worked, increasing by two for each accumulated year, thereby promoting the right to rest and also the emergence of tourism in the country.

Statement of the problem

In 1975, Mexico joined the World Tourism Organisation [UNWTO], a United Nations agency responsible for promoting responsible, sustainable and accessible tourism for all, with the aim of promoting culture, protecting the environment, peace and security, and generating jobs, growth and economic development, giving rise to the Ministry of Tourism [SECTUR].

SECTUR is therefore the highest authority regulating tourism in Mexico, with the following vision: '*Mexico will position itself as a global tourism powerhouse, with a diversified range of competitive services and destinations. Tourism will trigger investment and economic growth, promoting balanced regional development and social benefits for the country*.'

This study will analyse some important data on tourism in the Mexican context, according to figures from the Ministry of Tourism [SECTUR, 2024]. At the end of August 2024, there were 1,485,541 [one million four hundred and eighty-five thousand five hundred and forty-one] international tourists from more than 25 different nationalities, with travellers from the United States [63.4%], Canada [6.2%], Colombia [3.3%], Spain [3.1%], and the United Kingdom [3.0%] among the top five, representing more than 79% of travellers entering Mexico.

These travellers entered the country through more than 26 airports nationwide, with the top five being Cancún Quintana Roo [44.3%], Mexico City [AICM] [21.8%], Los Cabos Baja California Sur [8.9%], Guadalajara Jalisco [6.8%] and Puerto Vallarta Jalisco [4.8%], which represent more than 87% of international arrivals according to nationality.

According to the Airports and Auxiliary Services [ASA] office, at the end of August 2024, the total number of domestic and international passengers was 43,059,484, representing a decrease of 29.9% compared to 2023. This figure includes domestic tourism, i.e., Mexicans who travelled within the country. The airports with the highest activity and at the top of the top 5 are Cancún, Guadalajara, Tijuana, Monterrey, and Los Cabos Baja California Sur, which account for 64% of arrivals.

In the case of the state of Sonora, located in northern Mexico, it is important to mention that the airport in the city of Hermosillo, Sonora, recorded 723,854 passengers at the end of August 2024, representing 1.68% of total domestic arrivals and a decrease of 3.3% compared to 2023. However, these statistics do not reflect travellers visiting the state of Sonora who enter through the airport in Ciudad Obregón, the second most important city in the state, which leads us to conclude that Ciudad Obregón does not figure nationally as a destination appreciated by domestic and international tourists.

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In this regard, there are data and statistics that are always studied and reported from the perspective of demand as a receiving destination, as reflected in the above statistics, but what would happen if we analysed residents of a destination as a sending destination? What meaning do they give to holidays? What motivates them to decide to holiday at a particular destination? What experiences do they have at the destination they visit? What experiences are they looking for?

The tourism experience is a topic that has not received much attention, and its analysis methodologies require further study in order to draw generalised conclusions that are applicable to destinations [Fuentes, 2015]. This research seeks to analyse the meaning of the holiday experience, with the sample study consisting of residents of the second largest and most important city in economic terms in the state of Sonora, which is Ciudad Obregón. Currently, there is very little information available on studies about the holiday experiences of Mexicans and Sonorans, which is an important reason for conducting this research, as the objective is to identify the main experiences sought by people who travel through the application of an instrument in order to contribute to the promotion of tourism in Mexico for the benefit of society.

We will refer to them as tourists who travel to a destination for holiday purposes, and we will evaluate their experience in terms of the emotional pleasure or surprise they feel when visiting the place, their encounters with the local population, and the impact that this subjective and personal perception has on them [Fuentes, 2015].

Literature review

The tourist experience is defined as the relationship between the person and their worldview depending on the location of their frame of reference with respect to the society to which they belong [Cohen, 1979]. On the other hand, Boorstin mentions that experiences always seek authenticity.

In a study conducted by Heredia et al., 2019, on why people travel or do not travel, it was found that people travel to gain new experiences, for recreation, to learn about new cultures, and do not travel due to lack of time and money.

This is important data for the creation of new tourism offers that are within the reach of all Mexican families, seeking the introduction of social tourism to Mexico. In another study, I analysed the theory of experiences to explain the direct relationship between competitive position, price and customer needs at each stage of development in the tourism industry. The results revealed that a memorable tourist experience is a stimulus; it can be stored in the memory [as an experience]; it can be encoded and retrieved [through storytelling]. In addition, he identified two factors [affective state and sensory state] to support the idea that the tourist experience can become memorable.

In another study conducted by Araujo et al 2017 on travellers and their motivations for loving to travel, they found seven recurring reasons for seeking out these experiences: 1] the search for self-knowledge and personal growth; 2] an interest in experiencing cultural diversity; 3] breaking with routine and escaping reality; 4] the search for novelty; 5] the search for adventure and challenges; 6] search for authenticity and freedom; and 7] search for stories to tell. We can see that all of these become emotional, cognitive and behavioural experiences.

There is a model of the tourist experience proposed by Otto & Ritchie [1996] which serves to evaluate the experience of tourists at the destination visited. It considers three key dimensions: the emotional [related to pleasure and surprise], the cognitive [related to learning and reflection] and the behavioural [related to participation at the destination].

There are also other theories related to the study of the tourist experience and tourists' holidays at destinations proposed by Dann [1977] called push and pull, which refers to push motivations [pressure] related to the internal needs and desires of travellers, which generate the demand to travel. On the other hand, pull motivations refer to factors attributed to destinations, or the external forces of destinations.

In other words, push could explain the desire to travel, the desire to escape, rest, have adventures or prestige, and pull would explain the selection of the destination, i.e. it is related to the attractions of the destination [Uysal & Hagan, 1993].

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Methodology

To achieve the objective of the study, quantitative research was conducted with numerical data for the variables Hernández et al. [2014] of the holiday experience phenomenon, using a non-experimental cross-sectional design as the variables were not manipulated. The participants in the research were 146 subjects residing in Ciudad Obregón who had gone on holiday to a place outside their residence in the last year.

Population and sample

A sample of 146 subjects who voluntarily agreed to participate in the research was obtained. It was a convenience [non-probabilistic] sample with the criteria of being residents of Ciudad Obregón and having taken a holiday trip in the last year to somewhere in the world.

Box 1

Table 1

Characterisation of the sample

Variable	level	Counts	Proporción
Gender	Male	61	42%
	Female	84	57%
	Non-binary	1	1%
Marital status	Married	59	40%
	Single	64	44%
	Divorced	11	8%
	Widowed	5	3%
	Unmarried	5	3%
	Prefer not to say	2	2%
Nationality	Mexican	145	99%
	Colombian	1	1%
Place of residence	Obregon City Sonora	146	100%
Grade of studies	Basic [up to secondary school]	4	3%
	High school	28	19%
	Bachelor's degree	94	64%
	Postgraduate	20	14%
Age	21-30	62	42%
	31-40	57	39%
	41-50	19	13%
	52-59	8	6%
	Average age	*M*=33.84	*DE*= 9.1
Holiday destination	Local [if your trip was within the State of Sonora]	37	25%
	National [if your trip was within Mexico]	78	54%
	International [if your trip was out of the country]	31	21%

Measuring instrument

For data collection, an online survey was administered [using a digital survey supported by Google Forms].

This instrument was operationalised as shown in Table 2, and was constructed from different sources [e.g., Fuentes et al., 2015; Clark et al., 2021; Otto and Ritchie, 1996; Morgan et al., 2003].

Box 2

Table 2

Operationalisation of the variable

OPERATIONALISATION OF THE STUDY VARIABLES		
Socio-demographic data	Gender, age, academic degree, marital status, place of residence, holiday destination.	Categorical unit of measurement by ranges.
VARIABLE HOLIDAY EXPERIENCE 5-point Likert scale: 1 [Strongly disagree], 2 [Disagree], 3 [Neither agree nor disagree], 4 [Agree], 5 [Strongly agree]		
Dimensions	**Ítems**	**Cronbach's alpha**
Emotional dimension [pleasure, surprise]	1. I have been excited 2. I have been emotionally recharged 3. I experienced a connection to the place 4. I felt a sense of adventure 5. I was aware of my own values 6. I wanted to relive it afterwards [talk about it with others and show photos].	.817
Cognitive dimension [learning, reflection]	1. I was thinking 2. I was interpreting things for myself 3. I developed a new skill 4. I acquired new knowledge 5. I reflected on the ideas I gained and discussed this with others. 6. I was being creative	.828
Behavioural dimension [Active participation]	7. I was active 8. All my senses were stimulated 9. I experienced unfamiliar things that are outside my 'everyday life' 10. I had the impression that destiny is different from my perception of it 11. I thought the experience was unique	.825

Note: The operationalisation of the variables to be analysed was based on Fuentes et al., 2015; Clark et al., 2021; Otto and Ritchie, 1996; Morgan et al., 2003.

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Procedure

The procedure followed to conduct this research was as follows:

1. The research protocol was carried out.

2. The instrument was designed and adapted based on theory and on an instrument provided by the Faculty of Tourism at the University of Colima.

3. The instrument was applied with the support of students from the Tourism degree programme at the Technological Institute of Sonora.

4. Internal consistency tests were performed using Cronbach's alpha statistic.

5. A descriptive analysis of the data was performed using JASP software.

6. The results and findings were written up.

Results

The descriptive results of the survey are shown in Table 3. The three dimensions of the experience variable are shown. The result of the first dimension of emotional experience, which translates into the traveller experiencing pleasure or surprise during the trip, was highest for the item 'I have been emotionally recharged' [M = 4.904; SD = .377].

On the other hand, in the cognitive dimension, which translates into the traveller having an experience of learning and reflection, the item with the highest value was 'I was thinking' [M = 4.856; SD = .538]. Finally, in the behavioural dimension, which translates into travellers having an experience of active participation in the destination visited, the item with the highest value was 'All my senses were stimulated' [M = 4.945; SD = .257].

These findings are consistent with previous studies [e.g., Heredia et al., 2019; Chiriboga 2022; Araujo et al 2017; Otto & Ritchie. 1996.

Box 3

Table 3

Descriptive results

Holiday experience	M	DE	kitty	Maximum
Emotional dimension [pleasure, surprise]				
1. I have been excited	3.938	0.293	2.000	4.000
2. I have been emotionally recharged	**4.904**	0.377	3.000	5.000
3. I experienced a connection to the place	4.870	0.515	1.000	5.000
4. I felt a sense of adventure	3.877	0.468	1.000	4.000
5. I was aware of my own values	2.952	0.244	1.000	3.000
6. I wanted to relive it afterwards [talk about it with others and show photos].	3.938	0.337	2.000	4.000
Cognitive dimension [learning, reflection]				
7. I have been interpreting things by myself.	4.836	0.526	3.000	5.000
8. I have been thinking	**4.856**	0.538	1.000	5.000
9. I developed a new skill	4.445	1.096	1.000	5.000
10. Acquired new knowledge	4.575	1.043	1.000	5.000
11. I reflected on the insights I gained and discussed this with others.	4.610	0.920	1.000	5.000
Behavioural Dimension [Active participation]				Behavioural Dimension [Active participation]
12. I was being creative	4.733	0.698	1.000	5.000
13. I was active	4.932	0.346	2.000	5.000
14. All my senses were stimulated	**4.945**	0.257	3.000	5.000
15. I experienced unfamiliar things that are outside my "everyday life".	4.911	0.388	2.000	5.000
16. I had the impression that destiny is different from the perception I had of it.	4.801	0.660	1.000	5.000
17. I thought that the experience was unique	3.822	0.547	1.000	4.000

It is important to mention that, although experiences and tourism are closely related, since a high-quality experience stimulates all the senses—things to see, things to hear, things to touch, things to taste, and things to feel, are aspects that are considered high-quality experiences and represent economic value in the tourism industry, as travellers spend money on leisure, recreation, and tourism activities [Swinnen, van Herck, and Vandemoortele, 2012].

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Holiday experiences have a positive meaning for travellers, generating emotional experiences that give pleasure and surprise: *I experienced a connection with the place [M = 4.870; SD = .515] I was* excited *[M = 3.938; SD = .293], I wanted to relive it afterwards [talk about it with others and show photos] [M = 3.938; SD = .237].* These elements can be interpreted under the theory of experience economics [Pine & Gilmore, 1999]: destinations do not only sell services but also memorable experiences that involve all the senses.

Conclusions

The research carried out fulfilled the objective of analysing the meaning of the holiday experience for residents of Ciudad Obregón, Sonora, a destination that does not appear in the top ten national holiday destinations, but which is a source of holiday travel.

The conclusions are as follows: 1] The results cannot be generalised [due to the type of sampling used], but the residents participating in the research indicate that the holiday experience in the destinations they visit when they travel provides them with emotional experiences that give them pleasure [e.g. they have been emotionally recharged, they were thinking and all their senses were stimulated]. 2] Going on holiday also allows them to experience other positive aspects, such as feeling connected to the place, feeling excited, which is good for their mental health, and creating memorable experiences that they want to relive later and show their photos and videos.

The city of Obregón is a source destination for travel by its residents. 3] The most frequent trips they take are within the country, particularly to the state of Quintana Roo, followed by international trips to the United States and, lastly, within the state to San Carlos. 4] It was found that there is a source market that requires the offer of travel packages and services, which is an area of opportunity for the destination to promote and offer wholesale travel agencies that can market their tourism products in these regions.

Declarations

Conflict of interest

The authors declare that they have no conflicts of interest.

Author contribution

Clark-Mendivil, Yesenia: was responsible for reviewing the literature, analysing the data and conducting the research.

Esparza-García, Irma Guadalupe: Was responsible for the research, data collection and processing.

Espinoza-Castelo, Luz Maria: Was responsible for the research design, writing, and general review of the project.

Availability of data and materials

The data generated in this research can be obtained or corroborated from Dr. Yesenia Clark Mendívil at the following email address: yessenia.clark@itson.edu.mx

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Abbreviations

for ASA: Airports and Auxiliary Services
SECTUR: Ministry of Tourism.
AICM: International Airport of Mexico City.
WTO: World Tourism Organization
e.g.: Example

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Article

Gender equity as a key factor in personal evolution and experiential learning

La equidad de género como factor clave en la evolución pesonal y el aprendizaje experiencial

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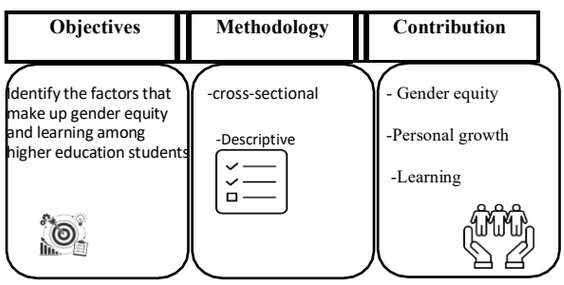
Abstract

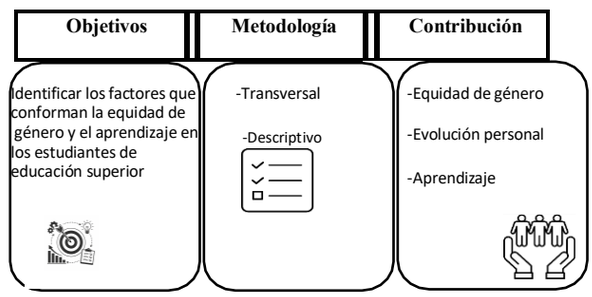
In higher education, the learning process is a complex experience that goes beyond the mere acquisition of knowledge. In this context, gender equity emerges as a fundamental factor that influences how students access educational opportunities and their overall academic experience. The present study aimed to identify the factors that constitute gender equity and learning among higher education students. It was a quantitative, cross-sectional, and descriptive study, based on the application of 925 surveys across different universities in Saltillo, Coahuila. The factor analysis shows that gender equity plays an essential role as a driver of personal evolution and experiential learning within the university setting.



Gender equity, Evolution, Learning

Resumen

En el nivel superior, el proceso de aprendizaje es una experiencia compleja que va más allá de la mera adquisición de conocimientos. En este contexto, la equidad de género emerge como un factor fundamental que influye en la forma en que los estudiantes acceden a oportunidades educativas y en su experiencia académica. El presente trabajo tuvo como objetivo general identificar los factores que conforman la equidad de género y el aprendizaje en los estudiantes de educación superior, fue una investigación de tipo cuantitativo, transversal y de alcance descriptivo, con una aplicación de 925 encuestas de diferentes universidades de Saltillo, Coahuila. En el análisis factorial se observa que la equidad de género desempeña un papel esencial como motor de la evolución personal y del aprendizaje experiencial en el ámbito universitario.



Equidad de género, Evolución, Aprendizaje

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Introduction

In higher education, the learning process is a complex experience that goes beyond the mere transmission of knowledge. In this context, gender equity emerges as a fundamental factor that influences how students access educational opportunities and their overall academic experience.

Gender equality in higher education refers to ensuring that all students, regardless of their gender identity, have equal opportunities to develop their academic and professional potential. However, despite advances in this area, challenges related to gender stereotypes, discrimination, and structural inequalities persist, which can hinder access and academic success for certain groups of students.

The university, as a space for the comprehensive training of individuals and their social contribution, recognises the historical gender gaps in terms of opportunities for growth, intellectual and personal development and recognition. These disparities, which are often taken for granted, manifest themselves in different aspects of the educational process, affecting both the quality and equity of learning. Several authors have addressed the need to incorporate the issue of gender into the educational sphere. Scott [1986] points out that gender is a fundamental component of power structures, while Subirats [1994] argues that equity must be understood as a process of change in the classroom.

Espinosa et al. [2004] emphasise that a gender approach makes it possible to highlight the historical discrimination faced by women, and González and Villaseñor [2010] urge teachers to recognise their responsibility in transmitting values and attitudes free of stereotypes. These contributions agree that education has the power to reproduce or transform existing social structures, depending on the pedagogical approach adopted.

The United Nations Development Programme [UNDP] in Mexico presented the Gender Equality Strategy 2023-2025, which is based on the institutional commitment to eradicate poverty, reduce inequalities and exclusion, and support the empowerment of all women in Mexico. [UN, 2023]

Another perspective says that gender equality is a fundamental principle that seeks to ensure that all people, regardless of gender, have the same opportunities, rights, and responsibilities in all aspects of life. This concept is not only an ethical and moral goal, but also the construction of just societies. [Medicall Home, 2024].

In this same context, gender equality refers to equal opportunities, rights, responsibilities and treatment for all people, regardless of their gender.

On the other hand, experiential learning has also become an essential component of academic development, particularly in higher education contexts. According to Burón Orejas [1993], learning involves developing metacognitive skills that allow students to self-regulate their knowledge, while Alonso et al. [1994] insist that learning goes beyond the simple accumulation of content and should encourage the development of flexible and transferable skills. Distance learning and the use of new technologies, as mentioned by Blumen et al. [2011], reinforce the importance of self-training and the active role of students in their educational process.

According to Mendoza et al. [2022], various factors, including the teacher, determine the implicit conceptions that enhance learning, while Pérez and Gardey [2023] comment that learning is a process of acquiring knowledge, skills, values, and attitudes, made possible through study, teaching, or experience. This process can be understood from various perspectives, which implies that there are different theories related to learning.

However, for Espinar Álava and Vigueras Moreno [2020], experiential learning appreciates the differences between each person. Students' prior knowledge and the incorporation of new mental structures are necessary for meaningful learning to take place. Meanwhile, for Reyes [2024], it is learning based on the direct experience of students that impacts the process of knowledge acquisition.

Within personal evolution, according to Jung [2017], individuals need to undertake a process of selfhood in order to consciously achieve who they really are. Individuation is a process of personal maturation with the purpose of achieving self-knowledge.

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Aragón-Macías et al. [2019] Currently, various factors are gaining importance in the evolutionary process of generations, aspects that in previous times were not considered in a social and cultural structure, which require countless theoretical contributions.

According to Freire et al. [2020], Aristotle and the eudaimonist approach point out that the ultimate goal of human beings is the desire to continue developing their potential to the maximum and achieving excellence.

Experiential learning represents a powerful path towards a more meaningful and transformative education. By focusing on students learning by doing, this approach fosters autonomy, practical skills, problem solving and critical thinking. It is about building knowledge from one's own experience. Despite theoretical advances, there are still significant gaps. For example, little is known about how gender equity, personal development, and experiential learning interact in specific university contexts. Although there are studies on learning styles or gender inequalities, few integrate both approaches to analyse their impact in conjunction with personal development and experiential learning.

This research aims to fill that gap, generating useful knowledge for actors and intervention processes in education. Therefore, the main question of this study is: What factors shape gender equity and learning in higher education students? Based on exploratory factor analysis, significant aspects of gender, personal development, and experiential learning are observed in factor two, according to the integration of its variables.

Methodology

This research is quantitative in nature, with a non-experimental, cross-sectional design and a descriptive, comparative and integrative scope.

It is based on a quantitative approach because its purpose is to measure and analyse using numerical data. This type of approach allowed the topic to be addressed in an orderly and precise manner, providing concrete data on how gender equality influences personal development and learning.

A non-experimental design was chosen because the conditions of the participants and the variables studied were not modified; the data were collected as they occurred in reality. As this was a cross-sectional study, the data were obtained at a single point in time, which made it possible to ascertain the current situation of the phenomenon. The research is inductive in nature, as it uses the data obtained to reach conclusions. Sampling was non-probabilistic, using a convenience strategy based on the characteristics of the respondents.

To collect the information, a questionnaire specifically designed for this study was used, based on two main themes: Gender Equality and Learning, and it also measured aspects of personal development. There were a total of 100 simple variables, which were rated on a scale of 0 to 10, where 0 is the total absence of the attribute and 10 is its maximum expression. Its reliability was tested using Cronbach's alpha coefficient, which gave a value of 0.95, indicating high internal consistency.

The questionnaire was administered in a single session, in printed format. The methodology includes statistical analyses at different levels: descriptive from frequencies and percentages, comparative and integrative, where a factor analysis with Varimax rotation was applied, which helped to simplify complex data into a smaller set of variables in underlying factors.

The specific objectives are:

- To analyse differences in opinion between gender and the study variables.
- To contrast differences in opinion with respect to age with the study variables.
- To identify differences in opinion between students from different schools with the study variables.

Results

Frequencies and percentages

The sample studied consists of higher education students, with 925 surveys from different universities in Saltillo, Coahuila. In terms of gender, 60% of the participants are women, 37% are men, and 1% identify as ‘prefer not to say’ or non-binary.

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In terms of age, 69% were between 18 and 21 years old, 17% were between 22 and 25 years old, 11% were under 18 years old, and only 2% were over 26 years old. Regarding higher education institutions, the most represented were ENEF with 16% and UVM with 14.1%.

Student's t-test for independent samples

The purpose was to observe significant differences between the general data of the sample of 925 students in contrast to the research axes with a confidence level of 95%. The significant responses are analysed by naming the null hypothesis h_0= 'the opinion groups show similarities between their means' and the alternative hypothesis, h_1= 'the opinion groups show significant differences between their means'.

Comparative Analysis Gender; Personal Development. The comparative analysis of men and women in contrast to the Personal Development variable shows a significant difference according to their mean. There is a difference of opinion between men and women who mention maintaining their position in difficult situations. H_1 is accepted for this analysis: there is a significant difference between the means in the group of men and women.

Comparative Analysis Age; Personal Development. There are significant differences in the age variable with respect to the variable 'Maintaining one's stance in difficult situations,' which is an indicator of personal development.

We conclude that there is a significant difference between the 18-21 and 22-25 age groups with respect to this variable, where younger people consider that they maintain their stance in difficult situations. H_2 is accepted for this analysis: there is a significant difference between the means of the age groups with regard to the study variables.

This result could be useful in guiding educational and personal development programmes, emphasising the importance of experience and maturity in managing challenging situations.

Comparative Analysis of Schools; Personal Development. The comparative analysis between universities with respect to the personal development variable shows a significant difference between ENEF University and UVM, as it is observed that ENEF students maintain a stronger stance in difficult situations, express their feelings, and empower themselves and work on aspects of mental health compared to UVM students. H_2 is accepted for this analysis: there is a significant difference between the means of the ENEF and UVM groups with respect to the study variables.

Factor Analysis

Using the Centroid method, which is integrated with variables related to a Varimax rotation and factor loading of 0.31. The sample used in this analysis consists of 925 students.

The sedimentation graph criterion is used for factor retention, with the inflection point observed in factor 3.

Factor one: 'Dimensions of Self-Regulated Learning and Educational Training'

This factor reveals that in the educational sphere, higher education students show a tendency to plan to pass the subject by pacing their schoolwork according to the guidance of their immediate superior. During this process, they observe progress in the expected learning outcomes, which facilitates the creation of reflective environments in which students can reflect on their own learning process.

This teaching approach is associated with a particular attitudinal profile among primary school teachers. They are characterised as intelligent and reserved individuals who rely more on reason than on their feelings. They maintain a romantic attitude, eat healthily and are comfortable with their bodies. They consider themselves patient, organised in their personal finances and punctual for appointments and commitments.

In terms of their thinking, they tend to be conservative and rely more on their experience than on the suggestions of others. They enjoy visiting museums, public speaking, and have good memories. In addition, they are able to remain calm in emergency situations and resolve conflicts appropriately, seeking a balance between personal and work issues.

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This attitudinal profile is closely related to the educational training of teachers, which is reflected in their ability to respect the opinions of others, be aware of how to improve as a person, and share personal and academic experiences within the classroom. Professional practice, participation in online classes, and the contribution of ideas that raise awareness are fundamental aspects of their educational training.

This description of a sample of the current paradigm of the educator in teaching practice reflects the influence of established methods in the planning and evaluation of learning. This traditional approach conditions the teaching-learning process, highlighting the importance of teacher intervention that exemplifies a personality oriented towards reflection and effective management of emotions, which contributes to an environment conducive to the academic and personal development of students.

Factor two: 'Gender, Personal Development and Experiential Learning'

This factor reveals fundamental aspects that influence gender, personal development and experiential learning in individuals. On the one hand, what enriches experiential learning is remaining steadfast in the face of complicated situations and seeking out experiences that enrich life; the ability to cope with adversity shows a significant factor load, suggesting that this skill is crucial for facing everyday challenges.

On the other hand, aspects of the social environment highlight the relevance of justice for all genders and the need to eliminate discriminatory treatment. These elements reflect the importance of promoting equity and respect in society, as well as questioning norms that perpetuate discrimination.

Taken together, the findings indicate that gender, personal growth, and experiential learning are interrelated and foster individual resilience and social equity, which are key to overall well-being.

Factor three highlights the influence of two fundamental aspects on individuals' personal development and social environment.

First, this factor emphasises the importance of remaining steadfast in the face of difficult situations and seeking new experiences that enrich one's personal life. The ability to maintain one's stance in difficult times shows a significant factor loading, suggesting that this skill is crucial for coping with life's challenges.

On the other hand, in terms of the social environment, the relevance of aspects such as self-love, controlling emotions, and satisfying the needs for self-actualisation is observed.

These aspects reflect the importance of promoting individual well-being and emotional stability within the community. In addition, leadership, striving to give one's best every day, and expressing feelings are highlighted as key components for personal development.

Taken together, these findings suggest that personal development and the social environment are intrinsically linked, and that promoting individual resilience and emotional wellbeing are essential elements for people's overall growth.

Conclusions

Based on the results, we can agree with Scott [1990] on some aspects of gender, who views gender as power structures, and with Subirats [1994], who views it as a process of change in the classroom. Espinosa et al. [2004] argue that gender highlights historical discrimination, and González and Villaseñor [2010] invite teachers to recognise their responsibility in transmitting values. However, it should be noted that this not only implies social justice, but also enhances the personal and academic development of students by creating contexts with greater security and respect.

For their part, Espinar Álava and Vigueras Moreno [2020] believe that experiential learning values individual differences and the construction of meaningful knowledge. In the same vein, Reyes [2024] states that experience-based learning has an impact on students' knowledge. We agree with the authors' comments and, in addition, the results show that experiential learning allows for the development of emotional self-regulation skills and metacognitive strategies in the learning process.

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Based on the results obtained from the different statistical levels of group comparison and exploratory factor analysis, this chapter presents conclusions that account for the perspective of gender equity as a key factor in personal development and experiential learning.

This analysis validated the specific objectives and contrasted the working hypotheses proposed.

With regard to the comparative analysis of gender with the areas of study, differences of opinion were observed between men and women, with women maintaining a stronger stance in difficult situations than men. Working hypothesis H_1 is accepted and the specific objective of analysing the differences of opinion between gender and the study variables is achieved.

The comparison of age groups shows that there are significant differences in the means, with younger students considering themselves to have greater management of difficult situations than older students. H_2 is accepted for this analysis: there is a significant difference between the means of the age groups and the specific objective is met: to contrast the differences of opinion with respect to age with the study variables.

Regarding the school groups [ENEF and UVM], the hypothesis was that there are significant differences based on the means in the perception of personal development. The results show that ENEF students have higher levels of self-regulation, emotional awareness and mental health care than UVM students, thus achieving the specific objective of identifying differences of opinion between students from different schools with the study variables.

In the exploratory factor analysis, three significant factors were generated, with factor two underpinning the work: Gender, Personal Development and Experiential Learning, which responds to the general objective set out: to identify the factors that make up gender equality and learning in higher education students and answers the main question: what factors make up gender equality and learning in higher education students.

Declarations

Availability of data and materials

The data obtained in the research are available.

Conflict of interest

The authors declare that they have no conflicts of interest. They have no known competing financial interests or personal relationships that could have appeared to influence the article reported in this paper.

Contribution of authors

Sánchez-Rivera, Lilia: Conceptualisation, research, data curation,

Espericueta-Medina, Marta Nieves: Formal analysis. Supervision, methodology,

Ramos-Jaubert, Rocio Isabel: project management, validation.

Herrera- Zuñiga, Dulce Karina: Visualisation, writing, review and editing.

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Origin

This study comes from a final research project.

Abbreviations

ENEF	Escuela Normal de Educación Física
UVM	Universidad del Valle de México

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Article

The Doubt as an ethical competence in the face of artificial intelligence: a documentary analysis of human skills and responsibility

La duda como competencia ética frente a la inteligencia artificial: un análisis documental sobre habilidades humanas y responsabilidad

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Abstract

The growing use of artificial intelligence in academic and professional contexts has intensified ethical debates concerning human responsibility, decision-making, and the delegation of cognitive processes. From a historical and conceptual perspective on artificial creation, this article examines the progressive transition from scientific intervention on the body to the externalization of intellectual functions traditionally attributed to human agency. The objective of the study is to analyze doubt as a central ethical competence for the responsible use of artificial intelligence, in articulation with other human capacities such as conceptual mastery of the field, critical judgment, intentionality, and awareness of limits. Through a qualitative documentary analysis, these competencies are systematized. The article's main contribution lies in proposing doubt as an articulating ethical axis that sustains human responsibility in the use of cognitive technologies

Objetivos	Metodología	Contribución
		

Ethical doubt, Artificial intelligence, Human responsibility

Resumen

El uso creciente de la inteligencia artificial en contextos académicos y profesionales ha intensificado los debates éticos relacionados con la responsabilidad humana, la toma de decisiones y la delegación de procesos cognitivos. Desde una perspectiva histórica y conceptual sobre la creación artificial, este artículo examina la transición progresiva desde la intervención científica sobre el cuerpo hacia la externalización de funciones intelectuales propias del ser humano. El objetivo del estudio es analizar la duda como una competencia ética central para el uso responsable de la inteligencia artificial, en articulación con otras capacidades humanas como el dominio conceptual del campo de trabajo, el juicio crítico, la intencionalidad y la conciencia de límites. Mediante una metodología cualitativa de análisis documental, se sistematizan estas competencias. La contribución del artículo radica en proponer la duda como eje articulador de la responsabilidad ética frente a tecnologías cognitivas.

Objetivos	Metodología	Contribución
		

Duda ética, Inteligencia artificial, Responsabilidad humana

Area: Strengthening the scientific community

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Introduction

The gradual incorporation of artificial intelligence into academic, professional and social spheres has profoundly transformed the ways in which knowledge is produced, decisions are made and problems are solved. Tools capable of generating texts, analysing data, simulating reasoning or proposing solutions have begun to occupy spaces that were traditionally reserved for human judgement. This scenario has generated obvious benefits in terms of efficiency and access to information, but it has also reactivated fundamental ethical questions related to responsibility, agency, and the meaning of decisions mediated by cognitive technologies [Floridi et al., 2018].

Far from being an isolated phenomenon, artificial intelligence can be understood as part of a broader historical trajectory in which humans have sought to expand, replicate, or replace essential dimensions of life. From the first attempts to scientifically intervene in the body to current technologies aimed at externalising intellectual functions, there has been a progressive shift in the focus of artificial creation. While previous developments focused on the manipulation or reproduction of biological life, contemporary technologies are oriented towards the simulation of cognitive abilities, such as reasoning, language and decision-making, traditionally considered exclusive to human beings [Harari, 2017].

This shift poses a specific ethical challenge: the possibility of delegating thought processes to systems that lack consciousness, bodily experience and moral responsibility. Several authors have warned that, although artificial intelligence can process large volumes of information and offer coherent responses, it lacks understanding of meaning and the ability to assume the consequences of its actions [Searle, 1980; Dreyfus, 2007]. In this context, the risk lies not only in technical errors, but also in the human tendency to accept automated results without sufficient critical reflection, thus diluting personal and collective responsibility.

Given this scenario, the ethics of artificial intelligence use cannot be reduced to technical standards or external regulatory frameworks. On the contrary, it requires the strengthening of human competencies that enable a reflective relationship with technology.

Among these skills, doubt takes on a central role, understood not as indecision or insecurity, but as the ability to question, suspend automatic acceptance, and critically examine the assumptions, scope, and limits of the responses generated by artificial systems. Ethical doubt is thus a necessary condition for preserving human agency in the face of technologies that operate without conscience or moral intent [Han, 2022].

However, doubt alone is insufficient if it is not articulated with other fundamental human capacities. Ethical practice in the face of artificial intelligence also requires a conceptual mastery of the field in which the technology is used, the ability to critically evaluate information, an awareness of the limits of automation, and the explicit assumption of responsibility for the decisions made. Various contemporary approaches agree that the ethics of artificial intelligence cannot be delegated to the systems themselves, but rather depends on the cognitive, moral, and reflective dispositions of those who design, use, and interpret them [Bostrom & Yudkowsky, 2014; Vallor, 2016].

In this sense, this article aims to analyse doubt as an articulating ethical competence in the use of artificial intelligence, in relation to other human skills that are indispensable for the responsible exercise of cognitive technologies. Using a qualitative approach based on documentary analysis, academic, philosophical and normative texts that address the relationship between artificial intelligence, human thought and ethical responsibility are examined. The relevance of this work lies in contributing to the contemporary discussion on the irreplaceable role of human reflection in a context marked by the increasing automation of thought and decision-making.

Methodology

This section outlines the methodological procedure followed to analyse doubt as an ethical competence in the use of artificial intelligence, as well as the criteria used for the selection, organisation and interpretation of the documentary material reviewed.

The methodological description aims to make transparent the analytical decisions that guided the development of the study and to offer the reader the necessary elements to understand the logic of the analysis carried out, without anticipating results or interpretations.

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In line with the purpose of the article, the components of the methodological design, the treatment of the documentary corpus and the analytical strategy adopted are presented below.

Research approach

This study is developed from a qualitative approach, which is appropriate for analysing complex phenomena involving meanings, values, judgement criteria and ethical positions. This research allowed us to understand how notions such as doubt, responsibility and critical judgement are constructed and articulated in relation to the use of artificial intelligence. Given that these dimensions are not directly observable or reducible to numerical indicators, their study required an interpretative approach to the discourses, arguments, and conceptual frameworks present in the analysed texts [Tracy, 2020].

From this perspective, ethics is not conceived as a set of technical rules, but as a field of critical reflection on human action. Consequently, the qualitative approach is relevant for exploring how human responsibility is defined, problematised and substantiated in relation to cognitive technologies that operate without consciousness or moral agency. This methodological position recognises the active role of the researcher in constructing the analysis, as well as the need to make explicit the theoretical assumptions that guide the interpretation [Braun & Clarke, 2021].

Research design: documentary analysis

A qualitative documentary analysis design was adopted, understood as a systematic process of reviewing, selecting, interpreting, and synthesising documents relevant to the object of study.

Documentary analysis allowed for the examination of academic, philosophical, and normative texts as spaces in which ethical meanings are produced and negotiated, especially in contexts of accelerated technological innovation. This design is particularly relevant when the research interest focuses on reconstructing conceptual frameworks and contemporary debates, rather than describing specific empirical practices [O'Leary, 2020].

Unlike a systematic review aimed at exhaustiveness or the comparison of empirical results, qualitative document analysis prioritised interpretative depth and theoretical coherence. In this study, documents were not considered solely as sources of information, but as units of analysis that reflect positions, tensions and ethical assumptions surrounding artificial intelligence and human action.

Documentary corpus

The documentary corpus consisted of scientific articles, book chapters, and institutional documents selected through purposive sampling, based on criteria of thematic relevance and academic rigour. The analysis was based primarily on foundational theoretical and conceptual literature, incorporating recent references when relevant to the methodological framework and contemporary discussion.

Priority was given to texts that explicitly addressed the ethics of artificial intelligence, technology-mediated decision-making, human agency, critical judgement, and responsibility in contexts of cognitive automation.

The inclusion criteria were:

a] peer-reviewed academic publications or recognised institutional documents;
b] a conceptual or normative approach to the relationship between artificial intelligence and ethics;
c] clarity of argument and theoretical basis; and
d] availability in digital format.

Documents of a purely technical nature focused on the development of algorithms or computational infrastructures without explicit ethical reflection were excluded, as were opinion pieces without academic support.
Analysis procedure

The document analysis was carried out in five interrelated phases. In the first phase, documents were searched for and collected from academic databases and institutional repositories, followed by an exploratory reading that allowed the final corpus to be defined. In a second phase, an in-depth analytical reading was carried out, identifying key concepts, central arguments and recurring ethical assumptions in the texts.

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Subsequently, a qualitative coding process was implemented, combining deductive categories derived from the conceptual framework of the study [such as ethical doubt, human responsibility, and the limits of automation] with inductive categories emerging from the analysis. This process allowed for the progressive refinement of the categories and the establishment of relationships between them [Saldaña, 2021]. In the final phase, the categories were reorganised into analytical axes that facilitated the interpretation and synthesis of the findings.

Analytical strategy

The analysis strategy was based on reflective thematic analysis, which allows for the identification of patterns of meaning within qualitative data and the construction of coherent theoretical interpretations. This approach recognises that themes do not emerge automatically from the data, but are the result of an interpretative process informed by the researcher's theoretical position [Braun & Clarke, 2021]. Iterative review of the themes ensured internal consistency, conceptual relevance and alignment with the study objectives.

Methodological rigour criteria

To ensure the quality of the study, the rigour criteria specific to qualitative research were followed. Credibility was ensured through transparent and justified document selection; consistency was maintained by ensuring congruence between the objective, design, and analysis; and reflexivity was promoted through explicit recognition of the researcher's theoretical position vis-à-vis the object of study. Likewise, analytical traceability was maintained by recording methodological decisions and categorical adjustments throughout the process [Tracy, 2020].

Ethical considerations

As this is a documentary study, no direct human participants were involved. However, fundamental ethical principles were respected, such as the responsible use of sources, the correct citation of the documents analysed and the contextualised interpretation of the texts, avoiding decontextualisation or conceptual simplifications. The ethics of the research process itself were conceived as an integral part of the analysis, in line with the object of study.

Results

The documentary analysis identified a set of interrelated analytical categories that structure the contemporary ethical debate on the use of artificial intelligence. These categories emerge from the systematic examination of academic, philosophical, and normative texts and reflect both consensus and tensions surrounding the delegation of cognitive functions, human responsibility, and the place of ethical judgement in contexts of automation.

The results are organised into subsections that present each category in a descriptive and analytical manner, without yet establishing conclusive assessments.

Doubt as a central ethical competence

One of the most consistent findings of the document analysis is the recurring presence of doubt as a key element in ethical reflection on artificial intelligence. In the texts analysed, doubt is not conceptualised as a form of insecurity or paralysis, but as an active reflective disposition that allows for the suspension of automatic acceptance of results generated by algorithmic systems. This capacity is associated with the possibility of questioning the relevance, validity, and scope of the responses produced by cognitive technologies.

Several documents agree that the growing sophistication of artificial intelligence tends to generate a perception of technical reliability that can inhibit human questioning. In this scenario, doubt appears as an ethical competence that reintroduces critical reflection into increasingly automated processes. The literature analysed points out that doubting implies recognising the provisional nature of knowledge generated by AI and resisting the temptation to completely delegate judgement to systems that operate without awareness or understanding of meaning.

Likewise, doubt is presented as a prerequisite for other ethical capacities. Several texts identify that, without an initial exercise in questioning, it is difficult to activate subsequent processes of evaluation, contextualisation, or responsible decision-making. In this sense, doubt is not an isolated skill, but rather an articulating axis that allows for a reflective relationship with technology.

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Conceptual mastery and validation of knowledge

Another relevant category identified in the analysis is conceptual mastery of the field of work as a necessary condition for the responsible use of artificial intelligence. The documents reviewed emphasise that the ability to critically evaluate the results generated by AI depends, to a large extent, on the user's prior knowledge of the subject matter. This mastery is not limited to the accumulation of information, but also involves theoretical understanding, familiarity with conceptual frameworks, and the ability to recognise inconsistencies or errors.

The texts analysed reveal a recurring concern about the use of artificial intelligence systems in contexts where people lack a solid conceptual foundation. In these cases, AI tends to be used as an unquestionable epistemic authority, which increases the risk of reproducing errors, simplifications, or biases without detection. The documentary analysis shows that this situation not only affects the quality of the knowledge produced, but also has ethical implications, as it dilutes human responsibility in the validation of knowledge.

Consistently, the literature points out that conceptual mastery allows for the formulation of more relevant questions, the adequate interpretation of the responses generated, and the establishment of clear limits on the use of technology. In this sense, knowledge of the field is configured as an indirect ethical competence, as it enables the exercise of critical judgement and informed decision-making.

Critical judgement and evaluation of results

Critical judgement emerges as a category closely linked to doubt and conceptual mastery. In the documents analysed, critical judgement is defined as the ability to evaluate the quality, consistency and relevance of the information generated by artificial intelligence, considering both technical and contextual criteria. This ability differs from simple factual verification, as it involves a broader analysis of the assumptions, implications and possible consequences of the results obtained.

The document analysis reveals that numerous authors warn against the tendency to confuse discursive fluency with veracity.

Artificial intelligence systems can produce texts or responses that are highly coherent from a formal point of view, which can create a false sense of reliability. In the face of this phenomenon, critical judgement is presented as an indispensable tool for avoiding the uncritical acceptance of automated content.

Likewise, the reviewed texts emphasise that critical judgement cannot be automated or completely delegated to technology. Although there are tools designed to detect errors or inconsistencies, the ethical evaluation of results requires a situated interpretation that can only be performed by a human agent. In this way, critical judgement is configured as a competence that preserves human agency in algorithm-mediated environments.

Human responsibility and decision-making

Human responsibility is another central category identified in the analysis. The reviewed documents agree that, although artificial intelligence can participate in recommendation or decision support processes, the ultimate responsibility for actions and their consequences lies with the people who design, use or interpret these systems. This distinction is essential to avoid the undue attribution of moral agency to technologies that lack intentionality and consciousness.

The document analysis shows that one of the risks most frequently highlighted in the literature is the externalisation of responsibility, understood as the tendency to justify decisions by appealing to the technical authority of AI. In this context, human responsibility is diluted, and decisions are presented as inevitable or neutral, when in reality they are mediated by prior choices of design, use and interpretation.

The texts analysed emphasise that assuming responsibility implies recognising the situated and contextual nature of decisions mediated by artificial intelligence. This includes taking responsibility for the possible social, educational or professional effects of such decisions, as well as the inherent limitations of the systems used.

Human responsibility, in this sense, is linked to the need to maintain a reflective and critical stance towards technology.

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Awareness of the limits of automation

Awareness of the limits of automation emerges as a cross-cutting category in the document analysis. The texts reviewed emphasise that artificial intelligence operates within specific frameworks defined by data, algorithms and programmed objectives, and that its ability to understand complex contexts or ethical dimensions is inherently limited. Recognising these limits is essential to avoid excessive expectations or inappropriate uses of the technology.

The literature analysed identifies a concern about the tendency to extend the use of artificial intelligence to areas where decisions require ethical sensitivity, contextual understanding and human deliberation. In response to this trend, awareness of limits is presented as a skill that allows us to define which tasks can reasonably be supported by AI and which should remain under direct human control.

This category is closely linked to responsibility and critical judgement, as recognising the limits of automation implies accepting that not everything that is technically possible is ethically acceptable. Awareness of limits therefore contributes to establishing a framework for responsible use that preserves the role of humans in meaningful decision-making.

Intentionality and sense of use

Another category identified in the results is intentionality in the use of artificial intelligence. The documents analysed highlight that the ethical use of technology requires clarity regarding the ends pursued and the values that guide its application. Intentionality differs from mere functionality in that it involves reflection on the purpose and impact of AI use in specific contexts.

The analysis shows that the absence of explicit intentionality can lead to an instrumental and uncritical use of artificial intelligence, where technology is applied for convenience or external pressure, without reflection on its relevance. In contrast, texts that address intentionality emphasise the importance of aligning the use of AI with clearly defined and ethically justified human objectives.

This category is related to the preservation of meaning in human action, as intentionality allows the use of technology to be placed within a framework of values and responsibilities. In this way, AI is conceived as a means and not as an end in itself.

Body–mind relationship and cognitive externalisation

Finally, the document analysis identifies a recurring reflection on the relationship between body, mind and technology. Several of the texts analysed question the idea that thought can be completely externalised without loss of meaning. From this perspective, artificial intelligence is understood as a system capable of processing information, but not of experiencing, feeling or assuming consequences.

The documents reviewed point out that human thought is linked to bodily, emotional and social experience, dimensions that cannot be replicated by algorithmic systems. The externalisation of cognitive functions therefore raises questions about which aspects of thought can be delegated and which must remain anchored to human experience.

This category articulates several of the previous ones, highlighting that the ethics of artificial intelligence use is not limited to technical correctness, but involves a profound reflection on the nature of thought, agency and human responsibility in contexts of increasing automation.

Synthesis of analytical categories

In summary, the results of the documentary analysis allow us to identify a network of interdependent human competencies that structure the ethical use of artificial intelligence. Doubt emerges as the articulating axis that activates critical judgement, conceptual mastery, responsibility, awareness of limits and intentionality.

These categories do not operate in isolation, but rather form a system of ethical provisions that allow human agency to be sustained in the face of advanced cognitive technologies.

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Conclusions

The analysis developed throughout this article allows us to affirm that the ethical and responsible use of artificial intelligence does not depend exclusively on regulatory frameworks, technical principles or external regulations, but fundamentally on the human competencies that mediate its use. Based on the documentary analysis carried out, it is evident that the growing sophistication of cognitive technologies has intensified the tendency to delegate thought, evaluation and decision-making processes, which poses ethical challenges that cannot be resolved solely through engineering or automation.

One of the main contributions of this study is to position doubt as a central ethical competence in the relationship between human beings and artificial intelligence.

Doubt, understood as an active reflective disposition, allows us to suspend the automatic acceptance of results generated by algorithmic systems and reintroduce human judgement into processes that are increasingly mediated by technologies. Far from representing indecision or insecurity, doubt is a necessary condition for preserving human agency, as it opens up a space for questioning the validity, relevance and scope of automated responses.

In the field of education, various authors agree that the incorporation of artificial intelligence needs to be accompanied by training processes aimed at developing critical thinking and digital citizenship. Recent literature emphasises that the ethical use of these technologies cannot be separated from people's ability to understand their scope, identify risks and take responsibility for decisions mediated by automated systems. In this context, training in critical skills is recognised as a key element in avoiding technological dependence and preserving human agency in educational contexts mediated by artificial intelligence [Imaicela et al., 2025]. Cifuentes [2025] warns that the uncritical use of artificial intelligence tools in educational contexts can lead to an undue delegation of human judgement, weakening critical thinking and fostering excessive reliance on automated systems that lack ethical and contextual understanding. However, the analysis also shows that doubt alone is insufficient if it is not articulated with other fundamental human capacities.

In this sense, the study highlights the importance of conceptual mastery of the field of work, critical judgement, responsibility, awareness of the limits of automation, and intentionality as interdependent ethical dimensions.

These competencies make it possible to evaluate the information generated by artificial intelligence, contextualise its use, and assume the consequences of the decisions made, avoiding the uncritical externalisation of responsibility towards technology. The conclusions of the documentary analysis indicate that one of the most significant risks associated with the use of artificial intelligence is the confusion between technical efficiency and ethical legitimacy.

The ability of algorithmic systems to produce consistent and functional results can create an illusion of neutrality and objectivity that inhibits human questioning. In the face of this risk, strengthening ethical competencies is an indispensable strategy for counteracting the uncritical acceptance of automated solutions and sustaining reflective and responsible decision-making processes. The study also emphasises that artificial intelligence lacks moral agency, consciousness and bodily experience, which prevents it from being held ethically responsible for the consequences of its use. This finding reinforces the need to maintain responsibility in the human sphere, both in the design and in the implementation and interpretation of cognitive technologies.

Delegating decisions without assuming the corresponding responsibility implies a progressive renunciation of human agency and an erosion of the ethical sense of action. Another relevant conclusion of the article is the need to recognise the inherent limits of automation. The analysis shows that not all tasks or contexts are susceptible to ethical support from artificial intelligence. In areas where decisions involve values, contextual understanding, human sensitivity or significant social consequences, the intervention of technology must be carefully delimited.

Awareness of these limits is a key ethical competence in avoiding inappropriate or decontextualised uses of artificial intelligence.

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From a broader perspective, the study's conclusions invite us to rethink the relationship between human thought and technology. The outsourcing of cognitive functions raises not only operational questions, but also ontological and ethical ones, about what it means to think, decide and take responsibility in a technologically mediated environment. The article argues that human thought cannot be reduced to information processing, as it is anchored in bodily, emotional and social experience, dimensions that are absent in algorithmic systems.

In terms of theoretical contribution, this work provides an integrative conceptual framework that allows us to understand the ethics of the use of artificial intelligence as a network of interdependent human competences, articulated by doubt.

This approach shifts the focus from the question of what technology can do to a reflection on what human beings must preserve when interacting with advanced cognitive technologies. In this sense, doubt is proposed not as an obstacle to innovation, but as a necessary condition for guiding its development and use in a responsible manner. The implications of the study are particularly relevant to the educational, academic and professional fields.

Training in the responsible use of artificial intelligence cannot be limited to learning technical tools or skills, but must incorporate the deliberate development of ethical competencies such as critical judgement, responsibility and awareness of limits. Promoting doubt as a formative capacity involves encouraging reflective practices that enable people to question, evaluate and decide autonomously in the face of increasingly influential technologies.

Finally, it is important to recognise the limitations of this study. As it is a documentary analysis, the findings are based on the interpretation of academic and regulatory texts, which does not allow for a direct account of the specific practices of artificial intelligence use in specific contexts. However, this limitation does not detract from the conceptual contribution of the work, but rather opens up the possibility of future empirical research exploring how the identified ethical competencies manifest themselves in real experiences of interaction with artificial intelligence.

In conclusion, this article argues that the ethics of artificial intelligence use cannot be automated or delegated, as it depends on human competencies that preserve agency, meaning, and responsibility. In a context of increasing outsourcing of thought, doubt emerges as an indispensable ethical competency that allows for a critical and reflective relationship with technology. Strengthening these competencies is a central challenge for contemporary societies and an indispensable condition for the truly responsible use of artificial intelligence.

Declarations

Conflict of interest

The authors declare that there are no conflicts of interest associated with the preparation of this article. No competing financial interests or personal or professional relationships that could have inappropriately influenced the content or results of the study have been identified.

Contribution of the authors

All authors contributed equally to the design of the study, the development of the theoretical framework, the analysis of the documentary material, and the writing and revision of the final manuscript. Each author actively participated in all stages of the research process, ensuring that academic and scientific responsibility was distributed equally among all collaborators.

Availability of data and materials

The data used in this study correspond exclusively to publicly accessible documentary sources, such as scientific articles, book chapters, and institutional documents consulted for the analysis. No original empirical data sets were generated. The materials analysed are available in academic repositories and specialised databases and can be consulted using the references included in the article.

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Abbreviations

AI: Artificial Intelligence

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Article

Sociocultural and Academic Factors Associated with Engineering Career Choice among Female University Students in Northern Mexico

Factores socioculturales y académicos asociados a la elección de carreras de ingeniería en mujeres universitarias del norte de México

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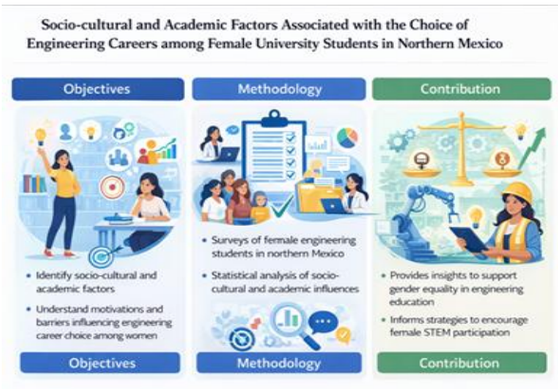
Abstract

The objective was to analyze the factors that influence women to remain in engineering careers. A quantitative approach was adopted with a non-experimental, cross-sectional design and a correlational explanatory scope. A 22-item instrument was used with a random sample of 370 female engineering students. An exploratory factor analysis was conducted using a structural equation model to determine the behavior. It was found that the variable Y_Engineering_Choice obtained a Pearson correlation coefficient of determination [R^2] of 0.496. Two research hypotheses were accepted as they were significant, meeting the critical criteria of a T-value ≥1.96 and a p-value ≤0.05, resulting in t = 3.006 and p = 0.003 for X1_Sociocultural_Factors; t = 13.043, p = 0.000 for X2_Academic_Factors; Finally, for X3_Personality_Factors, t=0.808 and P-value=0.420. It is established that personality factors do not significantly influence women's decisions to enter engineering.



Sociocultural factors, academic factors, personality factors, engineering choice

Resumen

El objetivo fue analizar los factores que influencian a las mujeres a permanecer en las carreras de ingeniería. Se adopta un enfoque cuantitativo con un diseño no experimental, de corte transversal y un alcance explicativo correlacional. Se utilizó un instrumento de 22 ítems y una muestra aleatoria de 370 alumnas de ingeniería. Mediante un modelo de ecuaciones estructurales, se llevó a cabo un análisis factorial exploratorio para determinar el comportamiento. Se descubre que la variable y elección ingeniería obtuvo un coeficiente de correlación de determinación de Pearson R2 de 0.407. Se aceptan dos hipótesis de investigación al resultar significativas al cumplir con los criterios valor critico de T ≥1.96 y un P-Value ≤0.05, resultando t=3.006 y P-value=0.003 para X1_Factores_socioculturales y t=13.043, P-value=0.000 para X2_Factores_Académicos. Se establece que los factores de personalidad no influyen significativamente en las decisiones de las mujeres para ingresar a las ingenierías dando como resultados un t=0.808 y un P-value=0.420

Factores socioculturales, factores académicos, factores de personalidad, elección de ingeniería

Area: Advocacy and attention to national problems

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Introduction

Women have faced great challenges in making the decisive decision to venture into areas defined by specialists as exclusively male-dominated fields of engineering. Women have been characterised by their perseverance and poise in overcoming obstacles in all areas and achieving equality. The role of women has traditionally been associated with aspects of family and domestic life [Buquet et al., 2013; Fernández Rius, 2008; McKendall, 2000; Minerick, Wasburn and Young, 2009; Moors et al., 2014; Preciado Cortés et al., 2015; Rhoton, 2011], while men have their primary responsibilities in the world outside the home. In the work of Hill Collins [1990], the idea of 'navigating gender' is revisited, placing contemporary Western feminist critical thinking, where the social subject is conceptualised as an entity with free will.

According to the Global Gender Gap Report [2017], gender parity is an essential element in the growth, competitiveness, and projections of economies and businesses [Schwab et al., 2017]. This is a field dominated by men, who have imposed themselves above women's rights to 'govern' and establish laws on top of those already in place.

Various authors refer to the female gender and its incursion into the workplace. Schuster, A., Puente, M., Andradra O., and Maiza, M., [2013] consider it a paradigm, a stereotype [National Institute of Statistics and Informatics, 2012] and, at times, a stigma; Moreno, Bastidas & Ramos [2020], for their part, consider women to be outside the norm for exceeding the imposed stereotypes. Since time immemorial, this has represented a tireless struggle to position themselves in such a competitive context.

The academic sphere has been no exception, especially in those fields labelled as 'for men,' where women have redoubled their efforts to enter, remain, and establish themselves in university programmes: engineering. Escolano [2006] questions the evolution of gender figures as one ascends the hierarchical levels of the university education system, given that the proportion of women enrolled in university is higher than that of men. The path has not been easy, and many women have given up during their training and joined the ranks of female university dropouts.

Of those who have completed their studies, few, at least according to the statistics, have pursued their engineering specialisation, instead becoming mothers and/or housewives. Or, in cases that are not as isolated as one might think, they have become brilliant professionals, establishing themselves in a competitive labour market that is, in most cases, dominated by men.

Their results are comparable to those of any engineer, and in some cases even surpass them. This indicates that gender is just that, a fact that for years has led to women being considered the weaker sex, but today, in these times, that term must be rethought. We must recognise the consolidation of results, the performance of indicators, the achievement of work goals, and acknowledge that beyond gender, there is talent, a virtue that has allowed women engineers today to be on a par with any male engineer.

This distinction between female [Cubillas, M., Valdez, E., Domínguez, S., Román, R., Hernández, A. and Zapata, J., 2016] and male [Arredondo et al., 2019] roles is what Valian [1998] calls 'gender schemas'.

The entry of women into the workforce has led to a series of changes: wages, economic security [Bello, 2020], labour force [Organisation for Economic Co-operation and Development, [OECD], 2019], human development, competitiveness [Thomas et al, 2015]. Recent studies in Mexico have begun to investigate how gender structures career choices in the field of engineering, as well as women's experiences in their professional training in this area [García y González y González, 2014; Gutiérrez y Duarte, 2011].

In Mexico, according to the OECD [2015], only 13% of women said that their parents expect them to work in these areas [Oliveros Ruiz, et al, 2016]. Reports published by Elsevier [2017] show that the career paths women embark on place them in the dilemma of deciding between the generally exclusive dichotomy of starting a family or having the opportunity to develop professionally, something that does not happen among men. Mendivelso Ramírez, I. [2017] points out that motherhood often plays a decisive role in the career paths of future female engineers and that daughters are somehow forced to find a balance between their family and professional life plans.

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According to López [2020], the School of Higher Studies was founded on scientific and philosophical knowledge, with women making up 15% of enrolments. By 1926, this had increased to 78%. In the 19th century, women's access to higher education [De Garay and Del Valle-Díaz-Muñoz, 2012; UNESCO, 2012; UNESCO] 2019] and the professions initially developed in the Mexican capital, which was the intellectual centre of the country [Cano, 1996]. By 2020, 31% of national enrolment [ANUIES, 2020]. Historian Patricia Mazón notes that the admission of women to higher education [Quintanilla, 2005; Cano, 1996] did not only mean removing barriers [Martínez, 2008; Palomar, 2011], but also careful selection for university admission [Mazón, 2003].

A similar situation occurred in Spain, where 25% of university students are women [Instituto de la Mujer, 2016 cited in Rozas, 2021]. According to the National Institute of Statistics and Informatics [2012], university degrees or engineering degrees account for 7.6% of female enrolment. Benso [2003] points out that access to higher education presented a series of challenges for women [Jiménez, 2016]: opening the door to female emancipation. Subirats [1994] shows that throughout that century, progress was very slow in terms of women's right to higher education.

Zepeda & Villagómez [2021] argue that admission and gender stereotypes are a significant obstacle, but an interest in mathematics [López, M., 2020], physics and science plays an important role in women's decision to enter engineering [Castellanos, 2015]. Avendaño [1977] considers that career choice is influenced by a person's perception of their ability to meet the demands of the career. Galván [1985] points out that women were discouraged from entering university, and it was not until the turn of the century and the Mexican Revolution that more women enrolled at the National University.

Connell [2003] stated that throughout the world there is a mixture of social [López, M., 2020] and cultural relationships that pressured women not to enter the ‘masculine’ world of engineering. However, their emergence has been highest in the last twenty-five years, as Rodríguez [2000] cites in comparison with other areas and careers that are more popular with women.

On the economic side, the possibility of increasing development in Mexico and women represent an important potential for this task [Lucas, S. D., & ETSIIT, S. 2016].

The interviews revealed that many women chose these careers because of their interest in mathematics, physics and the environment, as well as having relatives in engineering. The students mentioned problems such as misogynistic comments and male employment preference. Despite this, women are positioning themselves as leaders in these areas [Razo, 2008]. Some others were influenced by their families with backgrounds in these areas, but cultural barriers and gender stereotypes also persist [García, 2002].

This research aims to determine the level of involvement that sociocultural, academic, and personality factors have on women who have decided to enter engineering.

Three hypotheses have been defined:

H1: Sociocultural factors have a positive and significant influence on women's entry into engineering.
H2: Academic factors have a positive and significant influence on women's entry into engineering.
H3: Personality factors have a positive and significant influence on women's entry into engineering.

To change the size, type and number of letters for editing purposes, they must be of high quality, not pixelated, and must be visible even when the image is reduced in scale.
Source [in italics]

Methodology

The research adopts a quantitative approach with a non-experimental, cross-sectional design and an explanatory scope with causal correlation. For data analysis, SMART PLS-SEM v3.02 [Ringle et al., 2015] and SPSS Statistics 29, IBM, were used.

The purpose of this section is to obtain consent from the participants in this research and to provide a clear explanation of the nature of the research, as well as the role and functionality of each of the participants.

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Participation in this study is strictly voluntary and anonymous, with an express guarantee that the information collected will be used entirely for research purposes, safeguarding the identity and integrity of the content.

If you have any questions about the study, you may ask them at any time by contacting us at: hector.escobar@tecsanpedro.edu.mx. Similarly, you are invited to withdraw from this research at any time without prejudice. To participate in the study, you were asked to answer a series of questions, which would take approximately 15 minutes.

The measurement instrument used consists of 22 items and was applied to 370 female students studying computer systems, industrial, business management, and logistics engineering. Following a review of the literature, the study will validate the relationship between the multiple factors of the independent variables: sociocultural, academic, and personality factors on the dependent variable Engineering_choice. Data was collected through a questionnaire in Google Forms, using a five-point Likert scale, where 1 is the lowest value [never] and 5 is the highest [always].

Construct reliability was analysed, which is a more advanced measure that takes into account the individual factor loadings of each item and their errors. This makes it more accurate than Cronbach's alpha, especially in more sophisticated analyses such as confirmatory factor analysis [CFA] or structural equation modelling. Given that greater precision is required and the analysis is based on a factorial model, composite reliability could be a better indicator option. In addition, various analyses were carried out to validate the model assumptions in multiple linear regression, including tests of homoscedasticity, linearity, normality, and data fit and adequacy.

Box 1

Table 1

Distribution by Years

Years	N	Porcentage
17-19 years	235	63.5%
20-22 years	125	33.8%
23-25 years	10	2.7%
Total	370	100.0

Source: Own elaboration.

The average age for studying engineering is normally between 18 and 22. In recent years, there have been students aged 17, due to the fact that they completed a two-year secondary school programme. At the same time, statistics show that there are female students over the age of 22 who are still studying engineering. More than 60% of female students are between the ages of 17 and 19. Only a small percentage [2.7%] are between the ages of 23 and 25.

Box 2

Table 2

Distribution by Career

Career	N	Porcentage
Business Management Engineering	75	20.3%
Logistics Engineering	130	35.1%
Computer Systems Engineering	29	7.8%
Industrial Engineering	136	36.8%
Total	370	100.0

Source: Own elaboration.

There is an unequal distribution among the four engineering disciplines. However, the discipline with the highest number of women is industrial engineering, with 36.8%; industrial engineering is predominantly male [Moreno, Bastidas & Ramos, 2020]. Computer systems engineering has the lowest female enrolment, at 7.8%. The presence of women in this field of engineering is related to the graduate profile and the job market in which graduates will participate.

Box 3

Table 3

Distribution by Semester

Semester	N	Porcentage
Second semester	200	54.1%
Fourth semester	62	16.8%
Sixth semester	55	14.9%
Eighth semester	53	14.3%
Total	370	100.0

Source: Own elaboration

The distribution of female enrolment is associated with the type of engineering with which they have the greatest affinity upon entry. It is common to see that the number of female students entering engineering programmes is substantial, but as the semesters progress, the number of students decreases.

However, the table reflects a different effect.

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Box 4

Table 4.

Distribution by Location

Location	N	Porcentage
Urban	197	53.2%
Rural	173	46.8%
Total	370	100.0

Source: Own elaboration

The distribution of the origin of female students enrolled in engineering courses at the institute is shown. It is interesting to note that the rural sector continues to encourage its inhabitants to pursue a professional career, which for years has been labelled as "only for men".

Box 5

Table 5

Distribution by Average

Average	N	Porcentage
Less than 70 points	4	1.1%
70 – 79	58	15.7%
80 – 89	202	54.6%
90 – 100	106	28.6%

Source: Own elaboration

There is talk of "acceptable" averages for students in general. On this occasion, women mark a turning point in terms of academic achievement. Many of them excel in the student rankings, representing 87.7% with outstanding grades.

Box 6

Table 6

I like mathematics

	N	Porcentage
Yes	180	48.6%
No	190	51.4%
Total	370	100.0

Source: Own elaboration

The use and mastery of mathematical skills have long been a major challenge for female students today. Almost 50% express an interest in applied basic sciences.

Box 7

Table

Y_ Engineering selection

Cronbach's alpha	Number of items selected	Media	Standard deviation
0.837	4	2.8831	0.6373

Source: Own elaboration

It refers to the dependent variable Y_Engineering choice and consists of four items, which were the result of a model adjustment in a sample of 370 respondents. Its Cronbach's alpha shows an acceptable result: 0.837.

Box 8

Table 8

X1_ Sociocultural factors

Cronbach's alpha	Number of items selected	Media	Standard deviation
0.749	3	2.9159	0.44357

Source: Own elaboration

The first independent variable, X1_Sociocultural_factors, encompasses three items in a sample of 370 respondents. Its Cronbach's alpha shows an acceptable result: 0.749.

Box 9

Table 9.

X2_ Academic factors

Cronbach's alpha	Number of items selected	Media	Standard deviation
0.817	2	0.191	0.066

Source: Own elaboration

The second independent variable X2_ Academic factors. Contained in three items, in a sample of 370 respondents. Its Cronbach's alpha is: 0.817

Box 10

Table 10

X3_ Personality factors

Cronbach's alpha	Number of items selected	Media	Standard deviation
0.887	3	2.2500	0.70161

Source: Own elaboration

Table No. 10 refers to the independent variable X3_Personality_factors. It contains three items in a sample of 370 respondents. Its Cronbach's alpha shows an acceptable result: 0.887.

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Results

Box 11

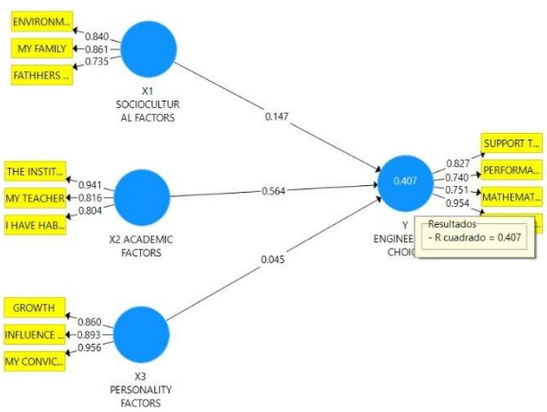

Figure 1

Pearson's correlation coefficient of determination R2

Source: Own elaboration

Figure 1 shows, with the help of SMART PLS v3.02 [Ringle et al., 2015], the results of the variables, where Y_Engineering_Choice obtained a Pearson R2 correlation coefficient of 0.407. Given their accuracy and analysis, they are above the minimum acceptable level.

Box 12

Table 11

Compound Reliability

	Fiabilidad compuesta
X1 Sociocultural factors	0.854
X2 Academic factors	0.891
X3 Personality factors	0.930

Source: Own elaboration

Table 11 shows the results of the variables using SMART PLS v3.02 [Ringle et al., 2015]. Given their accuracy and analysis, they are above the minimum acceptable level.

Box 13

Table 12

Pearson's correlation coefficient

	R square	R square adjusted
Engineering selection	0.407	0.402

Source: Own elaboration

The results for the variable Y_Engineering_choice are shown, which obtained a Pearson correlation coefficient R^2 of 0.407.

Box 14

Table 13

Path coefficients, Student's t-statistic, and P-value

	Original sample	Average of the	Standard deviation	Statisticians	P values
X1 Sociocultural factors – Y_Choice of Engineering	0.147	0.148	0.049	3.006	0.003
X2 Academic factors – Y_Choice of Engineering	0.564	0.564	0.043	13.043	0.000
X3 Personality Factors – Y_Choice of Engineering	0.045	0.048	0.056	0.808	0.420

Source: Own elaboration

Two research hypotheses are accepted as highly significant with a critical value of T >1.96 and a P-value <0.05. The P-value was set at < 0.001 for academic writing purposes.

Box 15

Table 14

Model summary

Model	R	R squared	Adjusted R-squared	Standard error of the estimate	Change statistics					Durbin-Watson
					Change in R squared	Change in F	gl1	gl2	Change in F	
1	0.704[a]	0.407	0.402	0.48710	0.496	119.827	3	366	>.001	1.923

a. Predictors: [Constant], X3 Personality factors, X2 Academic factors, X1 Sociocultural factors
b. Dependent variable: Y_Engineering choice

Source: Own elaboration

Using Pearson's R2 correlation coefficient statistic, 40.7% of the variability in the engineering choice model is explained by the variables: X3 Personality factors, X3 Academic factors, X1 Sociocultural factors. Likewise, with regard to the adjusted R2 of 40.2%, according to Hair et al. [2021], the coefficient of determination [R2] for these relationships >0.40 is considered acceptable. With regard to the Durbin-Watson statistic, the permitted threshold is met, as the parameters are between 1.5 and 2.5; in relation to Fisher's F >0.006, this indicates that the variability explained by the model is greater than the variability within the groups. This can be understood as statistically significant differences between the groups analysed. With regard to the degrees of freedom [n-1] and the variation of the means, it can be established that there is precision in the estimation of the distribution.

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Box 16

Table 15

Assumption of homogeneity of variances

Model		Sum of squares	gl	Quadratic mean	F	Sig.
1	Regression	85,293	3	28,431	119,827	<,001[b]
	Residual	86,840	366	,237		
	Total	172,132	369			

a. Dependent variable: Y Choice of Engineering
b. Predictors: [Constant], X3 Personality factors, X2 Academic factors, X1 Sociocultural factors

Source: Own elaboration

This statistical technique allows the means of three or more groups to be compared to determine whether there are significant differences between them. It evaluates the effect of independent variables at different times on the same groups. If the result is 0.001 < 0.005, it will be highly significant, indicating that at least one of the variables is accepted as a research hypothesis. This is because the variances of the groups appear to be approximately equal.

Box 17

Table 16. Predictive factor of the variables in the model

	SSO	SSE	Q^2 [=1-SSE/SSO]
X1 Sociocultural factors	1110.000	745.276	0.329
X2 Academic factors	1110.000	596.379	0.463
X3 Personality factors	1110.000	445.688	0.598
Y_Choice of Engineering	1480.000	748.029	0.470

Source: Own elaboration

Table 16 indicates that the predictive factor of the Q2 model refers to the model's ability to predict the quality of the product or service. In the context of the Q2 model, the predictive factor is used to evaluate the relationship between the independent variables and the dependent variable. Therefore, the latter indicates that the model explains approximately 47% of the variability in the dependent variable, which is considered moderate, i.e., it has acceptable predictive capacity, but not excellent. For the independent variables, X1 is explained by 32.9%, which is considered low or of limited impact in relation to the dependent variable; X2 explains approximately 46.3% of the variability and is interpreted as a moderate effect.

Finally, X3 is explained by 59.8%, interpreted as moderate-high, which means that the model has acceptable predictive power and explains a significant part of the variability in the dependent variable.

Box 18

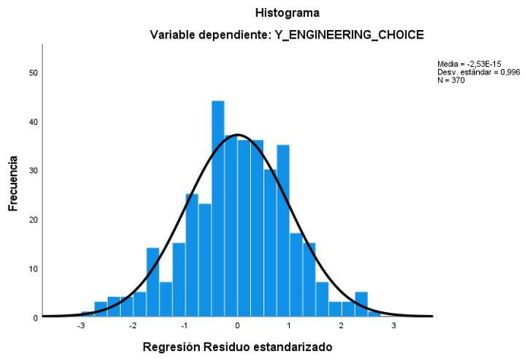

Figure 2

Assumption of normality

Source: Own elaboration

Box 19

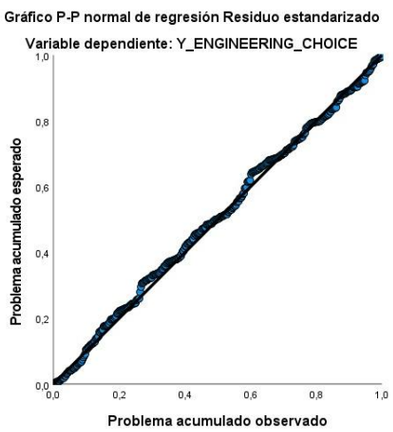

Figure 3

Independent Variable: Y Choice of Engineering

Source: Own elaboration

Complying with this assumption, which shows how the data is distributed around the mean. A symmetrical and mesokurtic behaviour can be seen in the Gaussian bell curve, adjusting the data and showing that it has a standard distribution in the observations. When performing multiple linear regression, the model assumes that the effects of the predictor variables on the response variable are represented by a straight line where all responses are adjusted to the average of the observed data, thus allowing for precision in the estimation of the coefficients and the effect of statistical inferences on variable Y. Choice of Engineering.

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Conclusions

In answering the research question, 'How do factors influence women's entry into engineering careers?', it is determined that after an exhaustive review of the literature and bibliometrics, different qualitative and quantitative studies agree that young women's decision to enter an engineering career is mediated by four blocks of factors: sociocultural: the gender stereotype with the discourse 'engineering is a man's job' is discouraging, while in role models, female references in the classroom and in the media strengthen the perception of women in the profession; educational: a high sense of personal competence was found that motivates women to pursue engineering for a career perceived as demanding.

Female students perceive greater ability in their prior mastery of mathematics, chemistry and physics and therefore feel more confident in choosing engineering; institutional: when working with the phenomenon under study, it was noted that universities use rankings for the employability of women in control and production processes, which positively influences career choice; When forming effective work teams, workshops, and mentoring programmes, female follow-up and sensitivity play an important role.

Finally, in terms of personality factors, there are different economic and family support resources that are involved in the emotional aspect, which are decisive in enabling young female engineers to enrol. In addition, opportunities for good salaries compensate for the family barrier of low job expectations.

The results of the study corroborated that, in relation to the hypotheses, three are accepted as significant with a critical value of T >1.96 and a P-Value <0.05, with respect to the variance inflation factor [VIF]. For H1_sociocultural factors, there is a positive and significant influence on women's entry into engineering, obtaining a value of T=3.006 and a P-Value=0.003; for H2_academic factors, there is a positive and significant influence on women's entry into engineering, with a value of T=13.043 and a P-Value=0.000. For H3_personality factors, there is no positive or significant influence on women's entry into engineering, with a value of T=0.808 and a P-Value=0.420.

When analysing the factors that influence women to enter engineering careers, a structural equation model was designed that shows the direct and indirect routes between the factors considered and the intention to enter and pursue a career in engineering.

The variability of the Y_Engineering_Choice model is shown at 40.7%, explained by the variables X1_sociocultural_factors: with a standardised β of 0.004 indicating a weak effect; X2_academic_factors with a standardised β of 0.877 showing a strong effect; X3_personality_factors with a standardised β of 0.069, showing a low, almost zero effect.

The statistical analysis was carried out using SPSS and SMAR PLS software to validate the model, with the help of Google Forms and Microsoft Excel as data collection tools, to validate the assumption of normality, linearity and homogeneity of the data.

The findings determined that women's decision to choose engineering careers is not an isolated process, but rather the result of the simultaneous interaction of different factors, which reinforce each other and help to confront stereotypes and different challenges.

Declarations

Conflict of interest

The authors declare that they have no conflict of interest. They have no known competing financial interests or personal relationships that could have appeared to influence the article reported in this article.

Contribution of the authors

Héctor Escobar: Participated in the conceptualization of the study, the methodological design, the statistical analysis of the data, and the interpretation of the results. Víctor Cárdenas contributed to the literature review, the construction of the theoretical framework, and the drafting of the manuscript.

Guillermo Benítez: Collaborated on data collection, the validation of the research instrument, and the critical review of the final content. All authors read and approved the final version of the manuscript.

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Availability of data and materials

If you have any questions about the study, you can ask them at any time by contacting the following email address: hector.escobar@tecsanpedro.edu.mx

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Abbreviations

Foncyt	Fund for Scientific and Technological Research

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Basics

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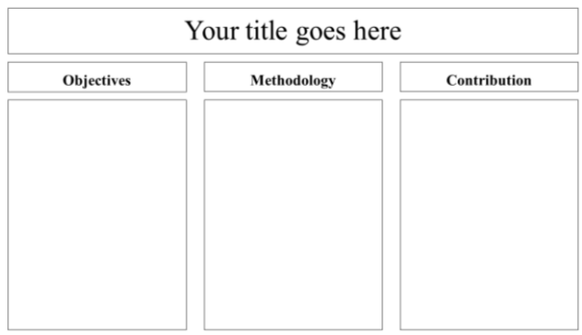

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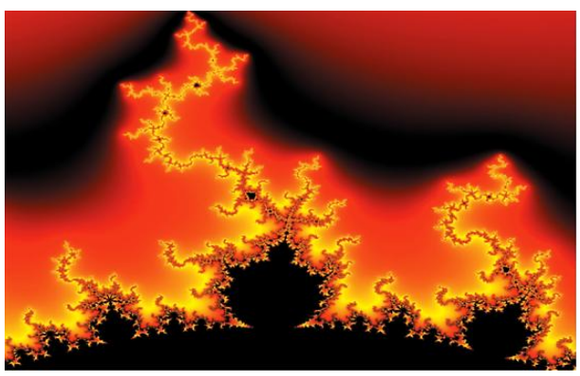

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