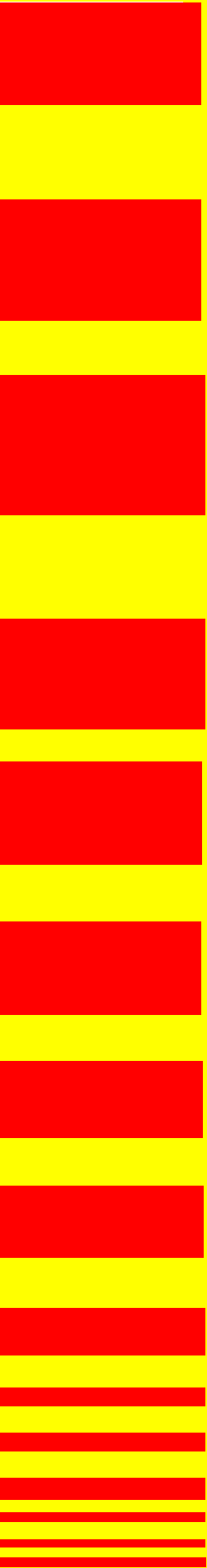


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As the first article we present, *Correlation between memory ability and age in older adults* by Rosales-Sánchez, Andrea, Ontiveros-Vargas, Angel Adrián, Santiesteban-Contreras, María Tereza and Vázquez-Ríos, Elda Raquel, with adscription in the FaPyTCH, UJED, as a second article we present, *The role of the accountant in the digital transformation of accounting through the application of Artificial Intelligence*, by Loayza-Pereira, Walter Arturo & Herrera-Freire, Alexander Geovanny, with adscription in the Universidad Técnica de Machala, as a third article we present, *Virtual reality for inclusion in community health*, by Flores-Azcanio, Nancy P., González-Hernández, Jorge Daniel and Echevarría-Chan, Ivonne, with adscription in the Universidad Politécnica del Valle de México, Universidad Autónoma Metropolitana and Tecnológico Nacional de México, as fourth article we present, *Rural electromobility: innovation for transportation in indigenous and rural communities*, by Eliseo-Dantés, Hortensia, Pérez-Garmendia, Gloria, García-Reyes, David Antonio and García Jerónimo, Beatriz, with adscription in the TecNM / Instituto Tecnológico de Villahermosa and TecNM / Instituto Tecnológico de Mérida, as next article we present, *Animals in the Middle Ages: another humanity*, by Sánchez-Usón, María José, with adscription in the Universidad Autónoma de Zacatecas "Francisco García Salinas", as next article we present, *Towards academic excellence in the training of music educators: challenges and perspectives*, by Martí-Reyes, Mireya, with adscription in the Universidad de Guanajuato, as last article we present, *Human Rights to Water and Food with gender perspective: Urgent call for inclusion of autonomy of women irrigation users, México 2025-2030*, by Monsalvo-Velázquez, Gabriela, with adscription in the Universidad Azteca.

Content

Article	Page
Correlation between memory ability and age in older adults Rosales-Sánchez, Andrea, Ontiveros-Vargas, Angel Adrián, Santiesteban-Contreras, María Tereza and Vázquez-Ríos, Elda Raquel <i>FaPyTCH, UJED</i>	1-8
The role of the accountant in the digital transformation of accounting through the application of Artificial Intelligence Loayza-Pereira, Walter Arturo & Herrera-Freire, Alexander Geovanny <i>Universidad Técnica de Machala</i>	1-11
Virtual reality for inclusion in community health Flores-Azcanio, Nancy P., González-Hernández, Jorge Daniel and Echevarría-Chan, Ivonne <i>Universidad Politécnica del Valle de México</i> <i>Universidad Autónoma Metropolitana</i> <i>Tecnológico Nacional de México</i>	1-6
Rural electromobility: innovation for transportation in indigenous and rural communities Eliseo-Dantés, Hortensia, Pérez-Garmendia, Gloria, García-Reyes, David Antonio and García Jerónimo, Beatriz <i>TecNM / Instituto Tecnológico de Villahermosa</i> <i>TecNM / Instituto Tecnológico de Mérida</i>	1-5
Animals in the Middle Ages: another humanity Sánchez-Usón, María José <i>Universidad Autónoma de Zacatecas "Francisco García Salinas"</i>	1-7
Towards academic excellence in the training of music educators: challenges and perspectives Martí-Reyes, Mireya <i>Universidad de Guanajuato</i>	1-11
Human Rights to Water and Food with gender perspective: Urgent call for inclusion of autonomy of women irrigation users, México 2025-2030 Monsalvo-Velázquez, Gabriela <i>Universidad Azteca</i>	1-7

Correlation between memory ability and age in older adults

Correlación entre la habilidad para la memoria y la edad en adultos mayores

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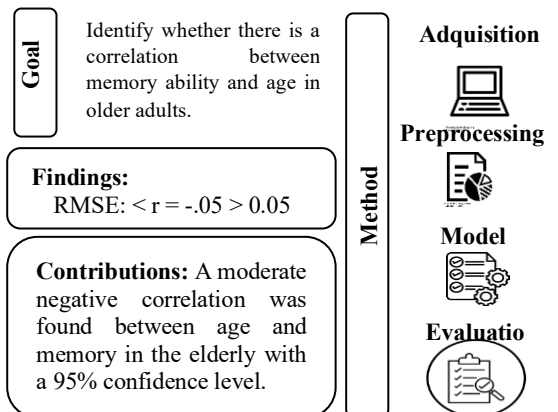


Abstract

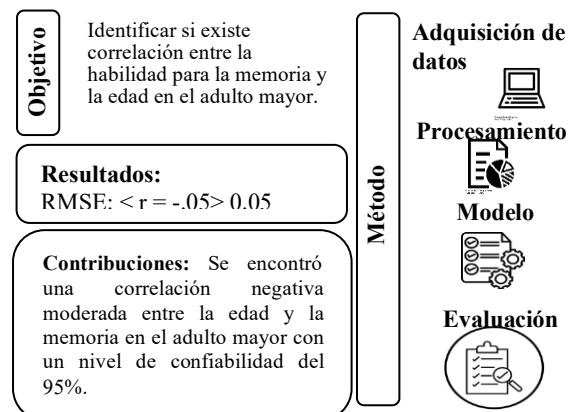
It is important to point out that old age is a substantive state, which is reached by a chronology of biological events, whose most visible and experiential manifestation is the functional wear and tear of daily life. In this article we identified the correlation between memory and age in the elderly, evaluated by means of the MINI-MENTAL test. Methodology: non-experimental, exploratory, observational research with correlational analysis. Contribution: in a sample of 19 participants, a moderate negative correlation was found between age and memory in older adults with an average of 78 years of age. Therefore, it is interpreted that the older the age, the lower the memory ability with an $r = -0.05$ and a $p = 0.05$ of reliability.

Resumen

Es importante señalar que la vejez es un estado sustantivo, a la cual se llega por cronología de sucesos biológicos, cuya manifestación mas visible y experiencial es el desgaste funcional de la vida cotidiana. En el presente artículo se identificó la correlación que existe entre la memoria y la edad en el adulto mayor, evaluados mediante en Test MINI-MENTAL. Metodología: investigación de tipo no experimental, exploratorio, observacional y con análisis correlacional. Contribución: en una muestra integrada por 19 participantes, se encontró una correlación negativa moderada entre la edad y la memoria en adultos mayores con una media de 78 años de edad. Por lo que se interpreta que a mayor edad, menor habilidad para la memoria con una $r = -0.05$ y una $p = 0.05$ de confiabilidad.



Memory, Elderly, Correlation.



Memoria, Adulto Mayor, Correlación

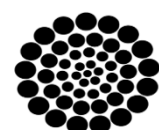
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Introducción

The affective or emotional component of the daily life of the older adult, often deprived of the warmth and support of the family group or a minimum of positive social interactions, confers different meanings to the gradual reduction of various biological, cognitive or sensory functions and, with it, a greater vulnerability to various agents or pathogenic factors. [Tello, 2020]

There are elements to take into account that determine the maintenance of cognition in the elderly patient such as; pathologies of the patient, social support, mood and the presence of geriatric syndromes such as frailty and osteopenia. [Zambrano, 2020]

With aging, there is the consequence of a degenerative process at the organic level, due to the accumulation of molecular errors, including in the brain. Dr. María Sagrario Manzano, a neurology specialist in Madrid at the Infanta Cristina Hospital, mentions that in the aging brain only certain areas involved in executive functions and memory are affected. Throughout this process, neurons decrease in size and others die [Riojas, 2021]

Memory and attention are higher brain functions that, under normal conditions, allow human beings to perform appropriately in personal and social life. To a large extent we are what we remember, and in doing so we can guide and inform our present and future behavior [Zanín, 2004].

Since these functions are of utmost importance for our life, the question arises whether mood influences the alteration of these functions, hence the objective of this research which is to know the processes of attention and memory and their relationship with mood in the elderly through the application of the following tests: Hamilton test, Beck test and mini-mental screening test.

Justification

It is known that memory and attention are main aspects of executive functions; with the passage of time the quality of life and health of people is affected by a decline in their functionality, which leads to consequences at social, mental and physical levels. [Riojas, 2021]

Age-related memory problems are a cognitive alteration considered normal, they are mild forgetfulness. It has been suggested as a normal stage in the elderly. This event is known as Age-Related Memory Impairment [ARMD], but this cognitive alteration is not considered a disease. [Sosa, 2016]

Carbajal [2007] explains that in our country most of the older adults who consult for memory loss do not have cognitive disorders, what they present are these subjective memory losses, where they believe they present a decrease of some cognitive function but in reality this loss is not made known after the corresponding tests have been performed. This subjective loss is strongly related to anxieties, fears of developing dementia, relationship conflicts and attention problems of older adults. [Sosa, 2016].

According to the above mentioned and seeing the importance of attention and memory in daily life, it was considered important to conduct this research in order to verify the impact that the mood of older adults may have in relation to the loss or deterioration of attention and memory.

Based on the above, the interest of this research is to investigate attention and memory in older adults and their relationship with mood.

Problem

Depression is a common illness worldwide, with an estimated 3.8% of the population affected, including 5.0% among adults and 5.7% among adults over 60 years of age. Approximately 280 million people worldwide have depression. Depression can become a serious health condition. It can cause the affected person to suffer greatly and function poorly at work, at school and in the family. In the worst cases, depression can lead to suicide. More than 700 000 people die due to suicide every year [INEGI, 2021].

According to the World Health Organization [WHO] dementia and depression affect approximately 5% and 7% of the world's elderly population, respectively. Anxiety disorders affect 3.8% of the older population. [INEGI, 2021].

Older people with depressive symptoms have poorer functioning compared to those with chronic medical conditions such as lung disease, hypertension or diabetes. [GOB, 2017].

Hypothesis

Ho: “Age is not a factor influencing memory ability in the older adult.”

Hi: “Age is a factor that influences memory ability in the older adult.”

Objectives

General objective: to identify whether there is a correlation between memory ability and age in older adults.

Specific objectives

- To know the total score of the memory subsection of the Mini Mental Test.
- Determine the mean age of the study population.

Theoretical framework

Background:

Older adult

In Mexico, older adult is considered a person who is over 60 years old and refers to the stage that adds up all the experiences of life and goes through most of the family, professional and social goals. But it also marks the beginning of a stage where people present conditions of physical, social and economic vulnerability. [GOB, 2017]

Aging involves a series of physical, psychological and social changes related to changes in all organs, including the brain. With the passage of time, a series of cognitive modifications begins involving memory, language, perception and attention. These cognitive changes constitute one of the central factors of the late stages of life. [Ardila, 2007]

Individuals between 55 and 74 years of age are considered senile young, senile old those over 75, and senile older those over 85 years of age. [Ardila, 2007]

Aging

Human aging is a dynamic process and not a static one; it is a natural process of change. Therefore, it does not occur suddenly or accidentally, but is gradual and progressive. It is characterized by the existence of biological, psychological and social conditions determined as a function of time [Tortosa, 2002]

Aging is a multifactorial phenomenon, which affects all levels of biological organization, from molecules to physiological systems. However, this biological phenomenon does not always coincide with the chronological one [Allevato, 2008]

Aging is a process inherent to human nature. All men of all times and cultures, transit and will continue to transit through aging. But it is worth noting that this process is highly differential and asynchronous in its manifestations [Binotti, 2009].

There is a great variation among individuals, since each person ages differently due to physical and physiological characteristics, personality structure and life history, as well as the socioeconomic context in which he/she develops. [Comachione, 1999]

Human aging is becoming a relevant topic for current research in all fields; however, there is still little information and dissemination on the topic of aging, which professionals should study in depth to improve the quality of life of the elderly and promote healthy and active aging.

Pathological deterioration in the older adult

Mainly it is necessary to clarify that there is a healthy aging that is the physiological aging process that develops chronologically in a normal way according to the standards of biological, physiological and psychological changes that are gradual and irreversible in the process of human development and a pathological aging that deviates below the ranges classified as normal. [Falqué, 2014]

The key is to recognize and make known to every human being that the aging organism is not necessarily sick; healthy aging is possible. Many problems can be avoided or reversed [Allevato, 2008].

The important thing is to reach old age, the last stage of the aging process with quality of life, surrounded by conditions not only material, but also affective, emotional, that provide an economic, social and spiritual balance. [Falqué, 2014]

The World Health Organization [WHO] has defined active aging as the process “by which opportunities for physical, social and mental well-being are optimized throughout life, with the aim of extending healthy life expectancy, productivity and quality of life in old age”. [INEGI, 2021].

Allevato & Gaviria tells us that, although at the moment it is not possible to stop the aging process, you can work to obtain a good quality of life. He mentions that the ideal would be to reach old age with a good cognitive level, adaptation to the changes associated with age, including some disease or degree of physical disability, a good level of socialization and life satisfaction. [Allevato, 2008].

Memory:

Memory is a neurocognitive function that allows recording, encoding, consolidating, retaining, storing, retrieving and recalling previously stored information. While learning is the capacity to acquire new information, memory is the capacity to retain the information learned [Portellano, 2005].

Basically, we can establish two main memory modalities according to the time elapsed for its storage: short-term memory and long-term memory. [Portellano, 2005].

Short-term memory [STM]

It is the process of initial retention of information for a short period of time ranging from a few fractions of a second to several minutes, although some authors place the time limit of short-term memory at 30 seconds. Before any perceptual processing of information can take place, it is necessary that a sensory encoding of the stimuli to be memorized takes place, so that within short-term memory there are several modalities: sensory memory, immediate memory and working memory. [Portellano, 2005].

Long-term memory [LTM]

is the ability to retain information for longer periods of time or permanently. LTM also refers to the ability to recall information after an interval of time in which the subject has focused his attention on another task. [Portellano, 2005].

Mini Mental Screening Test

The Mini-Mental State Examination [MMSE] is a written test commonly used as part of the process when considering a diagnosis of dementia, with a maximum score of 30, with lower scores indicating more severe cognitive problems.

It is one of the most widely used tools worldwide for its brevity and easy application it has 10 areas of assessment: spatiotemporal orientation, three-word register, attention fixation, memory, verbal nomination, repetition and comprehension, reading, writing and visuospatial construction, The cut-off point established for the MMSE defines "normal" cognitive function and is generally set at 24, although theoretically it could be anywhere between 1 and 30 [Llamuca, 2020].

It is mandatory when starting the test to begin by collecting the patient's data, as well as their degree of schooling and work they did before retirement [year in which they started school and year of completion, approximately]. This will also help to create a degree of trust with the patient and facilitate their collaboration.

If we analyze the MMSE, we see that it consists of 5 sections: [1°] Orientation, [2°] Fixation, [3°] Calculation and attention, [4°] Memory and [5°] Language and praxis. When carrying it out, we should not interrupt it, especially the sequence of fixation, calculation and attention and memory. Between the 1st and 2nd, and between the 4th and 5th we can make a brief pause if the patient gets tired or is very nervous, trying to reassure him and tell him that it is not an exam.

Range Level of cognitive impairment

< 24 Probable cognitive impairment
> 24 No cognitive impairment

With all this we will have reached the end of the test and we will have to make the correction for age and cultural level. After reviewing the MMSE we reach the following agreement.

Schooling refers to the age of completion of studies, not to the number of years of schooling. Broadly speaking, the first group includes those who have not completed primary school, the second group includes those who have completed primary school and those who have completed high school, and the third group includes those who have completed high school or a degree.

Patients with depression and anxiety usually score low on this type of test due to impaired attention and concentration, without being indicative of MCI or dementia [the response of "I don't know, I don't know" to simple orientation or calculation questions is characteristic, and they end up performing if we insist that they pay attention and make an effort.

Research methodology

The present study is exploratory, non-experimental, observational and cross-sectional, with a descriptive statistical analysis.

The complex variable of memory was analyzed for its relationship with neurocognitive functions by means of Mini Mental. In addition, the following variables were considered: age, gender and school grade.

For the statistical analysis of the population studied, measures of central tendency and dispersion were used.

Procedure

The participants were patients attending a geriatric center called "taking care of those who gave us life" in the city of Durango. Data collection was carried out during the month of February 2021, culminating at the end of February of the same year.

Informed consent was obtained after signing the informed consent in accordance with the official Mexican standards 004-ssa3-2012 on the clinical record and 040-ssa2-2004 on information, and the instruments for data collection and interpretation of the results were applied.

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The identification of the signalistic variables and academic performance [gender, age and school average] was obtained through the application of a clinical survey. Statistical analysis of the information obtained was performed using Excel software.

The inclusion criterion was limited to all those patients in the group who agreed to be part of the sample and signed the informed consent corresponding to the Mexican official standards [NOM-004-SSA3-2012 for the clinical record and NOM-040-SSA2-2004 on information] prior to their participation in the evaluation. Elimination criteria were discarded for participants who left any of the evaluation tests unfinished, previous neurodegenerative diseases and non-attendance at evaluations, as well as patients who wished to withdraw from the study. According to these criteria, out of a total of 20 patients, 10 were eliminated, leaving a total of 10 valid cases for the investigation.

Results

The sample studied was made up of 19 participants, who attend the "Geronto-geriatric Center: taking care of those who gave us life", of which 8 correspond to individuals of the female gender and 2 of the male gender [See graph 1].

Box 1

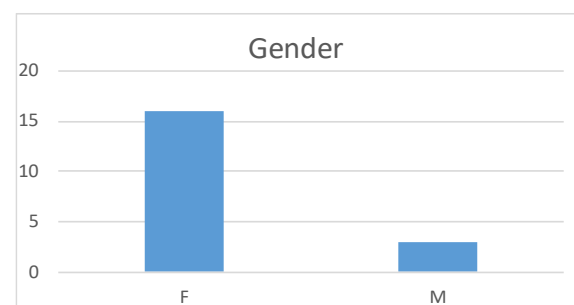


Figure 1

Gender of the simple

The mean age of the participants was 78.3 years, with the minimum being 55 years and the maximum being 88 years, with a mode of 71 years and a mean of 82.5, the standard deviation was 10.57. The reliability of the results obtained in the evaluation of the Beck Depression Test was with a Chronbach's alpha of .90 [excellent reliability].

As for the results obtained from the evaluation of the memory of the subtest of the MINIMENTAL Test, the following results were obtained. [See graph 2].

Box 2

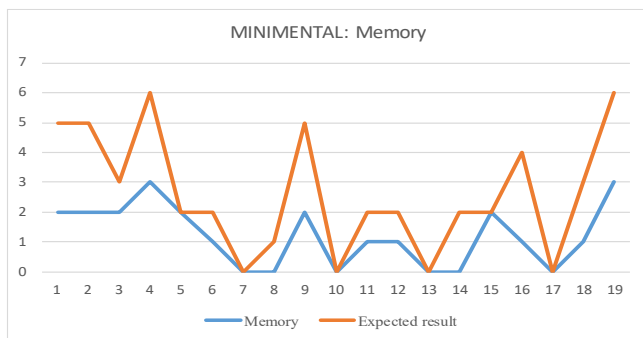


Figure 2

MINIMENTAL: Sub test memory

Regarding Pearson's correlational analysis between age and memory in people older than 78 years, it was found that there is a moderate negative correlation of $r = -.05$ with a reliability of 95%. This means that the older the person is, the lower the memory ability in older adults [See graph 3].

Box 3

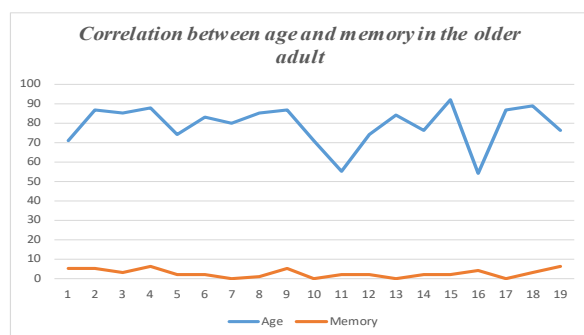


Figure 3

Correlation, age and memory.

Therefore, in the present investigation, the alternative hypothesis is accepted with a value of moderate negative significance with an $r = -.05$ and with a reliability of $p = 0.05$ which refers that, in a moderate negative way, the older the age, the lower the memory ability in older adults.

It is essential to emphasize that the results obtained in this population cannot be extrapolated, since it is a small sample from a single site. Comparisons with other institutes would be necessary to evaluate the state of cognitive functions more broadly and accurately.

Conclusion

Identifying the aspects involved in older adults is fundamental, since neuropsychological alterations can be prevented with timely evaluations and with the purpose of improving the quality of life of those who once cared for us.

With aging, there is the consequence of a degenerative process at the organic level, due to the accumulation of molecular errors, including in the brain. Dr. María Sagrario Manzano, a neurology specialist in Madrid at the Infanta Cristina Hospital, mentions that in the aging brain only certain areas involved in executive functions and memory are affected. Throughout this process, neurons decrease in size and others die [Riojas, 2021]

In the case of the limitations of this research, it is recommended to expand the sample by including a larger number of participants from different rehabilitation centers.

Additionally, it is suggested to increase the participation of professionals in human communication therapy during the rehabilitation steps of this addiction. In this way, along with the behavioral work, a therapeutic plan focusing on neurocognitive processes in adults could be evaluated and structured.

Declarations

Conflict of interest

Rosales Sánchez, Andrea.
Ontiveros Vargas, Angel Adrián.
Santiesteban Contreras, María Tereza.
Vázquez Ríos, Elda Raquel.

We declare that we have no conflicts of interest, either competitive or financial. In addition, we have no interest in personal relationships that could have influenced the article.

In addition, we declare that we have no conflict of interest with the publisher, the members of the editorial and arbitration board or committee.

Authors' Contribution

The contribution of each researcher in each of the points developed in this research, was defined based on:

Rosales-Sánchez, Andrea: Contributed to the project idea, research method and technique. He supported the design of the field instrument. He carried out the data analysis and systematisation of results, as well as writing the article.

Ontiveros-Vargas, Angel Adrián: Carried out the systematisation of the background for the state of the art. She supported the design of the field instrument. She also contributed to the writing of the article.

Santiesteban-Contreras, María Tereza: contributed to the research design, the type of research, the approach, the method and the writing of the article.

Vázquez Ríos, Elda Raquel: He supported the design of the field instrument.

Availability of data and materials

The data obtained were previously authorized by the geriatric center called “taking care of those who gave us life” in the city of Durango, as well as from the participants in this research by means of informed consent.

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Abbreviations

APA	American Psychiatric Association
DSM-V	Diagnostic and statistical manual of mental disorders
IMMS	Mexican Institute of Social Security
INAPAM	According to the National Institute of Older Adults
INEGI	National Institute of Statistics and Geography
MMSE	The Mini-Mental State Examination
NOM	Mexican Official Standards
WHO	World Health Organization
NOM	Mexican Official Standards
OMS	World Health Organization

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The role of the accountant in the digital transformation of accounting through the application of Artificial Intelligence

El rol del contador en la transformación digital de la contabilidad a través de la aplicación de la Inteligencia Artificial

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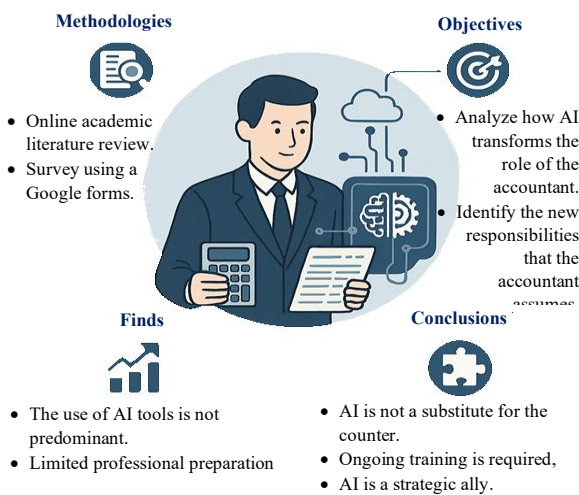
Abstract

The study analyzes how artificial intelligence is revolutionizing accounting and the role of the accountant in the digital context. Based on an online literature review, based on up-to-date academic sources, different points of view about the effect of Artificial Intelligence on accounting functions were examined. The objective is to identify the importance of accountants obtaining new digital skills and adjusting to technological platforms. The findings indicate that, although most recognize the advantages of Artificial Intelligence in the efficiency and accuracy of accounting work, there is also limited preparation. It is concluded that constant training is crucial to keep professionals up to date and have a strategic impact on decision-making. Instead of replacing the accountant, Artificial Intelligence emerges as an ally that enhances their skills, and creates new possibilities for the profession.

Resumen

El estudio analiza la manera en que la inteligencia artificial está revolucionando la contabilidad y la función del contador en el contexto digital. Basándose en una revisión bibliográfica en línea, fundamentada en fuentes académicas actualizadas, se examinaron diferentes puntos de vista acerca del efecto de la Inteligencia Artificial en las funciones de contabilidad. El objetivo es identificar la importancia de que los contadores obtengan nuevas competencias digitales y se ajusten a plataformas tecnológicas. Los hallazgos indican que, a pesar de que la mayoría reconoce las ventajas de la Inteligencia Artificial en la eficacia y exactitud del trabajo contable, también se nota una preparación limitada. Se concluye que la formación constante es crucial para mantener profesionales actualizados y tener un impacto estratégico en la toma de decisiones. En lugar de sustituir al contador, la Inteligencia Artificial emerge como un aliado que potencia sus habilidades, y crea nuevas posibilidades para la profesión.

The Role of the Accountant in the Digital Transformation of Accounting Through the Application of Artificial Intelligence



El Rol del Contador en la Transformación Digital de la Contabilidad a Través de la Aplicación de la Inteligencia Artificial



Artificial Intelligence, Accounting, Digital Transformation

Inteligencia artificial, Contabilidad, Transformación digital

Area: Development of strategic leading-edge technologies and open innovation for social transformation

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Peer review under the responsibility of the Scientific Committee [<https://www.marvid.org/>]- in the contribution to the scientific, technological and innovation **Peer Review Process** through the training of Human Resources for the continuity in the Critical Analysis of International Research.



1. Introduction

Digital transformation is profoundly impacting the accounting sector, with artificial intelligence [AI] playing a leading role in optimizing processes, reducing errors and strengthening data-driven financial decisions. This technology allows automating routine tasks, applying predictive models on financial information and significantly improving fraud and anomaly detection. [Appelbaum, Vasarhelyi, M.A., & Yan, Z, 2022].

Unlike other automated tools, AI has the ability to learn and evolve, making accounting processes increasingly efficient and accurate. In this sense, it does not replace the accountant, but rather expands his role, allowing him to focus on strategic activities such as tax planning, financial analysis and consulting. Far from representing a threat, AI becomes a powerful ally that strengthens the work of the professional accountant. [IFAC, 2021].

These technological innovations require a profound change in the accountant's profile. It is no longer enough to master basic digital tools; a combination of technical knowledge, advanced digital skills and strong professional ethics is required. [Gartner, 2022]. In this new context, the accountant must not only act as a user of the technology, but also as an active player in its implementation, ensuring a transition aligned with the strategic objectives of the organizations.

However, one of the main challenges to achieving a true digital transformation is the lack of preparation. This gap is not limited to the technical aspect, but also encompasses scarce continuing education, limited investment in technology and the persistence of outdated academic programs. As they warn, this situation is aggravated by the fear of being replaced by technology, which prevents taking full advantage of the potential offered by artificial intelligence.

This lack of digital skills is observed even in areas such as accounting, auditing, law and taxation, where, despite advances, there is still a significant gap between technological development and professional training. [IFAC, 2021].

However, those who choose to adapt find that Artificial Intelligence does not represent a threat, but an opportunity to reinvent their role and generate greater value. As Susskind and Susskind [2015] argue, accounting professionals will not disappear, but they will need to evolve to maintain their relevance in an era marked by collaboration between human knowledge and artificial intelligence.

At the organizational level, this resistance to change is particularly visible in small and medium-sized companies, which continue to use traditional methods due to fear, inertia or the perception that emerging technologies are costly, complex or of uncertain benefit. This situation is intensified by the shortage of personnel trained in the implementation of AI, which significantly limits the adoption of innovations in the accounting field.

In the Ecuadorian context, this reality represents a contradiction with the provisions of Article 385 of the Ecuadorian Constitution. [Constitución de la República del Ecuador, 2008], which establishes the State's commitment to promote equitable access to science, technology and innovation as instruments for development and improvement of the quality of life.

Against this backdrop, this study emphasizes a key aspect: the role of the accountant is crucial for the successful integration of artificial intelligence in accounting. It is not only a matter of managing technological systems, but of assuming an active role as an agent of change that articulates accounting knowledge with technology, without neglecting the ethical dimension of their professional practice. When accountants assume this role with leadership, adequate training and strategic vision, many of the obstacles begin to disappear, and investment in technology ceases to be perceived as an expense, becoming a firm commitment to sustainable development.

1.1 Objective of the study

The objective of this research is to analyze how digitalization is modifying the functions and skills linked to the professional performance of accountants.

In a context characterized by technological progress, not only have new tools been incorporated, but also the profile required by different sectors to perform accounting tasks has been reconfigured.

To understand this transformation process, it is crucial to begin with a description of the most relevant technological advances that are impacting accounting practice, with special emphasis on artificial intelligence as a revolutionary element. Therefore, the objective is to analyze how the traditional duties of the accountant are being redefined within the framework of digitalization, in addition to recognizing the new technical, digital and analytical competencies required by the contemporary work environment.

In addition, we seek to examine the degree of preparation and ability of accountants to adapt to the challenges posed by digital transformation. In this study, it is important to investigate the strategic role played by the accountant in corporate decision-making processes, in contexts driven by intelligent technologies.

In this context, artificial intelligence is presented as a main agent of transformation, gradually adopting reiterative operational functions and contributing to increase the accuracy and quality of accounting decision-making processes. [Kokina, J., & Davenport, T. H., 2017].

In addition, the contribution of neuroscience is relevant, as it facilitates the understanding of the cognitive processes involved in learning, adaptation and decision making. This insight is valuable in describing why accountants should enhance skills such as critical reasoning, cognitive adaptability and emotional intelligence.

These skills become essential in a work environment increasingly marked by the fast pace of technological innovation, where the human gains a new role. Nowadays, the practice of public accounting goes beyond the pure handling of normative and quantitative elements. The increasing automation of technical tasks requires accounting experts to acquire interpersonal, communication and strategic thinking skills, which are becoming key factors in professional performance.

Modern accounting is not restricted to compliance with tax or regulatory responsibilities, but also focuses on active participation in important decision-making processes for organizations, consolidating bonds of trust and offering a global perspective that automated systems are not yet able to emulate.

Therefore, preparing for the future means not only renewing technical knowledge, but also fostering personal skills that facilitate building meaningful relationships, generating added value and practicing the profession holistically and ethically.

In this context, although technical skills continue to be the mainstay of accounting practice, the real professional trait lies in human skills: ethics, empathy, clarity in communication and critical judgment. It is this combination of technical knowledge and soft skills that makes the accountant an essential professional in today's landscape.

2. Methodology

This analysis opted for a combined method, merging qualitative and quantitative instruments to gain a deeper understanding of the role that the accountant is playing in the process of digitalization of accounting, particularly with the inclusion of AI.

On the one hand, a bibliographic analysis was conducted, based on modern digital sources such as scientific publications, digital books and specialized research. This phase made it possible to understand the current status of the academic debate on Artificial Intelligence in areas closely linked to accounting, such as auditing, finance, law and taxation.

The second stage, of a quantitative nature, an online survey was developed and implemented, distributed with a Google form. The questionnaire was completed by accounting experts, which facilitated the collection of authentic views and experiences of the work environment. The questionnaire included 10 questions, focusing on two key elements of the study:

Variable 1:

Level of knowledge and use of artificial intelligence by accountants.

Variable 2:

Perception of the impact of AI on their professional role.

The results achieved were examined through descriptive statistics [such as frequencies and percentages], which facilitated the identification of patterns and trends about how accountants are approaching technological transformations and how empowered they perceive themselves in the face of the progress of artificial intelligence in their field of work.

In the accounting field, artificial intelligence is automating monotonous tasks, enabling accountants to focus on more strategic and analytical functions, demanding new competencies such as data analysis and interpretation [Appelbaum et al., 2017].

In the field of auditing, artificial intelligence is revolutionizing financial valuation by enabling more accurate identification of anomalies and fraud, enabling constant and proactive monitoring. [Yoon, Hoogduin y Zhang, 2015].

In the economic sector, artificial intelligence enhances analysis, risk assessment and investment management by handling data in real time and creating predictive models that improve decisions and boost efficiency and profitability.

In business and taxation, Artificial Intelligence automates tasks such as contract review and regulatory analysis, optimizing the interpretation of the law, although it raises questions about entrusting legal judgments to algorithms. [Surden, 2014].

In the tax field, the implementation of intelligent technologies is optimizing both taxpayer compliance procedures and the supervision procedures of public entities.

Studies such as the one conducted by Beretta, Demartini and Trucco [2020] show that algorithms are able to identify inconsistencies in tax returns, simplify digital audits and foresee tax risk behaviors. However, this technological progress requires continuous updating of the accounting expert's skills.

Research such as that conducted by Beretta, Demartini and Trucco [2020] evidences how algorithms can identify irregularities in returns, conduct digital audits and anticipate risky tax behaviors.

Undoubtedly, this increases the efficiency of the tax system, although it also requires constant updating of the accountant's skills to face new regulatory and technological challenges.

In all situations, preference was given to current, reliable and academically backed documents, which facilitated the construction of a complete perspective of how artificial intelligence is revolutionizing the accounting profession from various perspectives. This research modality not only facilitated the grouping of different points of view, whether theoretical or practical, but also made it possible to analyze trends endorsed by the global scientific community.

The literature review [in exploratory research such as this] is essential for understanding the phenomenon under analysis, as it facilitates the formation of links between previous studies and the present context. [Hernández-Sampieri, Fernández-Collado & Baptista-Lucio, 2014].

3. Results

This analysis adopted a combined methodology, merging a literature review with data collection through an online survey of experts in the accounting field. The mix of methods made it possible to understand both the theoretical-academic context and the perceptions and practical experiences of the experts.

3.1 Results by variable

Variable 1: Level of knowledge and use of AI.

A question related to this variable was:

Box 1

Table 1

Do you currently use artificial intelligence tools in your accounting work?

Age	Yes	No	I do not know / I am not sure[a].
20 to 30	3	21	10
31 to 40	2	35	18
41 to 50	0	47	4

Box 2

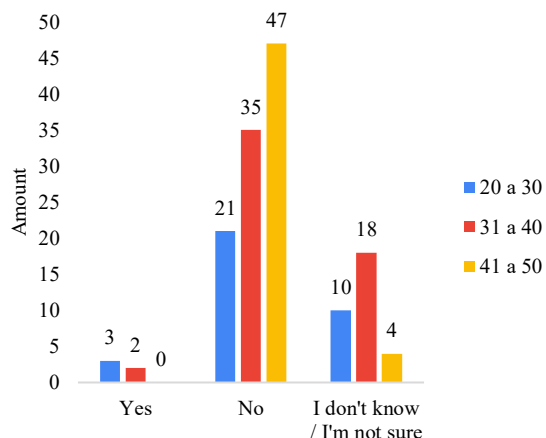


Figure 1

Do you currently use artificial intelligence tools in your accounting work?

Principal findings:

A considerable percentage of the participants in the survey expressed a general or average understanding of Artificial Intelligence, although not all of them implement it directly in their professional work.

The use of Artificial Intelligence tools is not yet predominant, indicating a gap between theoretical knowledge and its practical application.

The majority indicated that they had not obtained specific education in Artificial Intelligence during their university studies or job training, which underlines the urgency of a professional update.

Variable 2: Perception of the impact of AI on the accountant's professional role.

A question associated with this variable was:

Box 3

Table 2

Do you consider that AI is transforming the accountant's professional practice?

Age	Yes, significantly	Yes, but moderately	Not yet, but will soon	It is not transforming the profession	I do not have a formed opinion
20 a 30	13	4	17	0	11
31 a 40	17	5	15	0	12
41 a 50	16	6	13	0	11

Box 4

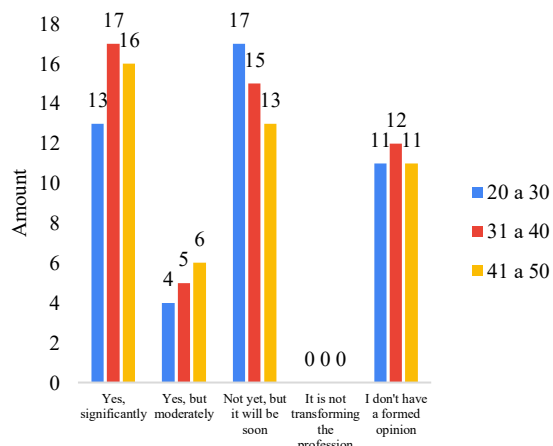


Figure 2

Do you consider that AI is transforming the accountant's professional practice?

Principal findings:

There is a very common perception that Artificial Intelligence will not fully replace the accountant, but will be an additional resource. It is also clear that the education provided by universities is considered insufficient, indicating a gap between academic education and the demands of the labor market.

Numerous participants in the survey expressed that the responsibility for failures made by Artificial Intelligence systems should be shared between developers, users and organizations.

In the short and medium term, a transformation of the accountant's role towards a more analytical, strategic profile focused on informed decision making is anticipated.

Although some experts consider themselves prepared, many admit that they require more training to face the technological challenges of the digital era.

3.2 Analysis overview

Based on data collected through the survey, a favorable attitude towards the adoption of technologies was observed, although this is intensified by an uncertainty resulting from poor preparation. This finding underscores the imperative need to review and renew both university-level educational programs and continuing education projects to include digital skills and knowledge in artificial intelligence [AI].

The current implementation of AI-based technologies by accounting experts is still in its infancy, indicating that technology adoption in this sector is still at an early stage of evolution.

3.3 Interpretation of data

The data shows that AI is bringing about a relevant change in accounting practice, although its effective implementation depends largely on the professional's training and ability to adapt. Not only do accountants need to understand the operational elements of AI; they must also develop critical and ethical competencies that will enable them to properly oversee its implementation.

This analysis highlights a disparity between the rapid progress of technology and the current training of those practicing the profession, which poses a significant challenge for both educational institutions and accounting regulatory authorities. Digitalization is not an ephemeral phenomenon, but a structural transformation that is significantly changing the dynamics of organizations. It is a cross-cutting combination of digital solutions focused on improving processes, increasing efficiency in operations and generating added value.

In the field of accounting, this change has been driven by the emergence of technologies such as Big Data analysis, cloud computing and, especially, artificial intelligence.

When AI is mentioned, it refers to the ability of technological systems to replicate some cognitive functions characteristic of human beings, such as learning, data processing, problem solving and decision making.

In the field of accounting, this involves the application of resources such as machine learning, natural language processing and specialized systems. These solutions make it possible to automate reiterative processes, identify anomalies or potential scams, and examine large volumes of data more quickly and accurately than conventional procedures.

This scenario is drastically changing the traditional perspective of accounting. The task is no longer restricted solely to the implementation of accounting rules and principles, but requires a more strategic perspective, focused on the analysis and projection of future situations.

Today, the accounting expert has extended his or her role beyond the pure recording of operations, becoming a crucial agent in the interpretation of real-time data and in assisting in decision-making within the entity. Faced with this new scenario, the accountant's profile is built on three fundamental dimensions:

3.3.1 Technical dimension. - Detailed understanding of accounting principles, current regulations and accuracy in financial records remains essential.

3.3.2 Technological dimension. - Functional management of digital tools and intelligent systems, which are transforming working methods in accounting practice, is essential.

3.3.3 Ethical dimension. - A solid commitment to the responsible and clear use of Artificial Intelligence is necessary, preserving respect for the principles of privacy, professional integrity and ethics in decision making.

This analytical approach facilitates understanding how artificial intelligence is changing the professional profile of the accountant and what skills he/she must cultivate to lead this transformation process efficiently and responsibly.

3.4 Evolution of the accountant's professional profile

Historically, the accountant has been recognized as the person responsible for financial control in entities, with responsibilities focused on manual recording of transactions, creation of accounting records, reconciliation of bank accounts and reporting. While these tasks remain critical, the work environment has undergone a significant transformation with the implementation of emerging technologies.

The incorporation of solutions such as automated accounting software, enterprise resource planning [ERP] systems and innovations based on artificial intelligence [AI] has transformed the skills expected of the accountant. No longer restricted to recording data, he or she is expected to be able to analyze complex financial information, provide strategic guidance and forecast economic situations through the use of predictive tools.

This transformation has redefined the accounting practice, giving it a more analytical, strategic and information-driven decision-making perspective. Some of the most significant changes include:

From recorder to analyst: AI gradually automates day-to-day tasks, allowing the accountant to focus on understanding results, identifying patterns and formulating projections.

From strategy compliance: The accounting expert, in addition to fulfilling legal responsibilities, is actively involved in financial planning and optimizing the use of resources.

From technical to digital: The management of technological platforms and intelligent tools has become a crucial skill for today's accountant.

From the personal to the community: Increasingly, accounting practice is carried out in multidisciplinary contexts, with specialists in data science, information technology and business analytics.

Rather than diminishing in importance, the accountant is taking on a more strategic and cross-cutting role in organizations. Their ability to adapt, constant education and the acquisition of new competencies are becoming crucial elements to remain active in a constantly changing environment.

3.5 Current implementations of Artificial Intelligence in Accounting

AI no longer represents an encouraging future, but a tool that is palpably revolutionizing contemporary accounting practice. Through its implementation, financial processes are becoming faster, more accurate and more efficient.

Among the most notable implementations are:

Automating daily processes: activities such as invoice classification, bank reconciliations and reporting are managed by intelligent systems, allowing the accountant to focus on tasks of greater complexity and significantly reduce the incidence of human error.

Machine learning-based financial projections: AI has the ability to examine large amounts of historical data to detect patterns and formulate financial projections, simplifying the organization of cash flows and more accurate decision making.

Assisted auditing and early anomaly identification: Some algorithms make it easier to identify atypical behavior or inconsistencies in accounting records, improving fraud identification and increasing audit accuracy.

Natural Language Processing [NLP]: This technology allows the study of unstructured documents, such as agreements or emails, obtaining relevant information for accounting procedures.

Digital assistants and chatbots: Several companies have implemented solutions that facilitate the response to common queries, the creation of real-time reports and immediate access to financial information through conversational interfaces.

Automated regulatory updates: Artificial Intelligence also has the ability to monitor changes in tax and accounting regulations, ensuring that returns and reports conform to current regulations.

These features not only increase efficiency, but also enable accountants to take on a more strategic role, focusing on analysis, data interpretation and decision support for the organization.

3.6 Challenges and possibilities in the age of Artificial Intelligence

The use of artificial intelligence in the accounting field is an important opportunity to update the profession, but it also presents several challenges that demand preparation, readiness for change and a vision for the future.

3.6.1 Main Challenges

Lack of digital skills: Many experts still lack the technical competencies required to handle AI-based tools, which restricts their effective application.

Resistance to transformation: The misconception that artificial intelligence could replace the accountant generates many fears, hindering the technology adoption process. However, it is important to emphasize that AI is not intended to replace the professional accountant, but to enhance his or her capabilities, allowing him or her to focus on strategic tasks and decision making with human judgment.

Ethical and legal issues: The implementation of algorithms raises questions about transparency, the safeguarding of personal information and the distribution of responsibilities in the event of automated failures. For this reason, clear and ethical regulations are needed to guide these practices.

3.6.2 Emerging opportunities

Greater efficiency and reduction of errors: The automation of tasks considerably reduces the risk of errors and increases the quality of the work, facilitating a more effective accounting administration.

Transformation of the professional profile: Accountants, instead of becoming outdated, have the possibility of moving towards more strategic roles, based on analysis and specialized consulting.

Transformation of the professional profile: Accountants, instead of becoming old-fashioned, have the possibility of moving towards more strategic roles, based on analysis and specialized consulting.

Protagonism in the digital transformation: Accountants trained in technology have the ability to lead innovation processes in organizations, establishing themselves as protagonists of the transformation.

4. Conclusions y recommendations

Conclusiones

Technological progress, especially the advance of artificial intelligence, has radically transformed the accounting process. Actions that previously required manual intervention and were performed systematically can now be automated, enabling the accounting expert to devote his or her time to tasks of greater strategic and analytical relevance.

The accountant's role has progressed beyond conventional duties such as documenting transactions or complying with regulations. Today, it is anticipated that they will become actively involved in data analysis, valuable knowledge creation and strategic decision making with the help of technological tools.

Today, total control of accounting principles is not enough. Technological skills, the ability to sift through large amounts of information, and interpersonal skills such as ethics, effective communication and complicated problem solving are also needed.

Despite attempts by accountants to adjust to the new digital environment, there are still significant differences in terms of access to training and technological resources. This restricts the full integration of innovative tools in professional practice.

The accountant stands out as a crucial participant in the organization's decision making, due to his specialized knowledge and his ability to efficiently employ intelligent technologies. This mix gives them a significant role in the elaboration of business strategies.

The progress of digital transformation in accounting is not based solely on the adoption of cutting-edge technologies. Its real triumph is based on the attitude and willingness of the experts leading this transformation. It is the accountant's ability to adjust, acquire knowledge and lead that will define his or her importance in this new era. In this context, artificial intelligence does not replace, but enhances the value that humans can provide.

Recommendations

It is vital for accounting experts to keep abreast of the use of emerging technologies. It is essential to acquire knowledge about the operation and practical use of these tools in order to maintain their importance in the work environment and provide considerable added value. Both educational institutions and entities must modernize their methods in relation to the accountant's profile. It is essential to educate and attract professionals with a more complete perspective, able to play more strategic roles in organizations.

It is advisable to invest in training processes that merge the use of digital technologies with the strengthening of soft skills. This mix of technical skills and human skills is essential to face the challenges of the current labor market.

It is crucial to create opportunities for constant updating. Companies, professional unions and educational institutions must take a proactive role in the training of accounting staff, fostering a culture of constant learning.

It is necessary to encourage the accountant's involvement in strategic areas of the company. Their holistic perspective and career path can contribute significantly beyond the economic, enhancing the decision-making process in various sectors of the organization.

Declarations

Conflict of interest

The authors declare that there is no conflict of interest related to the preparation and publication of this scientific article. They have no financial interests or personal relationships that could have influenced the development, content, or results of the study presented.

Authors' contribution

This article was prepared in collaboration between Loayza Pereira, Walter Arturo, who developed the methodological framework, data analysis and recommendations; and Dr. Herrera Freire, Alexander Geovanny, who formulated the theoretical-critical analysis, interpreted the results from a strategic perspective and wrote the academic conclusions. Both authors approved the final version of the article.

Loayza-Pereira, Walter Arturo: Responsible for Introduction, Objective of the study, Methodology, Variable 1: Level of knowledge and use of AI, Descriptive results and data analysis, Current implementations of Artificial Intelligence in accounting, Recommendations.

The author Loayza Pereira, Walter Arturo, contributed to the development of this article by preparing the introductory framework, formulating the general objective and structuring the methodology used.

He also led the collection and analysis of data on the current use of artificial intelligence in the accounting field, with special emphasis on its practical application, as well as the development of strategic recommendations for strengthening the professional profile of the accountant.

Herrera-Freire, Alexander Geovanny: Responsible for Review of the theoretical framework [AI, digital accounting, digital transformation, professional ethics], Variable 2: Perception of the impact of AI on the professional role of the accountant, Interpretative and prospective analysis of the accountant's profile, Challenges and possibilities in the era of AI, Conclusions, Critical and academic view on the strategic role of the accountant.

Dr. Herrera Freire, Alexander Geovanny, has contributed with the theoretical and analytical development of the article, providing a critical review on the impact of artificial intelligence on the accounting profession. He also elaborated the analysis of the change in the accountant's profile, identifying the main ethical, professional and technological challenges, and actively collaborated in the construction of the conclusions that support the need for strategic adaptation in the digital environment.

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Abbreviations

IA	Intelligence Artificial
IFAC	International Federation of Accountants
ERP	Enterprise Resource Planning
NLP	Natural Language Processing
Big Data	Conjunto de datos masivos o análisis de datos en masa [No es una sigla tradicional, pero se considera una abreviatura común]

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Virtual reality for inclusion in community health

Realidad virtual para la inclusión en salud comunitaria

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Abstract

Design of a virtual tour as a tool for inclusion in community healthcare, developed for the Comprehensive University Clinic of UNEVT, within the framework of the TIAPYC Node. The proposal integrates technological innovation and territorial relevance through the use of 360° photography, institutional narrative, and accessibility strategies. The study is based on the recognition of inequalities in access to healthcare services in rural areas of the State of Mexico and draws on concepts such as digital literacy and emerging technologies with an educational focus. It also considers previous experiences with the use of virtual reality in clinical settings, although the present case has not yet been evaluated with users. Furthermore, the importance of technology transfer models with social impact is discussed. The virtual tour is projected as a replicable tool that strengthens the relationship between the university and the community and promotes digital and territorial inclusion.

Resumen

Diseño de un recorrido virtual como herramienta de inclusión en salud comunitaria, desarrollado para la Clínica Integral Universitaria de la UNEVT, en el marco del Nodo TIAPYC. La propuesta articula innovación tecnológica y pertinencia territorial mediante el uso de fotografía 360°, narrativa institucional y estrategias de accesibilidad. El estudio parte del reconocimiento de las desigualdades en el acceso a servicios de salud en zonas rurales del Estado de México y se apoya en conceptos como alfabetización digital y tecnologías emergentes con enfoque educativo. También se consideran experiencias previas del uso de la realidad virtual en entornos clínicos, aunque el presente caso aún no ha sido evaluado con usuarios. Además, se discute la importancia de los modelos de transferencia tecnológica con impacto social. El recorrido virtual se proyecta como una herramienta replicable que fortalece la relación entre universidad y comunidad y promueve la inclusión digital y territorial.



Virtual Reality, Technology Transfer, Community Health



Realidad Virtual, Transferencia Tecnológica, Salud Comunitaria

Area: Development of strategic leading-edge technologies and open innovation for social transformation

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Peer review under the responsibility of the Scientific Committee [<https://www.marvid.org/>]-in the contribution to the scientific, technological and innovation Peer Review Process through the training of Human Resources for the continuity in the Critical Analysis of International Research.



Introduction

Equitable access to health services is a fundamental human right. However, in many regions of the State of Mexico—especially in rural and peri-urban areas—significant gaps persist in the use and utilisation of these services. Among the factors that limit effective access are misinformation, geographical distance, lack of trust in medical institutions, and low digital literacy [Arteaga-Yáñez, Mocha-Román, Vélez-Castillo & Zambrano-Requelme, 2025]. These elements, combined with contexts of structural poverty and cultural diversity, exacerbate inequalities in community health.

Against this backdrop, emerging technologies, particularly virtual reality [VR], offer a strategic opportunity to improve the relationship between health institutions and the communities they serve. VR allows the creation of immersive environments accessible from any device with an internet connection, providing users with a visual and spatial experience that facilitates understanding and symbolic appropriation of institutional places before visiting them in person [Yañez-Santaolalla, Gómez-Dantés, Piña-Pozas, Lloyd, Betanzos-Reyes & Arenas-Monreal, 2025].

In this context, the State University of the Toluca Valley [UNEVT], in collaboration with the TIAPYC Node [Technology, Innovation, Productive Autonomy and Consumption], accredited by the National Institute of Social Economy [INAES], is promoting the design of an interactive virtual tour of its Comprehensive University Clinic.

This initiative is part of a broader strategy of digital transformation and social inclusion that links university education with territorial development. The virtual tour is conceived as an educational and social tool aimed at reducing cultural, cognitive and technological barriers, while strengthening links between the university and the communities that use its services. The project is based on a vision of technology transfer with regional relevance, where the knowledge generated in the classroom is converted into concrete solutions to improve people's quality of life.

This article aims to describe the design process of the virtual tour, detail the pedagogical and technological foundations that support it, and reflect on its potential as a training tool.

Although the resource is still in the development phase and has not been evaluated by end users, it is projected as a replicable and scalable model, whose next application is planned at the Intercultural University of the State of Mexico [UIEM], adapting it to contexts with cultural and linguistic diversity.

Theoretical foundations

The design and implementation of digital technologies with a social focus requires conceptual support from multiple perspectives: technological, educational and community. In this sense, virtual reality [VR] has gained relevance in recent decades as a tool with high educational potential, due to its ability to simulate environments, facilitate discovery learning and generate meaningful experiences. Its use has spread to various fields, including health, architecture, tourism, education, and professional training. VR allows the creation of immersive environments accessible from any device... facilitating understanding and symbolic appropriation [Yañez-Santaolalla, Gómez-Dantés, Piña-Pozas, Lloyd, Betanzos-Reyes & Arenas-Monreal, 2025].

In the field of community health, VR has been used to recreate hospital tours, teach preventive practices, and train medical staff in complex procedures. For patients, the ability to virtually explore a clinical space before visiting it helps to reduce fear, familiarise them with the services and build trust in the care process [López-Isola, F. S., & Íncera-Fernández, D. 2025]. In communities with low exposure to technology, these experiences also help to introduce the use of digital tools in an intuitive way.

On the other hand, the concept of digital literacy plays a central role in this project. According to UNESCO [2022], digital literacy is not limited to the technical use of devices, but involves the ability to access, understand, use and transform digital information into useful knowledge. From this perspective, the virtual tour is not only an informative tool, but also a means of digital inclusion that enables the population to develop basic skills in navigation, interpretation of multimedia content and informed decision-making regarding their health.

The approach of this project is also aligned with the principles of socially meaningful technology transfer, understood as the process by which knowledge and products developed at the university are transferred to the environment to solve specific needs. Through the TIAPYC Node, this transfer is articulated under a model of territorial innovation, where the participation of community actors and the local relevance of knowledge are fundamental elements.

Likewise, the project is part of university-community outreach strategies promoted by public policies for social inclusion, regional development and the knowledge economy. The participatory methodology adopted for the design of the tour reinforces this link, as it actively involves institutional staff and students in the joint construction of technological solutions with a direct impact on the territory.

Design methodology

The methodology used to design the virtual tour followed a mixed and participatory approach, combining elements of qualitative research, instructional design and technological development. This approach made it possible to build a meaningful tool for both the user community and the educational actors involved [Kouijzer, M. M. T. E., Kip, H., Bouman, Y. H. A., & Kelders, S. M. 2023].

Contextual analysis and narrative design

As a first phase, semi-structured interviews were conducted with the head of the UNEVT Comprehensive University Clinic and the university rector. These interviews provided key information about the functioning of the medical service, relevant spaces and the institutional vision of community outreach. Based on these inputs, a storyboard was developed to structure the tour, define the visual narrative and plan the navigation points.

Note: The interviews were conducted in June 2025 and documented as part of the narrative design process for the tour. Internal project records are available for methodological traceability purposes.

Content planning

The essential spaces of the clinic [reception, consultation rooms, pharmacy, common areas] were identified and organised into a logical sequence. The key messages to be conveyed by the tour were also defined.

Content capture

360° photography technology was used to document the spaces, ensuring sharpness, clear visual orientation, and institutional neutrality. Technical aspects such as lighting, angle, and visual cleanliness were carefully considered.

Technological integration

The images were integrated into an accessible web platform, adapted for mobile and desktop browsers. An intuitive interface was designed, with interactive elements that allow for smooth navigation through the different spaces.

Accessibility and cultural adaptation

Although the tour was designed in Spanish, its translation into indigenous languages is being considered for future replicas. In addition, audio guides and subtitles are planned. The entire tour was designed with diverse audiences in mind, with special attention to digital inclusion.

Box 1

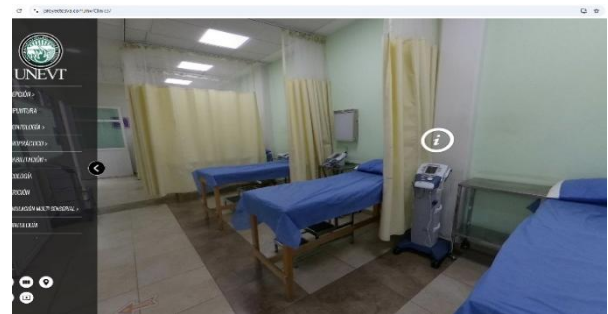


Figure 1

First version of the virtual tour of the integral university clinic

Source: Own elaboration

Results

Although the virtual tour has not yet been formally evaluated with end users, the design and pedagogical planning process has allowed us to anticipate a series of positive impacts, both for the community and for the university environment.

Flores-Azcanio, Nancy P., González-Hernández, Jorge Daniel and Echevarría-Chan, Ivonne. [2025]. Virtual reality for inclusion in community health. ECORFAN Journal-Spain. 12[22]1-6: e31222106. <https://doi.org/10.35429/EJS.2025.12.22.3.1.6>

Reduction of access barriers

It is hoped that previewing the clinic's spaces and services will reduce fear, uncertainty, or cultural prejudices that may limit the use of medical services. This tool could be especially useful for older adults, indigenous populations, or individuals with low functional or digital literacy.

Appropriation of the university space

The tour promotes a sense of belonging between the community and the university by representing the clinic as an accessible, reliable place that serves the collective well-being.

This symbolic appropriation can strengthen institutional identity and foster university-community collaboration.

Development of student skills

The project has been a learning experience for the students involved, who have been able to apply technical knowledge of web design, audiovisual production and interdisciplinary work. They have also reflected on the social use of technology and their role as agents of change in territorial innovation processes.

Scalability and intercultural adaptation

One of the main objectives is to adapt the tour model for implementation at the UIEM Intercultural Health Clinic. The lessons learned during the design phase will be used to incorporate linguistic criteria, cultural narratives and local knowledge that respond to the worldview of the indigenous peoples of the State of Mexico.

Discussions

The design of the virtual tour has been an opportunity to reflect on the relationship between technological innovation, social inclusion and university education. Although there are still no empirical results from the community's use of the tour, the design phase allowed us to identify good practices, needs and opportunities for improvement.

From an academic point of view, the process made it possible to identify how projects with a social purpose can be integrated as pedagogical strategies in curricula, promoting active learning, teamwork and commitment to the environment [Hoffman et al., 2023]. The teaching of web design and emerging technologies was enriched by a methodology based on real problems, linking professional practice with social transformation.

From an institutional perspective, the course can be considered a tool for guidance, service promotion and strengthening university identity [INAES, 2023]. Its digital dissemination allows it to reach populations that do not have direct access to the facilities and offers a bridge between the physical and virtual worlds.

Finally, future evaluation with users will be essential to validate the effectiveness of the course.

Finally, future evaluation with users will be essential to validate the effectiveness of the tour. This follow-up research is expected to focus on the browsing experience, understanding of the services offered, and perception of trust.

The findings will guide the continuous improvement of the tool and its replicability in intercultural contexts.

Conclusions and future work

The development of the virtual tour has made it possible to combine technological innovation with community engagement, generating both educational and institutional benefits. Beyond the final product, the process has been formative, reflective and proactive.

Among the main contributions are:

- The application of virtual reality as an educational and social strategy.
- The creation of a replicable, scalable and low-cost tool.
- The active participation of students in real projects with social impact.
- The integration of the university into territorial outreach processes through technological solutions.

Future lines of work include:

- Validating the tour with users through pilot tests, using qualitative and quantitative methods.
- Incorporating universal accessibility elements, including indigenous languages, visual contrast, screen reading and audio guides.
- Documenting institutional learning and publishing the experience as an academic reference.
- Adapt and implement the model at the UIEM Intercultural Clinic, in collaboration with community actors and with a focus on cultural relevance.

Declarations

Conflict of interest

The authors declare that they have no conflicts of interest. They have no competing financial interests or known personal relationships that could have influenced the content of the article presented in this document.

Contribution of the authors

Flores-Azcanio, Nancy Patricia: Led the technological and pedagogical planning of the project. Conducted the photographic survey and interviews with the main actors of the clinic. Coordinated the design, development and implementation of the virtual tour, and was in charge of the writing and main editing of the article.

González-Hernández, Jorge Daniel: Participated in gathering information through institutional interviews. Collaborated in defining content and the overall structure of the tour.

Echevarria-Chan, Ivonne: Actively participated in designing the storyboard for the virtual tour, contributing to the narrative and visual construction. Also supported the organisation of content and review of the manuscript.

Availability of data and materials

[Survey_Students.xlsx](#)

[Survey_ClinicUsers.xlsx](#)

[Interviews_Doctors.xlsx](#)

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Abbreviations

CSS	Cascading Style Sheets
DOI	Digital Object Identifier
HTML	HyperText Markup Language
INAES	National Institute of Social Economy.
NODESS	Nodes for the Promotion of the Social and Solidarity Economy.
RV	Virtual Defendant.
TIAPYC	Technology and Innovation in Productive and Consumer Autonomy
UIEM	Intercultural University of the State of Mexico
UNEVT	Toluca Valley State University

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Background

Arteaga-Yáñez, Y. L., Mocha-Román, V., Vélez-Castillo, A. E., & Zambrano-Requelme, J. [2025]. [Educación continua del profesional de salud para la prevención de enfermedades crónicas no transmisibles en comunidades vulnerables](#). *Revista Mexicana de Investigación e Intervención Educativa*, 4[S1], 241–248.

Basic concepts

Yañez-Santaolalla, J., Gómez-Dantés, H., Piña-Pozas, M., Lloyd, L. S., Betanzos-Reyes, Á. F., & Arenas-Monreal, L. [2025]. [Tecnologías de la información y comunicación en la educación para la salud en el control del *Aedes aegypti*](#). *Salud Pública de México*, 67[2], 172–179.

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Supports

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Rural electromobility: innovation for transportation in indigenous and rural communities

Electromovilidad rural: innovación para el transporte en comunidades indígenas y campesinas

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Abstract

Rural electromobility represents a strategic and innovative alternative for reducing mobility gaps in indigenous and rural communities in southeastern Mexico. This article analyzes the potential for implementing light electric vehicles [tricycles, motorcycles, motorized carts, and community transport] in rural contexts with a focus on sustainability, social justice, and cultural relevance. It presents an assessment of current conditions in rural municipalities in Tabasco, Chiapas, and Campeche, evaluating factors such as energy availability, road infrastructure, public policies, social acceptance, and local technical capabilities. The methodology is based on a mixed approach, using semi-structured interviews with community actors, documentary analysis, and case studies. The findings reveal that, although there are challenges in financing, maintenance, and training, rural electromobility can generate significant benefits: reduced emissions, economic savings, equitable access to services, and strengthening of the community fabric. It concludes that participatory design, local technical training, and coordination with academic institutions can accelerate the adoption of these technologies.

Resumen

La electromovilidad rural representa una alternativa estratégica e innovadora para reducir las brechas de movilidad en comunidades indígenas y campesinas del sureste de México. Este artículo analiza el potencial de implementar vehículos eléctricos ligeros [triciclos, motos, motocarros y transportes comunitarios] en contextos rurales con enfoque de sostenibilidad, justicia social y pertinencia cultural. Se presenta un diagnóstico de las condiciones actuales en municipios rurales de Tabasco, Chiapas y Campeche, evaluando factores como disponibilidad energética, infraestructura vial, políticas públicas, aceptación social y capacidades técnicas locales. La metodología se basa en un enfoque mixto, utilizando entrevistas semiestructuradas a actores comunitarios, análisis documental y estudios de caso. Los hallazgos revelan que, si bien existen desafíos en financiamiento, mantenimiento y capacitación, la electromovilidad rural puede generar beneficios significativos: reducción de emisiones, ahorro económico, acceso equitativo a servicios y fortalecimiento del tejido comunitario. Se concluye que el diseño participativo, la formación técnica local y la articulación con instituciones académicas pueden acelerar la adopción de estas tecnologías.



Objective

Analyse the potential of electromobility as an innovative and sustainable solution to improve access to transportation in indigenous and campesino communities in south-eastern Mexico, identifying barriers, opportunities and implementation strategies suited to the rural context.



Methodology

A mixed approach is employed. The qualitative part involves conducting semi-structured interviews with community actors, technicians and local authorities, the documentary part analyses case studies, public policies and national and international experiences on rural electric mobility. Municipalities in Tabasco, Chiapas and Campeche are selected as field study sites for their territorial.



Contribution

The article provides a contextualized vision of rural electromobility as a tool for territorial equity, social inclusion and environmental sustainability. It offers a framework of participatory implementation based on local capacities, promoting alternative transport models tailored to the needs and realities of south-eastern Mexican indigenous community.



Objetivo

Analizar el potencial de la electromovilidad como solución innovadora y sostenible para mejorar el acceso al transporte en las comunidades indígenas y campesinas del sureste de México, identificando barreras, oportunidades y estrategias de implementación adecuadas al contexto rural.



Metodología

Se emplea un enfoque mixto. La parte cualitativa consiste en realizar entrevistas semiestructuradas con actores comunitarios, técnicos y autoridades locales, mientras que la parte documental analiza estudios de caso, políticas públicas y experiencias nacionales e internacionales sobre movilidad eléctrica rural. Se seleccionan municipios de Tabasco, Chiapas y Campeche como sitios de estudio de campo por su territorio.



Contribución

El artículo ofrece una visión contextualizada de la electromovilidad rural como herramienta para la equidad territorial, la inclusión social y la sostenibilidad medioambiental. Propone un marco de implementación participativa basado en las capacidades locales, promoviendo modelos de transporte alternativos adaptados a las necesidades y realidades de la comunidad indígena del sureste de México.

Sustainable transport, Rural electromobility, Territorial inclusion

Transporte sostenible, Electromovilidad rural, Inclusión territorial

Area: Development of strategic leading-edge technologies and open innovation for social transformation

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Peer review under the responsibility of the Scientific Committee [<https://www.marvid.org/>]- in the contribution to the scientific, technological and innovation **Peer Review Process** through the training of Human Resources for the continuity in the Critical Analysis of International Research.



Introduction

La electromovilidad ha ganado una importancia estratégica en el contexto global como una alternativa tecnológica que reduce las emisiones de gases contaminantes, promueve el uso de energía limpia, y transforma el sistema de transporte hacia modelos sostenibles. [www.gob.mx > semarnat](http://www.gob.mx/semarnat) [Ministry of the Environment and Natural Resources [SEMARNAT], 2022]. In Mexico, electromobility has been promoted in urban areas; however, rural areas, especially indigenous and peasant communities, continue to face significant barriers in accessing adequate means of transport. In the southeastern states of Mexico, such as Tabasco, Chiapas, Campeche, and Oaxaca, there are high levels of marginalisation and social backwardness, which limit connectivity, access to basic services, and the productive mobility of their inhabitants [National Council for the Evaluation of Social Development Policy [CONEVAL], 2023].

This article argues that rural electromobility, particularly through light electric vehicles, can become a strategy for social innovation and territorial justice. Its implementation would improve access to services, reduce transport costs, generate local jobs and contribute to environmental sustainability. In this context, this article analyses the feasibility, barriers and opportunities of electromobility for rural communities in southeastern Mexico, with an emphasis on its socio-technical, cultural and economic adaptation [Secretariat of Energy [SENER], 2022].

Definition and relevance of rural electromobility

Rural electromobility can be defined as the use of electric vehicles adapted to the geographical, economic and cultural conditions of rural communities. These vehicles can include electric bicycles, motorcycles, tricycles, motorised rickshaws or minibuses that run on rechargeable batteries. Unlike urban solutions, rural electromobility requires innovative, adaptive and participatory approaches.

Its relevance is evident in multiple dimensions [Economic Commission for Latin America and the Caribbean [ECLAC] 2022]. Socially, it improves access to health, education and markets, facilitating mobility for women, young people and older adults.

Economically, it reduces dependence on fossil fuels, generates household savings and can activate local production chains. Environmentally, it contributes to climate change mitigation, reduces air pollution and promotes the use of renewable energies [Litman, 2025; Eliseo Dantés, 2024]. Culturally, it allows for the design of locally relevant solutions, respecting community knowledge and promoting technological appropriation.

Box 1



Figure 1

AI-generated image on electromobility *OpenAI*
Source: [2025]. AI-generated image on electromobility

Methodology

This research adopts a mixed approach combining qualitative methods and documentary analysis. The qualitative component involved semi-structured interviews with 15 key actors, including community leaders, municipal technicians, teachers from technological institutions, and representatives of grassroots organisations in rural communities in Tabasco, Chiapas, and Campeche. The interviews identified perceptions, needs, obstacles and expectations regarding the possible adoption of electromobility.

The documentary component included a systematic review of scientific literature, government reports and international experiences in the implementation of rural electric mobility projects. This review contextualised the phenomenon, identified good practices and built a comparative base with experiences in other Latin American countries. The triangulation of qualitative and documentary data strengthened the validity of the findings and guided the analysis towards viable proposals from a territorial development perspective.

Eliseo-Dantés, Hortensia, Pérez-Garmendia, Gloria, García-Reyes, David Antonio and García Jerónimo, Beatriz. [2025]. Rural electromobility: innovation for transportation in indigenous and rural communities. *ECORFAN Journal-Spain*. 12[22]1-5: e41222105. <https://doi.org/10.35429/EJS.2025.12.22.4.1.5>

Technical analysis

The qualitative analysis was structured using thematic coding, with Atlas.ti software to organise and classify the information obtained in the interviews.

Five central categories were identified: community perception, technical barriers, economic viability, social participation, and environmental sustainability. Each category allowed us to establish relationships between the different social, technical, and economic elements that influence the adoption of electromobility.

A documentary analysis matrix was also applied to compare public policies, regulatory models, and successful cases of electromobility in rural contexts in countries such as Colombia, Bolivia, and Peru.

This cross-analysis identified replicable patterns, as well as important differences in the institutional and cultural framework that must be considered for the Mexican context.

Results

For rural electromobility to become a viable reality, it is necessary to articulate multisectoral and inclusive strategies:

1. Participatory design: communities must be involved from the diagnosis to the operation of the systems, culturally validating the technologies.
 2. Technical training: rural youth must be trained in the maintenance, installation and operation of electric vehicles through programmes coordinated by institutions such as the National Technological Institute of Mexico.
 3. Inclusive financing: microcredit schemes, mobility cooperatives and subsidies targeting rural areas should be promoted to facilitate the acquisition of vehicles.
 4. Charging infrastructure: It is proposed to install community solar stations that function as charging points and local energy management centres.
- Differentiated public policy: There is an urgent need to create a regulatory framework that includes rural areas in energy transition and electromobility plans.

Impact of electromobility

The impacts of rural electromobility on indigenous and rural communities are multiple and cross-cutting. In the environmental sphere, it translates into reduced CO₂ emissions, improved air quality and reduced environmental noise. In the social sphere, it facilitates the mobility of vulnerable populations, enables access to health and education services, and strengthens community cohesion.

From an economic point of view, the use of electric vehicles reduces household spending on transport, improves agricultural production logistics and generates new job opportunities in the maintenance, assembly and operation of electrical systems. It also promotes energy autonomy through the use of solar systems and encourages sustainable social innovation models. In cultural terms, it contributes to strengthening community identity by allowing technological solutions to be integrated into the local way of life and values [[Mexico City Government Portal, 2022](#)].

Discussion

The findings show that rural electromobility can be an effective tool for reducing structural inequalities, but its success depends on critical factors: community ownership, access to financing, institutional support, and differentiated public policies. As mentioned by [[Litman, 2025](#)], experiences in Latin America show that cooperative models, targeted subsidies and technical education are key elements in ensuring the sustainability of these projects.

In the case of Mexico, the absence of specific regulations for rural areas, as well as the concentration of efforts in urban areas, represents a significant obstacle. However, coordination with academic institutions, local governments, and civil society organisations can generate synergies capable of overcoming these barriers.

The case of electric tricycles in municipalities in Chiapas and community solar systems in Campeche are examples of emerging initiatives that deserve to be strengthened and replicated.

Conclusions

Rural electromobility represents a viable, sustainable and necessary alternative for improving the living conditions of indigenous and rural communities in southeastern Mexico. Its implementation requires comprehensive strategies that include the active participation of communities, the development of local technical capacities, the design of inclusive public policies and the establishment of accessible financing schemes.

The approach must be intercultural, territorial and sustainable, promoting innovation models that are built on local knowledge and respect cultural diversity. Rural electromobility is not only a technical solution, but also an opportunity to advance towards energy justice that integrates historically excluded territories into the national development agenda.

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 influenced the article.

Contribution of authors

Eliseo-Dantés, Hortensia: Conceptualisation of the study, development of the theoretical framework, methodological design, data collection and analysis, drafting of the original manuscript.

Pérez-Garmendia, Gloria: Support in instrument validation, statistical analysis, critical review of content, editing and proofreading of the manuscript.

García-Reyes, David Antonio and *García-Jerónimo, Beatriz*: Overall supervision of the research project, advice on the interpretation of results, project management, resource acquisition, final review of the manuscript for submission.

Availability of data and materials

The data on which the conclusions of this study are based can be requested from the corresponding author.

Due to [confidentiality agreements / ethical considerations / institutional restrictions], some parts of the data cannot be shared publicly. Researchers interested in accessing the data sets can contact the corresponding author to discuss the possibility of sharing the data under appropriate conditions.

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Abbreviations

1. CONEVAL: National Council for the Evaluation of Social Development Policy [Consejo Nacional de Evaluación de la Política de Desarrollo Social].
2. SENER: Energy Secretariat.
3. SEMARNAT: Ministry of Environment and Natural Resources.
4. CEPAL: Economic Commission for Latin America and the Caribbean.
5. CDMX: Mexico City.

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Background

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Animals in the Middle Ages: another humanity

Animales en la Edad Media: otra humanidad

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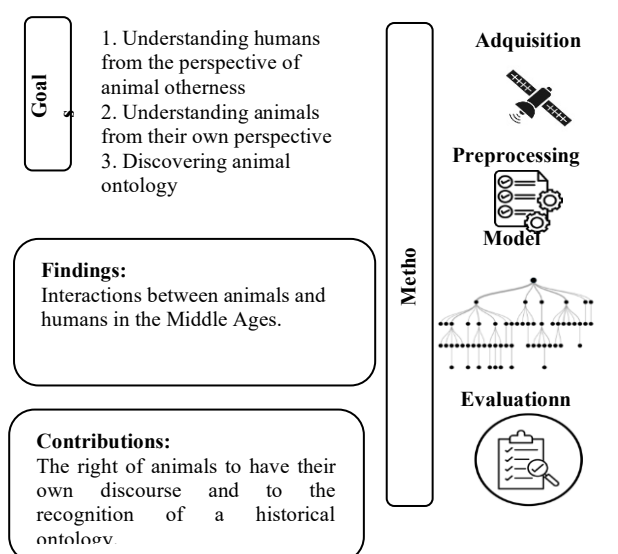
Abstract

The study of animals in the Middle Ages opens up a world of possibilities in elucidating their relationships and sociability with humans, which have an impact on the socio-economic system and civilizational changes in human groups; but they also reveal the symbolic function that animals have in the creation of the religious system and in the formation of a profuse and fascinating mythical-magical imaginary. These perspectives would have two common priority objectives: to attempt to use the study of the otherness of animals as living beings to better define and understand the human sphere, and to discover animals in their reality, in themselves and from themselves, that is, to be able to describe, analyze, reflect, and write about animals from their position, thus achieving an animal discourse.

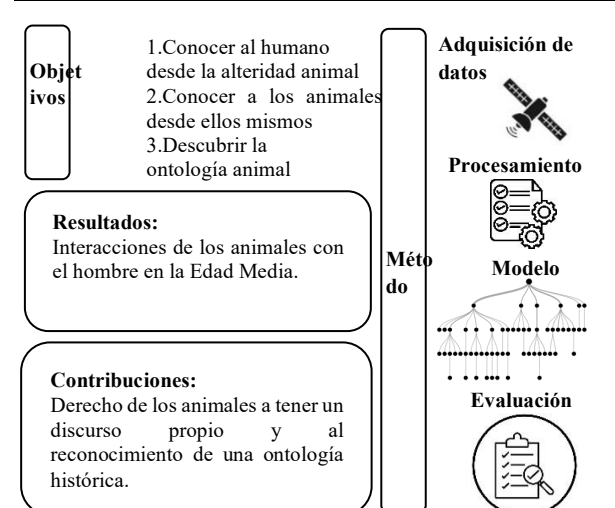
Resumen

El estudio de los animales en la Edad Media abre un mundo de posibilidades en la elucidación de sus relaciones y sociabilidades con el hombre, las cuales inciden en el sistema económico social y en los cambios civilizatorios de los grupos humanos; pero también revelan la función simbólica que el animal tiene en la creación del sistema religioso y en la formación de un profuso y fascinante imaginario mítico-mágico. Estas perspectivas tendrían dos objetivos comunes prioritarios: intentar que el estudio de la alteridad de los animales como seres vivos permita definir y conocer mejor el ámbito de lo humano, y descubrir a los animales en su realidad, en sí mismos y desde ellos mismos, es decir, poder describir, analizar, reflexionar y escribir sobre los animales desde la posición de estos, logrando así un discurso animal.

Animals in the Middle Ages: another humanity



Animales en la Edad Media: otra humanidad



Beyond a utilitarian conceptualization of animals

Más allá de una conceptualización utilitaria de los animales

Area: Promotion of frontier research and basic science in all fields of knowledge

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Peer review under the responsibility of the Scientific Committee [<https://www.marvid.org/>]- in the contribution to the scientific, technological and innovation Peer Review Process through the training of Human Resources for the continuity in the Critical Analysis of International Research.



Introduction

Discussing animals in the millennium known as the medium aevum or Middle Ages far exceeds the scope of this work, despite its focus on the Latin-Germanic West and, mainly, on the feudal and late medieval periods, for which more information is available than for the early medieval centuries.

The primary sources available for this are overwhelming and very varied: treatises, encyclopedias, and books, which we can now safely call scientific, exegetical and hagiographic texts, monastic, noble, and royal documentation, literary and iconographic works rich in information, and a long etcetera.

As a previous reference, among the treatise writers who deal with animals, Augustine of Hippo [354-430] stands out. He speaks of them as irrational creatures that are part of the natural order, being a means by which knowledge of the Creator is accessed. In his view, they are also images and signs of the virtues and vices of spiritual life and, therefore, a useful moral example for man.

There are many references to this in his works. For example, in *Confessions* he writes: "I asked the earth, the sea, the depths, and the creeping animals, and they all answered me: 'We are not your God; seek him above us'" [Augustine, 1991, Book X, chap. 6, 9].

Other fundamental authors include Isidore of Seville [c. 560-636], a great heir to ancient culture, particularly with his *Etymologies*; Rabanus Maurus [780-856], a man of the Carolingian Renaissance, whose work *De Natura rerum* expands and enriches what Isidore wrote; the Dominican Albertus Magnus [c. 1193/1206-1280], who devoted himself, among other subjects of study, to the scientific observation of animals, as demonstrated in his work *De animalibus*; the Dominican Thomas Aquinas [c. 1224/1225-1274], a disciple of the former, who in his *Questio 64* of the First Part of his *Summa Theologiae* deals with various aspects of animals, highlighting their irrationality and inferiority to man, who sees in them only a utility.

Obviously, Aristotle's *Historia Animalium* is present in all these medieval sources.

To these we must also add the *Physiologus*, an anonymous collection of Latin texts derived from a Greek original probably written in Alexandria in the first century and transmitted in medieval copies, which lists the allegorical meaning of biblical animals, with the aim of establishing a relationship between the earthly world and the afterlife.

Given all these theoretical influences, it is not surprising that in the geo-historical and cultural sphere of medieval Western *Christianitas*, animals were not considered to possess a rational soul, and were classified as reactive beings that neither wanted, nor desired, nor thought, acting simply on instinct. In short: the animal was not a *subiectus*. But this distinction opens a whole world of possibilities for studying the relationships and sociability of humans with animals, their symbolic function, their role in the creation of the religious system and apparatus, and their projection into a rich and fascinating imaginary world.

However, these perspectives would have two common priority objectives to consider: attempting to use the study of the otherness of animals as living beings to better define and understand the human realm, and [this other objective seems much more interesting to me] understanding animals in their reality, in themselves and from themselves, that is, describing, analyzing, reflecting, and writing about animals from the position of the animals, thus achieving an animal discourse. "Être du côté des animaux", being on the side of animals, argues Eric Baratay [<https://doi.org/10.4000/books.psorbonne.114767>], which means accepting an animal ontology, in this case a historical ontology.

Many medievalists work magnificently from this position with surprising results. Needless to say, animals did not write in the Middle Ages, but neither did the social class euphemistically referred to as "subordinate," composed of peasants, artisans, minor clergy, itinerant monks, marginalized people, women... and, contrary to what one might expect, it has been possible to reconstruct the past of all those who made up this voiceless mass. The same methodology that French Analysts used for this purpose in their day can now be applied to listen to animals; it is simply a matter of correctly questioning sources and comparing information of various kinds, among which literature stands out.

Methodology

The planning and development of this work combines several interdisciplinary strategies, such as the historical-critical analysis of documentary and bibliographic sources together with descriptive observation of iconography, which helps to provide a contextualized explanation of the ideas and content discussed. Both resources interact with each other, thus offering a more complete synthesis of the relationship established between humans and animals in the Middle Ages.

Development

Along with many other historians, French medievalist Jacques Le Goff, in studying animals in the Middle Ages, distinguishes between the development of a theoretical and ideological system that defines them and everyday experience with them. In this sense, based on the above, we can talk about animals directly related to humans in terms of their economic usefulness, with specific applications for human survival in medicine, agriculture, livestock, farming, war, hunting, festivals, travel, etc., with some of them acquiring great value [horses, falcons, dogs, oxen, etc.] and becoming indispensable for food, defense, trade, and communications. We therefore classify these animals from the perspective of their material usefulness; although, in the same way, they have another function that goes beyond the utilitarian: companionship, provided by domesticated animals [dogs, cats, ferrets, etc.] that live inside houses, or by other wild animals that are only semi-domesticated [crows, magpies, foxes, weasels, etc.].

Box 1



Figure 1

Tacuinum sanitatis, Ms. Lat. 9333, 14th and 15th centuries. Credit: BNF, Paris.

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A second category is that of animals used as Christian analogies and symbols, present in bestiaries, the iconography of religious buildings, commentaries and illustrations of Old Testament and New Testament texts, such as the Apocalypse [lion, lamb, pelican, phoenix], symbols of Christ's sacrificial and redemptive death and resurrection.

Box 2



Figure 2

Pelican feeding its young, Bestiary 1278–1300. Credit: J. Paul Getty Museum

This group would also include the animals that make up “the holy zoo,” that is, those that accompany the saints and are recorded in most of the *Vitae sanctorum* and hagiographic sources in general [raven, dove, lion...], although in other contexts these same animals may represent the devil, or the channel through which the evil one tempts souls.

Box 3



Figure 3

Saint Gertrude of Nivelles, patron saint of cats, Ms. Lat. 14th century. Credit: Sainte Geneviève Library, Paris

This explains one of the essential characteristics of the medieval mindset: duality, the incessant interplay of opposites, the existence of two possibilities, two meanings, which generates great ambiguity and leads to the proposal of a third category, the mythical-magical and supernatural, the product of an exuberant imagination populated by monstrous and fantastic animals that are symbols, but also realities. This group includes cases of transhumanism, trans-animality, and hybridization, for example: Animals that behave like humans, surpassing them in every way and forming an animal society with human virtues and flaws. These animals are the protagonists of the well-known *Roman de Renart*, a collection of anthropomorphic French poems written between the 12th and 13th centuries. The main source for this work is the Latin poem *Ysengrimus*, written around 1150 and attributed to the cleric Nivardus of Ghent.

Box 4



Figure 4

Roman de Renart, Ms. 12584, fs. 18v-19r, 14th century. Credit: BNF, Paris.

Men who treat animals as subjects of law, excommunicating or prosecuting them, as recalled in the case of the killer sow of Falaise, in Normandy, which killed a three-month-old baby and was sentenced to be mutilated and executed in 1387 [Dubois, 2021], after a trial was held against her with all the procedural characteristics appropriate for a person. This episode is recounted in the work of American philologist Edward Payson Evans, *Criminal Prosecution and Capital Punishment of Animals*, which documents almost two hundred similar cases, the first of which was against some moles in 824 in the Aosta Valley, according to the *Annales regni Francorum* [8th and 9th centuries], and the last in 1906, in which a dog was sentenced to death in Délémont, Switzerland.

Box 5



Figure 5

Molding on the Sainte-Trinité church in Faliase, recalling the process of “la truie”. Credit: https://www.youtube.com/watch?v=Fq_2ET9pO24

Wild men, who resemble animals or wish to be animals, as depicted in codex miniatures, legends related to forests, and palace celebrations. Such is the episode known as the “Dance of the Fiery Ones,” which took place in January 1393 and is recounted in Jean Froissart's *Chronicle*, in which Charles VI of France and five nobles disguised as “savages” accidentally set themselves on fire, killing four of them.

Box 6



Figure 6

Le Bal des Ardents, Illuminated miniature from Jean Froissart's *Chronicles*, Cat. Harley 4380. Credit: BL, London

Animals that rebel and subjugate humans: killer rabbits and giant warrior snails, present in all genres of visual art, but especially in the marginalia and buffoonery of codices.

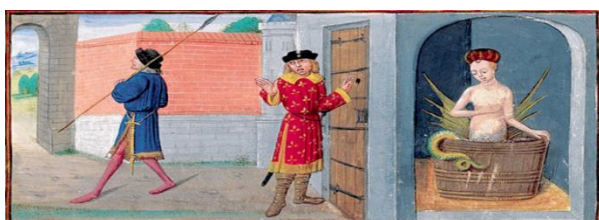
Box 7**Figure 7**

Rabbit rebellion, Smithfield Decretals manuscript, 14th century. Credit: BL, London

- Hybrid beings, such as Mélusine of Lusignan, whose story, which comes from oral tradition, was recorded at the end of the 14th century by Jean d'Arras, a poet from northern France, to compose the *Roman de Mélusine*, a text dedicated to John, Duke of Berry.

This novel tells the story of Raymond [or Raymondin] of Poitiers, a ruined nobleman who meets an aquatic nymph, a fairy named Melusine, in the forest. She promises him riches and children if he marries her, on the condition that one day a week she will retire to her chambers and he will not be able to see her. But Raymond is overcome with curiosity and drills a hole in the door of his wife's room to spy on her. When he does so, he sees that she is bathing and, surprisingly, has the tail of a snake or a winged dragon. Melusine, realizing she has been discovered, flies away from the castle, and her departure causes further ruin for Lusignan.

Along with the act of breaking a prohibition, which takes us back to Eden, duality is manifested here first in the morphology of Mélusine, half woman, half winged dragon or winged serpent, symbolizing good and evil, the devilish and the holy, the sacred and the profane. We also witness a surprising moral questioning, as Mélusine seeks redemption for her hybrid condition, being generous and fertile, while her husband, the man, who represents society, is the one who punishes her and loses her forever.

Box 8**Figure 8**

Melusine in her bath, spied on by Raymondin. *Roman de Mélusine*, Ms. 24383, fol. 19, [1450-1500], BNF

However, with her hybridization, Mélusine introduces two positive pre-intentional reflections into her story: the belief that no human being is entirely good or entirely evil and, perhaps from a somewhat forced reinterpretation, an improvement on the idea of women in her time, since it is this woman-animal, and not Raymond, who raises and enriches Lusignan, so that when she escapes from this earth, poverty and desolation fall upon the family, the children, and all the descendants of this house, who will henceforth be considered cursed, as were, for example, those belonging to the royal dynasty of the Plantagenets.

Conclusions

In conclusion, I fear that, without sufficient space to explain it in detail, what I have presented may seem like nothing more than a collection of historical anecdotes.

I want to make it very clear that what I have referred to are not anecdotes, nor even fiction, but realities and possibilities.

One of the most complex aspects of the Middle Ages to unravel, and therefore one of the most thought-provoking, is the constant division of human existence into two principles, two positions, two approaches [humanity and divinity, earthly life and supernatural life, body and soul, faith and reason, etc.].

The reality of the medieval world is dominated by marked antagonisms that paradoxically reside, grow, and emerge in actions, attitudes, and individual and social imaginaries: good and evil, the sublime and the base, the spiritual and the material, the sinister and the comic, virtue and temptation, sin and forgiveness, life and death, the human and the animal, are present in medieval daily life in a proportion and balance that is incomprehensible to modern man, so that, as the German medievalist Johannes Böhler explains, sometimes all “these notions [even though they are opposites] often come close together, reverse their positions, and then distance themselves again.” [Böhler, 1946, 39]. There are no boundaries, then, between the visible and the invisible. Jacques Le Goff said of medieval man that not only “[...] the visible is for him the trace of the invisible, but the supernatural bursts into [his] daily life at every moment.” [Le Goff, 1995, 38].

In short, in a world like this one, where anything is possible, there are no walls dividing humans and animals, at least not like those that a contradictory “supremacist humanism” and reason would later construct. Whatever the case may be, I will conclude by quoting Le Goff once again, who asserts that the Middle Ages cannot be conceived without animals. To do so would be to refuse to understand it in its breadth and depth.

Declarations

Conflict of interest

This text is from a single author, so there is no conflict of interest.

Authors' Contribution

This text is by a single author, so all the work is theirs.

Availability of data and materials

The images provided are in the public domain.

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The research did not receive any funding.

Abbreviations

BNF	Bibliothèque Nationale de France
BL	British Library

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Towards academic excellence in the training of music educators: challenges and perspectives

Hacia la excelencia académica en la formación de educadores musicales: retos y perspectivas

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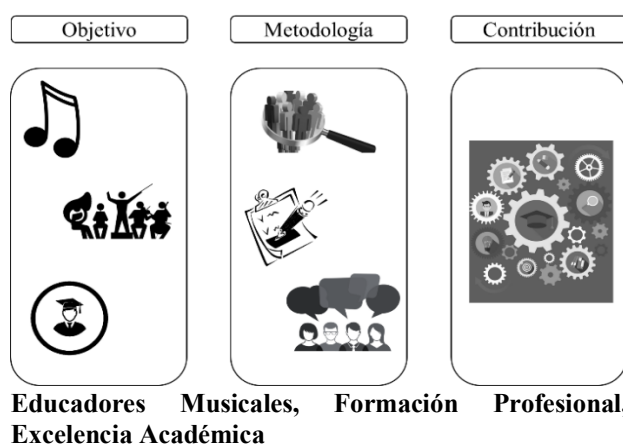
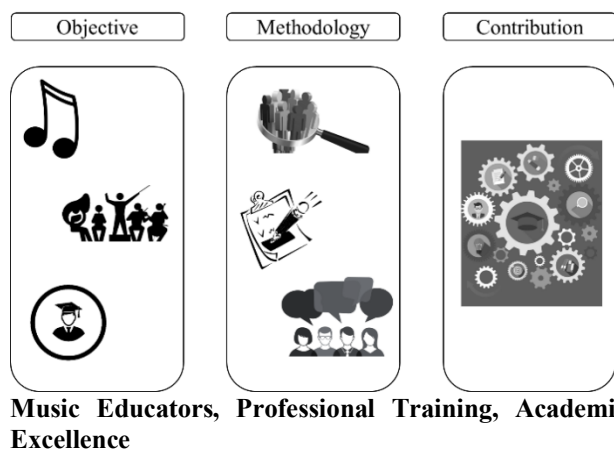


Abstract

The importance of music in shaping individuals since antiquity is undeniable. Recognizing the significance of music education for human development, some governments have incorporated music and other arts into their educational systems, considering it beneficial for students' holistic development. This is the case in Mexico. In this paper will present a research project that begins with identifying needs in the training of music educators at a public university, specifically within the Bachelor of Music program, at the Music Education specialization level. A qualitative methodology will be used, encompassing curriculum evaluation and gathering feedback from current and former students, with the aim of contributing to the improvement of this disciplinary training and fostering academic excellence among future professionals in this field.

Resumen

Resulta indiscutible la importancia que se le ha concedido a la música en la formación de las personas, desde la Antigüedad. Reconociendo esta trascendencia de la educación musical para el desarrollo humano, algunos gobiernos han incluido en sus sistemas educativos el aprendizaje de la música y de las demás artes, considerando que favorece el desarrollo integral de los estudiantes. Tal es el caso de México. En este trabajo se dará cuenta de un proyecto de investigación que parte de la identificación de necesidades en la formación de educadores musicales en una universidad pública, específicamente con el programa educativo de Licenciatura en Música, en su salida terminal de Educación Musical; mediante una metodología cualitativa, desde la evaluación curricular y la recuperación de voces de estudiantes y egresadas, con fines de aportar al mejoramiento de esta formación disciplinar y contribuir a la excelencia académica de los futuros profesionales en este campo.



Area: Dissemination of and universal access to science

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Peer review under the responsibility of the Scientific Committee [<https://www.marvid.org/>]- in the contribution to the scientific, technological and innovation **Peer Review Process** through the training of Human Resources for the continuity in the Critical Analysis of International Research.



Introduction

Music, closely linked to education, has played a fundamental role throughout history. Since ancient times, prominent Greek philosophers such as Plato and Aristotle have attached great importance to this art in the education of citizens. Similarly, music was included in the Quadrivium as part of the liberal arts in the Late Middle Ages, alongside arithmetic, geometry, and astronomy. More recently, ‘musical intelligence’ has been proposed as one of the multiple intelligences, and music studies have been incorporated into the field of neuroscience.

Considering this relevance, there are higher education courses in Mexico dedicated to training music educators, so that they can contribute to fostering the qualities that the Ministry of Public Education [SEP] itself identifies as contributions of music: for the harmonious development of all faculties, listening to and performing music as tools for intellectual and emotional training, to strengthen self-esteem, love of beauty [aesthetic experience], discipline, and training for life [SEP, 2019].

The importance of this issue has become more evident since the latest reform of Article 3 of the Constitution, which establishes that: ‘Curricula and study programmes shall have a gender perspective and a comprehensive orientation, and shall therefore include knowledge of the sciences and humanities: the teaching of [...] the arts, **especially music**’ [emphasis added]. [Official Gazette of the Federation – DOF, 15-05-2019], which confirms the need for a solid music education and, above all, for professionals in this field of education, as part of Sustainable Development Goal 4, which includes among its targets ‘ensuring equal access for all men and women to quality technical, vocational and higher education’ [United Nations [UN], 2015].

Likewise, it is very important in any educational programme [EP] to strive for quality, currently referred to as academic excellence, and ‘aimed at the continuous improvement of educational processes that promote the maximum achievement of learning by students, for the development of their critical thinking, as well as the strengthening of ties between school and community’ [Official Gazette of the Federation [DOF], *General Education Law* 30/09/2019, Article 16, section X].

Within this pursuit of academic excellence, in this particular case, we recognise music educators as those who have the responsibility of carrying out the teaching and learning processes through music, and we call this Music Education. Likewise, it is very necessary for teachers to have sufficient musical and pedagogical knowledge and skills so that their teaching practice encourages students to develop virtues derived from musical experiences that are reflected in their actions, feelings, and thoughts.

However, music educators and researchers have detected shortcomings in the training of music educators, also known as music teachers. A music educator with gaps in their training may not fully develop the characteristics corresponding to the ideal profile for this specialist and, as a result, may affect the expected outcomes of music education, which are aimed at awakening human faculties related to will, emotions and thought, unlike learning music, an instrument or singing, with the aim of specialising in the practice of musical art and developing the appropriate techniques for optimal development in these areas.

There is a misconception that any professionally trained musician has the necessary qualities to carry out music education, which is often confused with teaching music or a musical instrument for the sake of art or education for music. Often, when hiring music teachers, someone who knows something about an instrument is sought; and it is even better if the person in question knows how to play several instruments and has belonged to a musical group [Martínez *et al.*, 2015].

The problem that stands out is that, even though professional musicians have a high level of musical training, pedagogical training is necessary. In this regard, Frongillo mentions that ‘often, highly skilled and talented local musicians are selected, but they have little experience with children and no ability to organise classes’ [2016, p. 8]. In other words, it is not enough to be an excellent musician, as pedagogical training will always be necessary to teach, and both disciplines must be worked on together.

Thus, music education should only be carried out by teachers trained as music educators.

This was stated by Violeta Hemsy de Gainza [2003] in a lecture given on 23 August 2003 at the Permanent Research Seminar of the Master's Degree in Education at the University of San Andrés, Argentina.

This responsibility, which falls on music educators, should not be viewed superficially. It is necessary to delve into the skills, knowledge and expertise that they must develop and possess, based on the principles of music education itself. It is also essential to clearly recognise the ideal profile for those who will carry out this great task, which is why special attention must be paid to the way in which training processes for future music educators are being carried out.

Among the main omissions in the literature reviewed, it is noteworthy that there is no defined profile of the music educator. There is no reference in training programmes that is directly based on the fundamental principles of music education. Only profiles based on “educational policy” issues were found, responding to the demands of educational programmes according to the needs of different countries, but they address music teaching in a superficial manner, even delegating the task to general education teachers [Mateos, 2013; Pliego, 2011].

Furthermore, no homogeneous programmes were found in the professional training of music educators, as the training programmes offered by conservatories and universities are very versatile. Some studies show that there is a majority trend towards the development of musical skills, although with little focus on the pedagogical dimensions that focus on the development of the musical-pedagogical skills of the music educator [Cisneros-Cohernour and Canto, 2010].

As this is a sensitive issue that deserves special attention, and one of the challenges of higher education, it is essential to contribute to improving the training of music educators and raising the quality of education towards academic excellence, starting with identifying the shortcomings and needs in the profile of this education professional, in order to propose solutions to this problem, through a case study of a Bachelor's degree programme in Music, with a final specialisation in Music Education.

To this end, the starting point was the search for a clear and precise definition of the profile of a music educator, so that, with this reference, the objective of identifying and addressing the needs for their training could be achieved, producing graduates with extensive knowledge of music education and with adequate musical and pedagogical skills, but, above all, sufficient for their work in the classroom, so that their professional training contributes to the harmonious development of all the qualities necessary for a truly comprehensive education in children and adolescents.

In this article, in addition to outlining the issues to be addressed, a set of texts related to music education and the training of music educators in particular were reviewed, as well as previous research, laws and other guidelines that regulate education and training processes in Mexico.

Subsequently, the methodology used is described, the analysis of the research results is presented, including some testimonies from students and graduates, and finally, the conclusions and list of references are provided.

Conceptual approaches to the training of music educators

After searching and reviewing the literature related to music, education, and music educators, among the most frequently found topics are those that discuss the relationship between music and human beings, recognising the multiple benefits that active music practice brings to integral development, seen through various perspectives, applied in different dimensions, and leaving a variety of experiences throughout human history [Fernández, 2002; Frongillo, 2016; Galicia and Zarzosa, 2018; Gómez, 2016; López and Salcedo, 2021; Pérez-Aldeguer, 2013].

It is therefore pertinent to revisit the principles set out by great music educators such as Edgar Willems [1981] and Violeta Hemsy de Gainza [1999, 2003, 2011] who, along with others such as Shinichi Suzuki and Zoltan Kodály, recognise the great importance of music education in awakening human faculties, which is why it is necessary to find teaching methods that take these principles into account.

Considering the importance of music education for the human and comprehensive development of students and the recognition, in this sense, of the contributions of learning music, as well as other arts, this document presents the following concept in relation to the arts: Artistic thinking connects mental processes with emotions and feelings, encouraging self-exploration, relationships with members of the artistic community, artistic projects, and different aesthetic perspectives on the environment. In addition, it enhances imagination and creativity through exercises that allow students to generate their own expressions, recreate artistic works based on personal sensitivity, and imagine and implement solutions to everyday problems. [SEP, 2017, p. 477]

Currently, music education in Mexico does not always manifest the expected ideals. Musicians, educators, and researchers have worked to achieve them, but the research carried out is still meagre. In general, the arts belong to a field that has been little explored in research, compared to other subject areas. However, in many cases, 'Music Education is conceived only as training to perceive the musical message, and is ignored as an important element in the comprehensive formation of personality and everything that represents the aesthetic and cultural values of man' [De Alarcón, 1992, as cited in Ortiz and Ibarretxe, 2006, p. 34].

For the theoretical basis that underpinned this research, various categories of analysis were used, including: music, music education, and the training of music educators. In this regard, some of the conceptualisations found are noteworthy: Music is good and does good when it is properly taught, transmitted, and shared, similar to physical or spiritual nourishment offered in an atmosphere of serenity and balance. Hence the importance of having an up-to-date, high-quality pedagogy that guarantees successful learning and a broad human reach. [Hemsey de Gainza, 2011, p. 15]

'In music, unique among the arts, mathematical science and emotional sensitivity come together' [Willems, 1981, p. 205].

Similarly, authors such as López and Salcedo [2021] recognise that 'it is through music that the union between equals can be promoted and restored; creating an education that is more committed to the comprehensive training of young people' [n/p, para. 24].

Another fundamental position for pedagogical training is to consider that music 'is linked to the whole person, and its benefits are immensely broad [...] it helps clear thinking, educates and deepens feeling, harmonises the whole human being, strengthens the will, helps one breathe correctly, and removes tension' [Gómez, 2016, p. 15].

Another category of analysis derived from the literature reviewed addresses the principles of music education, its benefits for human beings, and the foundations of music education according to music educators Edgar Willems and Violeta Hemsey de Gainza who, as already mentioned, are the main references for the perspective taken in this work, due to the high reputation and recognition as intellectual authorities that they have earned over the years through their work in favour of music education. Regarding this concept:

In many cases, music education is conceived only as training to perceive the musical message, and it is ignored as an important element in the comprehensive formation of personality and everything that represents the aesthetic and cultural values of humankind. [De Alarcón, 1992, as cited in Ortiz and Ibarretxe, 2006, p. 34].

No less important is the training of music educators, where the leading music pedagogues are identified as primary contributors to the construction of a profile for music educators, as it is extremely important to have a profile as a reference for detecting gaps in training, as well as for recognising the contributions that can be made.

There is currently greater awareness in the educational-musical community of the need to converge and specify theoretical perspectives in favour of a professional training curriculum for music educators. Hemsey de Gainza [2003] even mentions that there is an intellectual elite made up of music educators from different generations dedicated to pedagogical research who are pursuing master's and doctoral degrees in pursuit of professional excellence.

In an analysis conducted by Cisneros-Cohernour and Canto [2010] on teacher training curricula in music education in Mexico and Central America, they found that most programmes emphasise both education and music.

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However, the entry and exit profiles are unclear. In Mexico, the vast majority of programmes are geared towards training musicians, and some universities that offer training programmes for music educators place greater emphasis on music than on education, with the percentage of psycho-pedagogical training subjects being less than 20%.

There is generally a lack of standardised criteria in the training of music educators, so to complement the development of skills and knowledge, those in training choose between specialisations in music teaching methods. These are offered within independent institutions dedicated to the study, practice and research of a single specific method. Undoubtedly, any of these can complement an area of music educator training.

Methodology

For the methodological approach of this research, the interpretive paradigm was selected in the search for understanding of the phenomenon. This paradigm, according to Latorre, Rincón and Arnal, focuses on giving meaning to human actions by entering into people's worlds. It is the most appropriate for the methodological approach required by this research, as it 'emphasises the understanding and interpretation of educational reality from the meanings of the people involved in educational contexts' [1996, p. 38].

Based on interpretive theory from a hermeneutic approach, a qualitative methodology was developed in which theory and practice are related. Therefore, the descriptive techniques used [documentary research, content analysis, curriculum evaluation] allowed for triangulation for data analysis.

The study population was a public institution offering a degree in Music Education, and it was determined that a case study would be an appropriate means of collecting information, which, according to Stake, proposes 'a disciplined and qualitative mode of research in the singular case' [1998, p. 11].

In this particular work, the results of an analysis of the curriculum content and programme structure are presented, with the aim of observing the pedagogical, theoretical and methodological foundations that underpin the training process of music educators.

In line with the concept of curriculum as a process [Ruiz, 2016], 'it is a matter of paying greater attention to the foundations that justify the establishment of certain goals and objectives, and to the selection of certain content and its form of organisation and distribution' [p. 22]. In order to carry out the curriculum analysis, it was necessary to construct a profile of the music educator, drawing on principles of music education set out by music pedagogues such as Edgar Willems and Violeta Hemsy de Gainza, and also considering recent contributions from various authors. This profile was our main reference point for identifying more precisely the specific needs in the training of music educators and as a guide for determining some of their essential characteristics. From this theoretical perspective, the ideal profile considers the following dimensions:

- Theoretical music knowledge,
- Musical skills,
- Pedagogical music knowledge
- Personal characteristics.

To carry out the documentary analysis of the exploratory research findings, matrices were designed to filter the information and categorise it into dimensions, aimed at observing the characteristics of the Bachelor of Music programme, with a terminal output in Music Education and its relationship with the ideal profile of the music educator; as well as to observe the type of approach and objectives of the Learning Units [UDA] that make up the programme. The other phase of the research focused on conducting interviews with students and graduates of this educational programme, in order to complement the findings derived from the documentary analysis with some of their testimonies.

Results on the training needs of Music Educators

During the first phase of data collection, 394 files were collected, from which 187 documents were selected, including: the network of subjects in the Bachelor of Music programme, the Music Education terminal output of the 2007 and 2017 plans [both currently in force], as well as 95 descriptive letters for each subject and 90 learning units [UDA], respectively [it should be noted that, for the purposes of this research, the terms subjects, courses and UDA were used as synonyms, as their function within the training programme is the same].

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For the analysis of the curriculum documents, based on the dimensions of a music educator profile [mentioned above], personal characteristics were excluded because they involve data that can only be obtained from the actors themselves. It was also necessary to adjust these dimensions to the type of information that could be obtained from the selected documentary sources, resulting in:

- Theoretical music knowledge,
- Practical music skills
- Pedagogical theory
- Pedagogical practice

Similarly, two further dimensions were added in order to more accurately categorise the approach offered by their objectives and to differentiate between:

- Music education
- Music teaching

All the descriptive letters of both plans were categorised in the terminal output of Music Education and the key points were coded to determine the type of thematic approach observed from their objectives and their contribution to the profile. The topics to be developed, the type of activities and the recommended bibliography were also considered.

After selecting the approaches, they were differentiated in the systematisation using colours [the three primary colours were taken as a reference: cyan, yellow and magenta, as well as the colours resulting from their mixtures], and these categories emerged:

1. **Music Education** It combines very specific aspects of education [yellow] and holistic development through music [cyan].
2. **Support for Music Education** Between Music Education and the educational sphere, with useful contributions for music educators [lime green].
3. **Academic music** Aimed at professionalising musicians [blue].
4. **Culture: Music and Art** Basic knowledge within the educational and cultural context [orange].
5. **General education** Subjects that contribute to a general university education [magenta].

As part of the analysis, a list of all subjects/UDA [unit of didactic action] in each plan was established and, for practical purposes, each UDA name was coded taking into account the semester to which it belongs, elements of its name and other specific details.

Table 1 shows the categories of approaches with their designated colours, in order to facilitate visual appreciation of the results, which are concentrated in Figure 1.

Box 1				
Table 1				
Music Education Music	Support for Music Education	Academic music	Culture: Music and Art	General training

Colours by approach in the Subject Network of the 2007 and 2017 Plans.

Source: Own elaboration.

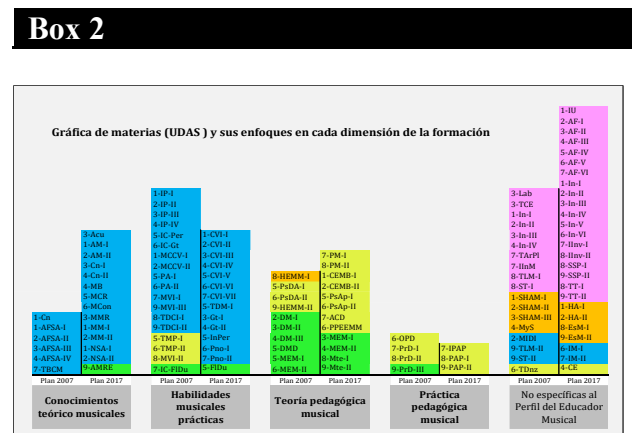


Figure 1 Subject matter [UDA] and its approaches by training dimensions

Source: Prepared internally based on the analyses carried out.

This is a bar chart showing, in addition to the approaches for each dimension, a comparison between the two plans [2007 and 2017] which, with their different heights and colours, present an almost quantitative argument about the number of subjects in each of the plans and which area of training for university students and future music educators they cover.

In order to gain a clearer picture of which subjects contribute to the training of music educators in the four dimensions described in the categories of analysis, all the subjects that are priorities in training and the approach proposed in the descriptive charter were analysed and classified. Similarly, subjects that do not contribute directly to the profile were identified, detecting their approaches.

Following this selection, and as can be seen in Figure 1, training needs were identified in relation to the academic workload, resulting from an imbalance between the dimensions of the profile, due to the fact that in both educational programme plans there are many more subjects focused on theoretical knowledge and practical musical skills [Academic Music – blue], in contrast to those focused on the theoretical and pedagogical-musical training required by music educators [Music Education – green and Music Education Support – lime green].

Although in the dimension of *Theoretical-Musical Knowledge*, the number of UDA increased in the 2017 curriculum redesign [from 6 to 14], the vast majority of subjects focus on an in-depth approach to academic music from its theoretical perspectives, and only one focused on Music Education [Musical Arrangement of the School Repertoire] was added.

In the results of the UDA dedicated to the development of *Practical Musical Skills*, it was observed that this dimension has the greatest weight in both plans; However, only one of them was designed with a focus on the profile of the Music Educator [Recorder], as the trend in this list is also towards the performance of academic music, and although there are some subjects that will provide support for the future professional [2007 plan], they do not go into depth on the profile and disappeared in the 2017 plan.

Applying the same analysis to the dimension of *Music Education Theory*, despite being the one with the largest number of subjects oriented towards the practice of Music Education, most of them have a support focus and, in the 2017 plan, there was even an increase in these UDA that do not delve into the specific profile of the music educator and a decrease in those that do focus directly on it [e.g. two in Music Didactics].

The dimension relating to *Music Teaching Practice* is the one that most lacks subjects that address this area of the profile, and it should carry considerable weight since, as Pliego [2011] points out: a university curriculum for the training of Music Educators must prioritise, for the profile of its students, their teaching practices in real teaching situations, which are well organised and supervised.

However, only one subject in the 2007 plan has the approach that opens up this possibility [Teaching Practices III], while in the most recent plan, there are none.

The other subjects that could not be categorised in any of the proposed profile dimensions were grouped together as subjects that are formative for university students in general. Furthermore, as this is training in the arts, several subjects are included that could be considered highly relevant for any future artist, although not specific to the profile of a music educator.

According to their description, in both plans, none of these UDA are designed to meet these basic needs for training music educators. even so, at least one subject per plan was found that may be useful: the *Dance Workshop* in the 2007 Plan, which proposes many recreational activities using rhythm, and the *Stage Behaviour* UDA in the 2017 Plan, which provides teachers with tools for their development in front of an audience, such as their future students.

The other subjects that in some way complement the training of music educators were placed in the category ‘Culture: music and art’ [orange], and, as can be seen in Figure 1, the vast majority of the UDA correspond to ‘General university education’ [magenta].

As a complement to the analysis of the study plans and programmes, some trends observed in relation to the interviewees' experiences are briefly described. In the area of theoretical music knowledge, they report that this area requires a change in approach, as the content covered is not particularly relevant to the practical development of teaching; in other words, it is of little use to them in their work as music educators. On this subject, one of the interviewees mentioned the experience she had with her group of classmates in a course [referring to the Analysis class], saying the following about her teacher: ‘*He made us analyse several works in great detail... sometimes we even left with a headache from all the explanations*’ [Irma, 15/01/2020].

These obstacles in training are the result of a curriculum design that recognises the Music Educator as just another musician, without taking into account the distinctions of each vocational level.

In view of this, substantial changes to the programme are suggested in order to redirect both the content of the subjects and the teaching practices towards training that is truly focused on awareness of knowledge in the field of Music Education. In this regard, there were statements that their area of training has received less attention than other final courses, as expressed by Susana [16/01/2020]: *‘they should focus the subjects according to the needs of the student, according to the degree... Music Education is one of the degrees that has been very neglected’*.

For her part, Cynthia [17/01/2020] suggests that the design of the subjects be reviewed and that teachers focus more on appropriate content, stating:

A complete analysis should be made of this descriptive letter that corresponds to each subject and, therefore, the subject should also be more “digestible” for us students, because we often say OK, we are in Counterpoint and I think we are already seeing other things as well, teachers tend to ramble a lot, don't they?

In this regard, there are similarities with the findings of a study conducted in Spain, which states that: “in their initial training, they do not receive sufficient tools to address and adopt appropriate strategies in a diverse classroom. This shortcoming should be overcome and teachers should be provided with quality training” [Blanco and Serrano, 2025, p. 145].

The concerns and opinions of the student community interviewed are diverse, as they also propose a change in dynamics, suggesting that teachers could make theoretical classes a little more practical in order to facilitate students' understanding. In this regard, Susana [16/01/2020] mentioned that:

It would be wonderful if, for example, history classes focused more on music, and instead of just giving theory, they presented the music... they played music so that we could understand, not just theory, but something much more practical.

In terms of instrument performance, the content, technical development and repertoire provided to music educators is similar to that given to students in other terminal courses, where the aim is to produce high-level instrumentalists.

This type of approach does not entirely converge with the practice of music education, bearing in mind that it is largely developed in primary school classrooms. In view of this, Irma [15/01/2020] complained:

When I told them, “I feel that what you are giving me is for the others who are learning piano,” but you never give me anything about music for children, such as what the teachers ask me for, for example, “I want a song for Mummy,” well, where do I get that from? They never taught me anything here related to the dates marked on the SEG calendar, and there are quite a few!

The voices expressed, on multiple occasions, that it is necessary to put knowledge into practice and, furthermore, that it is essential to know the real world when teaching. A variety of anecdotes emerged on this topic; however, for the purposes of categorisation, the most similar experiences and those that were most relevant to the objective of this study were synthesised. In context, the interviewees agreed that they had addressed pedagogical content, but only from a theoretical perspective. As an example, Violeta [28/01/2020] stated: *‘All pedagogy, theoretically speaking, may be what you are teaching, but in practice it is something completely different’*. This is in line with Cynthia [17/01/2020], who said that *‘there was a lack of practice, of connection with the real world’*.

It is worth noting an important fact that has not been mentioned until now: during each interview, without exception, each participant had a noticeable change in reaction when addressing this issue, ranging from complaint to irony, expressing open dissatisfaction with their experience during their pedagogical training.

As another reference, Susana [16/01/2020] stated that *‘there has been a lack of practice, much more practice... we have had a lot of theory, and theory sometimes goes in one ear and out the other, but you don't forget practice’*.

To summarise all of the above, it is necessary to strengthen the programme's in-depth approach to music pedagogy, both from a theoretical and practical perspective. In addition, the lack of teaching practice has generated various controversies and dissatisfaction among students, who expressed the need to carry out their teaching practice with real students.

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Faced with this situation, Susana [16/01/2020] said, 'We didn't have, for example, a subject called "teaching observation" [referring to the 2007 curriculum subject "Observation of teaching practice" code 6-OPD], we never went to any institution, never.'

Finally, the results of the analysis show that, in both plans, there is a need for a greater number of subjects in each of the dimensions of the music educator profile in the curriculum analysed, as well as an adjustment in the focus of these subjects, allowing for a balance between those oriented towards music education and support subjects, and those which, are currently mainly oriented towards Academic Music and even subjects that are not specific to the profile of the music educator, whose approaches are formative in general topics.

Therefore, it is essential that greater attention be given to music teaching practice, as the best learning is obtained through practice and experience, and the real scenario is what determines the consolidation of knowledge. With regard to music pedagogy, both plans show a disproportion between theory and practice, and it would be necessary to make adjustments to the programme in order to find a balance, both in terms of the number of UDA [academic units] and in terms of its approaches, in order to form a profile more in line with the principles of music pedagogy, given that there is an excess of subjects that meet the needs of university students or professional musicians, but not those of music educators.

It is well known that, ideally, all subjects should be based on the pedagogical foundations of music education. However, although it is recognised that other areas of knowledge must be considered in university education, when discussing a terminal degree in music education, the focus should be on those categories most directly linked to the ideal profile of a music educator.

Conclusions

In this research, dedicated to the analysis of the educational programme of the 'Bachelor of Music' degree, with a terminal degree in Music Education, one of the main findings is the imbalance that exists between the approaches of the different dimensions of the music educator's profile in relation to the categories analysed.

In short, there is a need for the subjects in the *Theoretical Music Knowledge* dimension to readjust their focus to that required by the terminal exit, since, as they stand now, they are oriented towards academic music, which is not exactly the most appropriate for music educators, taking into account that, in a real-life music education setting, a teacher will have few opportunities to address purely musical topics with their primary school pupils or to design musical activities at school.

Although the dimension of *Practical Musical Skills* carries the most weight in both plans, it is a conceptual error, with a pedagogical shortcoming, to assume that knowing how to perform academic music on various musical instruments leads to taking advantage of the possibilities of instrumental practice in the human and integral development of performers in primary education; What future music educators need is to understand how instruments can be used as pedagogical tools to awaken each person's abilities and employ them for the benefit of individuals' comprehensive development in the social context in which they will carry out their work.

The dimension of *pedagogical-musical theory* also highlights the need for a change in the approach to the subjects that comprise it, for which it will be necessary to take into account other perspectives in addition to those observed in the UDA bibliographies, integrating other authors who focus on a pedagogy that takes music as its main means for the formation of individuals.

In the dimension of *Musical Pedagogical Practice*, although there are countless types of practice that music educators should carry out, depending on the nature of the social and cultural groups in which they will work, it is essential to increase the number of subjects that focus directly on Music Education, rather than on its support, and, above all, to ensure that, from the beginning of their training, they make significant progress in this area, dedicating quality time to it.

Finally, the UDA [Unidades de Desarrollo Académico, or Academic Development Units] for 'General University Education' should be reduced in order to achieve a better balance with the rest.

In the category ‘Culture: Music and Art,’ although they are not specifically focused on knowledge and/or skills specific to the profile of the music educator in any of its dimensions, they do represent elementary and indispensable knowledge for every individual, artist, and musician, expanding the cultural heritage of the music teacher.

We can conclude that a new curriculum modification is required that seeks stability and better weighting of learning units in all dimensions of an ideal profile for music educators and, fundamentally, that places special emphasis on an approach oriented towards Music Education, which contributes to achieving the perspective advocated by Sustainable Development Goal 4, of quality education, also at the higher university level, as a path to academic excellence.

Declarations

Conflict of interest

The author declares that she has no conflict of interest. She has no known competing financial interests or personal relationships that could have appeared to influence the article reported in this article.

Availability of data and materials

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Abbreviations

CPEUM Political Constitution of the United Mexican States
DOF Official Gazette of the Federation
SDGs Sustainable Development Goals
UN United Nations
SEP Ministry of Public Education

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Background

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Human Rights to Water and Food with gender perspective: Urgent call for inclusion of autonomy of women irrigation users, México 2025-2030

Derecho Humano al Agua y Alimentación con perspectiva de género: Emergencia inclusión de autonomía de las mujeres usuarias de riego, México 2025-2030

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Abstract

This article addresses the human right to water and the inalienable need to add food, given the risks, litigation, and controversies surrounding the use of water for agricultural purposes. Governance as a foundation for understanding who will be entrusted with food production in Mexico over the next five years, using Module V Cortazar of Irrigation District 011 Río Lerma as a case study. The central question is: How many women irrigation users are there, and in what conditions and positions do they work? The challenges of equity, sustainability, and participation of women irrigation users are analyzed, considering the need for autonomy to exercise their leading role in water resource management and productive decision-making. The initial diagnosis concludes with the identification of operational needs such as: i] updating registries and ii] the emergence of inclusive public policies that guarantee the full exercise of the right to water.

Objective	Methodology	Conclusion
Analyzes the human right to water and the inalienable need to add food, in the face of risks, litigation, and disputes over the use of water for agricultural purposes.	The challenges of equity, sustainability, and participation of women irrigation users are analyzed, considering the need for autonomy to exercise their leading role in water resource management and productive decision-making	The initial diagnosis concludes with the identification of operational needs such as: i] updating registries and ii] the emergence of inclusive public policies that guarantee the full exercise of the right to water

Human rights of water with gender perspective, Women irrigation users, autonomy, General Law of Water

Resumen

El artículo analiza el derecho humano al agua y la necesidad inalienable de sumar la alimentación, ante riesgos, litigios y controversias por el uso del agua para uso agrícola. La Gobernanza como cimiento para comprender en manos de quienes se confiará la producción de alimentos en México en los próximos 5 años, como caso de estudio el Módulo V Cortazar del Distrito de Riego 011 Río Lerma. La pregunta: ¿Cuántas mujeres usuarias de riego existen y en que condición y posición trabajan? Se analizan los desafíos de equidad, sostenibilidad y participación de mujeres usuarias del riego, considerando la necesidad de autonomía para ejercer su papel en la gestión de recursos hídricos y en la toma de decisiones productivas. Se concluye como primer diagnóstico, la identificación de necesidades operativas como: i] actualización de padrones y ii] la emergencia de políticas públicas inclusivas que garanticen el ejercicio pleno del derecho al agua.

Objetivo	Metodología	Conclusion
Analiza el derecho humano al agua y la necesidad inalienable de sumar la alimentación, ante riesgos, litigios y controversias por el uso del agua para uso agrícola	Se analizan los desafíos de equidad, sostenibilidad y participación de mujeres usuarias del riego, considerando la necesidad de autonomía para ejercer su papel en la gestión de recursos hídricos y en la toma de decisiones productivas	Se concluye como primer diagnóstico, la identificación de necesidades operativas como: i] actualización de padrones y ii] la emergencia de políticas públicas inclusivas que garanticen el ejercicio pleno del derecho al agua

Derecho humano al agua con perspectiva de género, mujeres usuarias de riego, Ley general de agua

Area: Promotion of frontier research and basic science in all fields of knowledge

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Peer review under the responsibility of the Scientific Committee [<https://www.marvid.org/>]- in the contribution to the scientific, technological and innovation **Peer Review Process** through the training of Human Resources for the continuity in the Critical Analysis of International Research.



Introduction

The human right to water was officially recognised by the United Nations General Assembly through Resolution 64/292 in 2010. Water was recognised as a fundamental right essential to sustaining life and human dignity, which cannot be understood without food. In Mexico, this right was incorporated through a constitutional amendment in 2012 in Articles 5, 23 and 115, reaffirming its importance in sustainable development and social justice. However, its implementation faces significant challenges in the agricultural context, especially in irrigation units for rural development [URDERALES], where 94.7% use groundwater, and modules in irrigation districts use mixed water sources: 92% surface water and 8% groundwater, usually with emergency irrigation.

In both cases, women agricultural producers who use irrigation have historically been marginalised. Marginalised not only in terms of agricultural production, but also in terms of being recognised as holders and possessors of a right that has been denied them, both in terms of inheritance and recognition in their management and appropriation in the decision-making of the various bodies and levels of water representation.

The analysis starts from the essential elements of governance with a gender perspective analysis.

The hypothesis is: If the intragenerational male transfer of the first generation of irrigation users in Mexico is completed in 2030, then it is women irrigation users who will have to take control and operation of irrigation management to guarantee future food sovereignty.

To project this hypothesis to 2030, a mixed methodology was applied with a case study of Module V Cortazar of Irrigation District 011 Río Lerma. The materials and methods are limited to the analysis of basic descriptive statistics from a global level. Given the lack of information, it was decided to manage the process until the Irrigation User Register for the aforementioned module was obtained and analysed, which would allow for the projection of a real situation in the field that would enable the research question to be answered: How many female irrigation users are there in Mexico?

The results presented conclusively reveal the hypothesis as a real case representative of this problem. It is concluded that, given the lack of inclusion in governance for women's participation in decision-making, coupled with the ageing of users and the lack of up-to-date information on irrigation registers, we are facing an emerging complexity of factors that hinder the efficient and equitable management of water for women irrigation users in Mexico. In this context, evidence is presented for a proposal to adhere to the General National Water Law.

Theoretical framework

The analysis starts from the constituent elements of governance, understood as the way in which people and institutions are organised for decision-making [Gleik, 1998]. This considers the set of structures, processes and regulations that govern water management, seeking equitable and sustainable use over time. Another element present for the self-management of governance is common property [Ostrom, 1990, 2012] and the way in which agents organise themselves around a common resource such as water. In a geographical area defined not by administrative boundaries, but by a body of water such as a river, a dam or a main canal. It is in this arena of action that those who participate show their capabilities, interests, commitments and strength. In view of this, it is clear that the position and status of women that was initially proposed for analysis is surpassed, as explained in the results. On gender issues, I had the opportunity to ask the author Elinor Ostrom directly in 2012, when she made her last visit to Mexico, whether there could be a gap in the origin of decisions for equitable governance with gender equality, if she carried out a specific comparative analysis between women's decisions and men's decisions. Her response was simply emphatic, and with a smile she gave me the order: Go ahead!

Box 1



Figure 1

Exchanging views with Dr Elinor Ostrom. Source: Elinor Ostrom's last visit to Mexico, Autonomous Metropolitan University, Xochimilco campus, 2012

Since then, I have devoted myself to analysing the environments and decisions of women irrigation users in increasingly complex and even dangerous contexts.

Methodology

A mixed methodology was applied, using a hermeneutic approach to analyse brochures, images, and dissemination and consultation materials. Quantitative information from irrigation user registers was analysed using basic descriptive statistics to calculate means, modes, and medians.

In addition to the quantitative information, interviews and life stories were conducted with three women who have held representative positions. Work is still ongoing after the publication of this document.

In seeking the answer to the research question of how many women irrigation users there are in Mexico, we began at the national level with the institutions in charge: the National Water Commission [CONAGUA] and the National Association of Irrigation Users [ANUR], including the offices in charge of the directory of irrigation units in the Ministry of Agriculture and Rural Development [SADER], without obtaining any information from any of these bodies.

Given this result, it was decided to narrow down the analysis by searching for information in the field and to develop an applied research project with the management to access a register of irrigation users from one of the 11 irrigation modules that make up irrigation district 011 alto rio lerma: Module V Cortazar. From this register, a descriptive statistical analysis was carried out, yielding the following results.

Results

Following a hermeneutic research process, the starting point is the recognition of two indivisible elements necessary for the unavoidable maintenance of human life: water and food consumption.

From this, the following was found regarding the first element:

Human Right to Water

In 2010, with Resolution 64/292 of the UN General Assembly, drinking water and sanitation were recognised as essential human rights for the full enjoyment of life and all human rights [UN, 2010]. This right implies guaranteeing sufficient, safe, acceptable, affordable and accessible water for all.

Two years later, Mexico amended its Constitution to recognise the right to water in Articles 2, 25 and 115, which guide management towards equity and sustainability. The laws currently in force are two initiatives: i.] the National Water Law and ii.] the General Water Law, although constitutional controversies persist and there are more than 12 cases before the Supreme Court of Justice of the Nation concerning concessions, transfers, diversions and allocations of surface and groundwater.

Human Right to Food

Access to water is closely linked to the right to food: full, adequate and sufficient, recognised by UNICEF and the FAO, established in the International Covenant on Economic, Social and Cultural Rights.

Food production depends directly on the volume of water available. Therefore, proposals to condition, limit, deprive and restrict access, use, management, control, administration or inequalities in access affect security and jeopardise food sovereignty, especially for rural and indigenous communities that depend directly on the direct and indirect activities of each agricultural cycle per year.

Diagnosis of Irrigation District 011

In 2023, Mexico ranked 6th in the world in irrigated agriculture with 6.2 million hectares, distributed between surface water, groundwater or mixed use.

This area is organised into 84 Irrigation Districts with their modules, and countless irrigation units for rural development [URERALES], which means that in times of water stress that severely affects rainfed agriculture, it is this sector that must be in a position to save the food production that the country needs for national consumption.

One of these 84 irrigation districts is 011 Río Lerma, located in the central-western part of the country known as El Bajío. DR 011 has an irrigated area of 112,670 hectares. It is a key system for agricultural production not only for the state of Guanajuato, but also for the country, competing closely with irrigation districts in northern states such as Sinaloa, Chihuahua, and Sonora. All districts depend on an authorised available volume collected in large dams, which is distributed among the respective basin councils to distribute these volumes to the five consumptive uses, where, invariably in all cases, agricultural use accounts for an average of 74.5% of the total volume.

On the other hand, all the information on crop data, productivity per cubic metre applied, and areas sown versus harvested is available, but when inquiring about the persons responsible for these hydro-productive exercises, there is no information. Based on the register of irrigation users in Module V Cortazar, the analysis reported the following facts:

1. All irrigation user registers in Mexico are more than 30 years old. As a result, there are people registered who no longer exist. There is no clarity about the people currently responsible for irrigation, payments, water conveyance and use.
2. The average age of male farmers is 76.5 years old. The average age in Guanajuato is 73 years old for men and 78 years old for women. Added to this situation is the health condition of tired men, with the after-effects of COVID-19, stressed by debt and the inability to generate territorial roots in the young men of their families. In five years, by 2030, a considerable percentage will no longer be present to make operational decisions in the field regarding the management, distribution, and application of irrigation water.
3. In 1991, the World Bank carried out a programme to transfer irrigation management [TMR] to users, through technical, administrative and operational training for the first generation of irrigation users in Mexico, organised into civil associations.

However, women irrigation users were not considered eligible for training because they were not represented in any of the categories: Ejido Delegates, Small Property Owners and/or Community Members, coupled with their unequal roles and workloads, which have led to further gender gaps, where inclusion was absent then and remains absent today.

4. Currently, if the intra-generational transfer of irrigation users were to take place today, the burden of responsibility for converting water into food would fall on wives, daughters, sisters, and mothers, without them being equipped with the skills and knowledge for access, use, distribution, operation, control, measurement, transfer, diversion, saving, collection, payment, and efficient use of water for agriculture.

An analysis of the irrigation user registry for Module V Cortazar shows a strong gender bias: 69% are men and only 31% are women. This inequality is exacerbated by the lack of updated records and the limited training of female users.

Using a binary classification to count men and women in the irrigation user registry, the following figures were obtained.

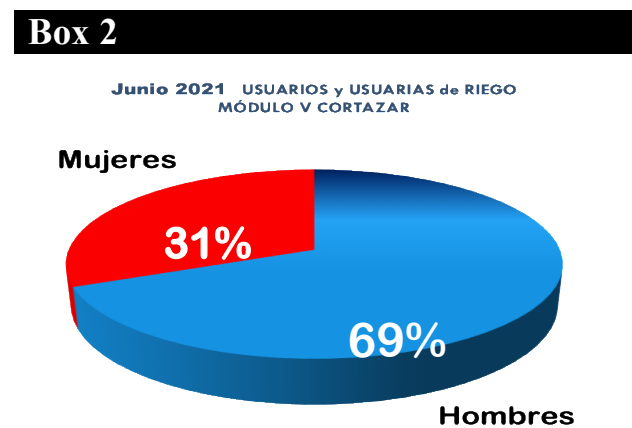


Figure 2

In the Cortazar Module, women face structural barriers such as:

- Limited or no active participation in assemblies; they can attend meetings only if they have been previously appointed in their ejidos or small properties as water delegates or substitutes. They can attend the meeting only if one of the two positions is vacant and she takes it.

- Lack of legal recognition of their ownership of land or water. It should be noted that land ownership and possession has never gone hand in hand with water. It is indicative but not limiting or conditional
- Institutional and symbolic violence in agricultural management spaces. In operational decision-making in the field, the work of active women who are **holders-have** the right to use water for irrigation is recognised, but when it comes to making decisions in assemblies, they do not demonstrate that they are **owners** of the right due to the lack of documents that accredit them and provide legal support to that effect.

This condition does not only apply to the use of water, but also to the lack of *ownership and possession* of agricultural machinery, infrastructure, movable and immovable property. Given the initial data, we proceeded to consider the statement of the first female director of an irrigation district in Sonora, who declared that half of irrigation users are women.

Using the existing data, I applied a five-year projection calculation from 2025 to 2030 to estimate what the data would look like in relation to the presence of female irrigation users in the figures from the Cortazar Irrigation Module.

This yielded the following information as a projection for 2030, considering that it is a 30-year-old registry and that many social conditions have changed. The context can be observed as follows:

Box 2

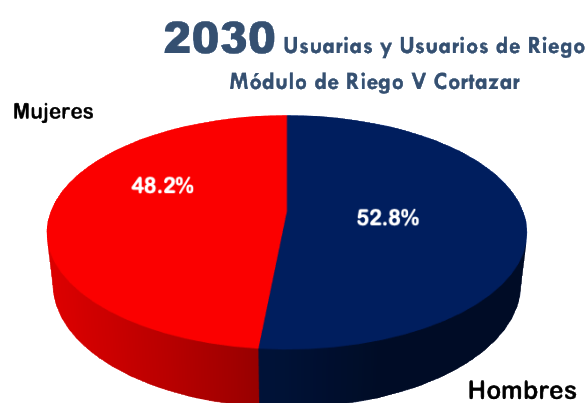


Figure 3

Emergency due to the inclusion of women irrigation users.

Given the hard data suggesting a trend towards the **hydro-feminisation** of the countryside in the coming decades, gender-focused public policies are required.

Progress towards equitable water management requires the integration of women as agents of change. Inclusion implies not only their recognition in the registers, but also their active participation in the planning, distribution and sustainable use of the resource.

Although this analysis is limited to one module in one irrigation district, it is useful for projecting the results to units and all modules in the 84 irrigation districts in Mexico.

Main findings

In this context, when interviewing the eight female irrigation users who are current representatives, such as ejido delegates, well diggers, canal diggers, small property representatives and former irrigation module managers, the responses themselves speak to the status and position of women at the forefront of access, distribution, use, management, control, operation, administration, conservation, transfer, risk management, conflict management, among other operational needs in the field. The themes that emerged from the interviews were:

Positions of authority abandoned due to changes in marital status or the onset of reproductive life:

"... as manager of the Module, I think I played a good role, I have the knowledge I learned in Irrigation in Chapingo..."

I was clear on the figures, strict on field measurements, and I was behind the canal workers... ..the problem is that I got married and soon after I got pregnant. He didn't like me continuing to work because it was too much pressure."

-MJG:2021-

Taking on responsibilities through empirical knowledge, feeling the need for endorsement in decisions and the risk of compromising individual safety:

"... When my old man died, I took over turning the well on and off, opening the floodgates, and assigning irrigation shifts. I learned how to do it. ... My problem is that I no longer have anyone to defend me, ... anyone to look out for me, or anyone to ask if it's okay to give water to those who owe me, who don't clean their channels either, because then I'm afraid they'll give me a hard time because I don't let them skip their turn... At night, I've seen them messing around with the girls... Because they don't pay! There's no way I'm going to pay those deadbeats!"

-CMS:2020-

Need for external male support, despite having her own track record, her own network is the most violent, leaving her vulnerable to uncertainty.

"... They appointed me as moderator of the meeting. At first, I didn't understand why me. Then I realised it was because I could tell the thugs to calm down because they don't clean the canals, they don't keep their shifts, they don't pay... and on top of that, they come and insult me or dictate their terms! It gives me courage because there are others who know that I don't stay quiet. The problem is when I go home and everyone gangs up on me, and no one stands up for me!"

Exposure to public displays of sexism, losing courage and undermining her own potential.

"... He dared to bring the canal manager and pressure me to give up my irrigation shift... They act like they're tough, but not with me anymore... I was so angry that I burst into tears. Why do we have to put up with them treating us like this? Don't we have the right to work on equal terms? So who do I ask? My brothers in the United States, my father is already deceased, he never came back... everything is in his name! Now what can I do if they all agree and ignore me?"
Need for commercial information support for better room for manoeuvre and individual negotiation.

'... no, when it comes to selling, they have to tell me how and to whom I sell, otherwise how can I do it on my own?!"

Dilemmas between fulfilling roles and workloads, aware of the need to participate in collective management.

"... Going to meetings is a waste of time, and who's going to do my work here? ... I want to go, but who's going to pick up my kid? ... Then I have to look after my father-in-law, who is ill and needs help with everything... I pay for irrigation by selling some animals when I don't have any... If I miss it, my friend helps me out, even if it's just with emergency irrigation... even if it's just to keep me going!"

Collective uncertainty in the face of the closure of communication channels due to external pressure.

'... Well, they say the president gave the order, but what are we going to do with the channels that are very cemented, but that take the water elsewhere... Some say one thing, others say another. I want them to give me the water I need to harvest my crops, and if there are problems, they will call us to report them...'

Evolution that gives knowledge and power over others, based on the practice of learning and taking on a self-managed role for governance as a central node.

"When I first started participating, I used to sit at the back, trying not to be seen in case they asked me something I didn't know... ... Not today. I go to the front, and if I have questions, I ask them and I don't care. I am the delegate for the module, responsible for bringing information to my entire community.

I can't go back without concrete, well-explained data. ... They respect me because they know how hard I've worked, and I've shown everyone that I know, I can, and because I can, I go for it!"

The responses were illustrative and compelling, providing evidence of the lack of autonomy in complex processes that affect women's sense of self and their relationships with others. The lack of autonomy caused by ignorance and the support that men do have in their process of growth and development, while women are questioned about their identity, their position, condition, and capacity, and even so, women, despite their experience, maintain the need for consultation, support, protection, endorsement, companionship, and support from a man. An additional factor that has fractured incipient processes of empowerment in water management and control has been insecurity and drug trafficking.

Conclusions and recommendations

In conclusion, there is an institutional need for an intersectoral update of all irrigation user registers in Mexico, both for surface water and groundwater, in order to know exactly who is responsible for what volumes of actual authorised water are available, from the parcel level to the basin council level, so that the real water situation in the country can be assessed.

It is important to urgently implement a training process that addresses individual technical, social and commercial needs in hydro-productive management in the field, which will contribute to the adoption of women's autonomy in their individual decision-making processes, from the individual and personal to the collective and public, without the need for external consultation.

Undoubtedly, the need was identified to anticipate a concrete proposal that would visualise each and every one of the situations that, in sum, constitute forms of **water patrimonial violence**, which must be considered for inclusion in the body of Article 49 without correlation of the General Law on National Waters in Mexico. The breakdown of this proposal was presented and delivered to the Deputies responsible for the Water Affairs Committee of the Chamber of Deputies in the open consultation forums on 18 November 2025.

Recommendations

Universities should work inter-institutionally on applied research into problems such as those raised here. This exercise should be linked to the one carried out in the Lerma-Chapala Basin in the 2000-2001 cycle in response to the need to transfer water to Lake Chapala. Where more women can participate and where their decisions are free from fear and guilt and they can enhance each and every one of their abilities to achieve collective action as a full example of social governance.

Colleagues must recognise the clear division that has always existed between the management, operation, work and production of land and water. Now more than ever, these two resources are following separate paths. It is worth conducting an exhaustive analysis of the creation of legal frameworks that are far removed from social practices in the field, where laws made in the cabinet are irrelevant and are not adopted due to the inconsistency of a daily reality of growing hydro-feminisation.

Finally, real processes to counteract **gender-based water patrimonial violence** by attending to, accounting for, accessing, caring for, distributing, transforming, saving, transferring, sharing, charging for and conserving water in all its contexts and locations before it is too late and we are facing the tragedy of the commons.

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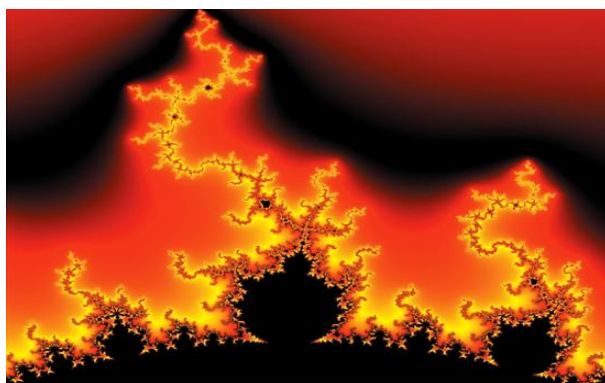


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