Women's leadership in STEM fields: Key to promoting inclusion and diversity[1]

Liderazgo de la mujer en áreas STEM: Clave para la promoción de la inclusión y la diversidad

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How to cite: Vega Osuna, L; Vega Esparza, R; Alvarado-Peña, L; Ramírez Gómez, J; Muñoz Castorena, R; Reyes Bazúa, X. (2025). Liderazgo de la mujer en áreas STEM: Clave para la promoción de la inclusión y la diversidad. *Mujer Andina, 3*(2), e030201. https://doi.org/10.36881/ma.v3i2.987

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No conflict of interest

Received: 25.10.2024
Reviewed: 05.12.2024
Aceppted: 20.01.2025
Published: 30.01.2025

Resumen

Women's leadership in STEM is crucial to achieving gender equality and promoting a more inclusive and diverse environment that benefits the entire scientific and technological community, but also society in general. Inequality regarding women's leadership is a global problem that requires the formulation of public policies and programs that intensify support for the female sector, facilitate advancement in their professional careers, and reach a consistent level of development; In this context, there is evidence today that vindicates the fight, which serves as a model for the young generations. The objective set was the following: to analyze the impact of the leadership of women scientists in STEM areas as models to promote the inclusion and diversity of young generations. A documentary investigation was carried

1 This research article is part of the scientific production of the research project: "Leadership of Professional Women in Latin America", ascribed to lines 1, 5 and 6 of the Research Institute of the REOALCEI Network. www.reoalcei.com. The participants of this research were: the Academic Body "Organizational Development UDOCA3" of the Universidad Autonoma de Occidente (UAdeO), Mexico; the Academic Body "Regional Studies, Sustainability and Quality of Life, UDG-CA-746" of the Universidad de Guadalajara, (UDG), Mexico, and the Academic Body in "Management, Evaluation and Training Processes of Public Policies" of the Universidad Autonoma de Zacatecas, Mexico. This networks alliance, Inter - Academic Bodies and the Research Institute, represents the joint work and leadership of the researchers team involved in reducing the gender gap and the equal participation of women in the fields of Science, Technology and Innovation and Education. This research has received funding from the Research Institute of the REOALCEI Network, according to code L1, L5 and L6-INTER- 2024 and 2025.

out with a narrative approach, based on criteria for analysis and description of the phenomenon studied; The essay-type format used served to frame the discussion. It was based on the search for literature on the subject in different electronic media and databases for the dissemination of knowledge. As a result, updated information was obtained on women's leadership in Latin America. It concludes with the importance of the leadership roles acquired by female scientists in the region, playing an important role in the fight to close the gender gap and achieve equity for the achievement of professional objectives and aspirations.

Keywords: leadership, women's leadership, women in STEM, women scientists in Latin America, inclusion and diversity in STEM.

Resumen

El liderazgo de la mujer en STEM es crucial para alcanzar la equidad de género y para el fomento de un entorno más inclusivo y diverso, que beneficie a toda la comunidad científica y tecnológica, pero de igual forma a la sociedad en general. La desigualdad en torno al liderazgo de las mujeres es una problemática mundial que requiere formular políticas públicas y programas que intensifiquen el apoyo al sector femenino, faciliten el avance en sus carreras profesionales, y alcancen un nivel de desarrollo cónsono; en este contexto, hay evidencias en la actualidad que reivindican la lucha, las cuales sirven de modelo para las jóvenes generaciones. El objetivo planteado fue el siguiente: analizar el impacto del liderazgo de las mujeres científicas en áreas STEM como modelos para promover la inclusión y la diversidad de las jóvenes generaciones. Se realizó una investigación documental con un enfoque narrativo, basado en criterios de análisis y descripción del fenómeno estudiado; el formato empleado tipo ensayo sirvió para enmarcar la discusión. Se basó en la búsqueda de literatura sobre la temática en los diferentes medios electrónicos y bases de datos para la divulgación del conocimiento. Como resultado se obtuvo información actualizada sobre el liderazgo de la mujer en Latinoamérica. Se concluye con la importancia que representan los roles de liderazgo adquirido por las científicas en la región, jugando un importante papel en la lucha por cerrar la brecha de género y alcanzar la equidad para el logro de los objetivos y aspiraciones profesionales.

Palabras clave: liderazgo, liderazgo de la mujer, mujeres en STEM, mujeres científicas en Latinoamérica, inclusión y diversidad en STEM.

Introduction

In the last ten years, several policies and programs have been implemented in Latin America and the Caribbean (LAC), with the aim of fostering and increasing the participation of women in the fields of science and technology (Bello, 2020). The Inter-American Task Force on Women's Leadership (2022) states that all women have the right to participate and lead in the different areas of life: economic, social, political, technological and cultural. Their participation in these decision-making and leadership spaces is transcendental, since they generate a positive impact on productivity, innovation, legitimacy and responsiveness.

The different international organizations in charge of promoting and participating women in the sciences, indicate that masculinization persists in these areas, and has an unfavorable impact

(Prieto-Echagüe, 2020). In this sense, it is important to highlight that despite the great advances in this issue, challenges and obstacles persist, in addition to the limitations inherent in social formation, their gender and personality (Paz *et al*., 2019).The daily struggle to overcome underrepresentation and close existing gender gaps remains a critical concern in STEM fields.

This document demonstrates with different models, the crucial role of female leadership in STEM (Science, Technology, Engineering and Mathematics), to achieve gender equity, as well as to promote a more inclusive and diverse environment, which benefits not only the entire scientific and technological community, but also society in general.

Thus, different studies carried out have been of great importance in recent years, since they have exposed the significant development and participation of women in STEM areas, specifically in Latin America and the Caribbean (LAC). These works have been driven by the imperative need to close the gender gap that exists between men and women; and on the other hand, due to the positive impact that female leadership can have on the promotion of inclusion and diversity, in favor of the development of many priority sectors (United Nations Development Program, UNDP, 2024).

Currently, it is observed that the leadership of women in STEM has resulted in the contribution of innovative ideas and creative solutions to existing problems. This thanks to their particular perspectives and approaches, which enriches research and development (R&D) processes and also promote a culture of respect for inclusion and diversity (Bello, 2020).

Despite all the obstacles, the inclusion and representation of women in leadership roles in STEM is an increasingly visible fact, as many achievements have been reached that continue their march, but there is still much to be done (Velloso, March 13, 2024). This is a global problem that suggests the design of public policies and programs to intensify support for the female sector, facilitate advancement in their professional careers and reach the levels of professional development they aspire to.

Notwithstanding this, in the "Global Gender Gap Report 2021", they predicted that one more generation of women would have to wait to achieve gender parity. According to the current trajectory and the impacts caused by the Covid-19 pandemic, it will take 135.6 years to close the gender gap worldwide, and 145.5 years to achieve gender parity in politics (Inter-American Task Force on Women's Leadership, 2022).

Acknowledging the need for equitable societal transformation, a broad spectrum of stakeholders, including individuals, organizations, and governments, are prioritizing research, policy, and action to combat this critical issue. Driven by a commitment to human rights and legal principles, they are striving for significant equality and equity, despite current obstacles.

Some of the global organizations with the greatest commitment are: the United Nations Development Program (UNDP), the Inter-American Task Force, UN Women, the United Nations Human Rights (OHCHR), the Sustainable Development Goals, UN-SDGs, the International Labor Organization (ILO), the Inter-American Development Bank (IDB), the Economic Commission for Latin America and the Caribbean (ECLAC), the International Monetary Fund (IMF), and other similarly relevant entities with widespread presence among nations and member states.

This research stresses the importance of diversity and inclusion for women in STEM and the impact of effective female leadership on equity and social justice. Although showcasing successful women as role models is crucial for inspiring future generations, it is not enough (Donoso, July 30, 2024).

As doubts, false beliefs, and other clichés dissipate, the possibilities increase for other women with equal potential, abilities, and aspirations to achieve success in traditionally male-dominated fields, breaking down the barriers, inequalities, and imbalances that reinforce the gender disparity be-

tween men and women, not only in STEM, but in other disciplines and professional fields.

Now, it is understood that achieving excellence in the scientific field depends largely on the support available to women scientists who hold leadership roles, where the support of "mentoring networks" that offer advice focused on the area of leadership (Leadership Mentors), with different perspectives, resources, and experiences, is interesting (Gazdik, October 23, 2024). The equitable inclusion of women with respect to men involves offering them the same opportunities for growth and development that are offered to men, resulting in benefits that go beyond the academic or professional field.

As a result, by betting on more significant and transcendental scientific and technological advances, women in STEM occupy roles, fulfill functions, and excellently manage the different activities assigned to them, showing through their functionality their own characteristics such as knowledge, experiences, the ability to analyze, and motivation as part of their human formation. Besides, their ability to work collaboratively as a team, which contributes to the momentum of the institutions where they operate and the achievement of their objectives (Perozo and Paz, 2016; Paz, 2019).

It is important to conclude that it is essential to analyze gender inequality concerning women's access to leadership positions, grounded in merit and rights. The persistence of inequity, due to its perceived significance, requires ongoing research to prevent its further entrenchment in cultural and social contexts (Moncayo and Zuloaga, 2024).

The objective of this work was as follows: to analyze the impact of the leadership of women scientists in STEM areas as role models to promote the inclusion and diversity of younger generations. From this objective, the following question was raised: Is it possible that the roles of power and leadership occupied by women in different activities and functions in STEM disciplines serve as a model, promote inclusion, and increase the interest of younger generations to develop professionally in these areas?

Methodology

A documentary research approach (Gómez *et al*., 2016) was used, employing narrative analysis to describe, interpret, and analyze the phenomenon and its current state (Tamayo and Tamayo, 2003; ATLAS.ti., 2024). This method, in line with the study's aims (Perozo and Paz, 2016), was supplemented with data on the leadership, experiences, and functional contributions of Latin American scientists in STEM fields. An expository essay, structured with an introduction, development, and conclusions, served as the framework for this discussion. According to Suárez (2023), this type of essay is designed to present information on a specific topic in a clear, objective, and coherent manner, effectively informing the reader.

The method was based on the search, review and reading of literature by titles related to the proposed theme: "women's leadership or female leadership in STEM areas or disciplines," "the woman scientist in Latin America," as well as elements of the discussion such as: "the incidence or impact, importance or influence of female leadership on the generations of girls and young women, role models," with respect to professional development in STEM disciplines. The information was obtained by accessing various electronic materials available on the internet such as: documents, reports, books, book chapters, opinion articles, presentations, standing in institutional repositories of HEIs, different databases of non-governmental organizations, social institutions, international organizations of recognized trajectory with authority in the matter on women's leadership, presence and roles played by women in STEM areas, regarding their rights, equality and the gender gap, such as: UN Women, UNESCO Women, OAS, ECLAC, IDB, WEF, UNDP, among others. Similarly, documents published in different media and communication, events, congresses and meetings were reviewed. This information selection parameter was due to the importance of the topic and the interest that its dissertation has at present in all global areas and contexts.

For the selection and review of scientific and academic articles, inclusion criteria prioritized recent publications from the last 10 years (2014-2024) that presented updated information on "leadership", "female leadership", "women's leadership in STEM in LATAM", "leadership of women scientists in STEM disciplines" and discussion elements such as: "the incidence or impact, importance or influence of female leadership on the generations of girls and young women, role models (in careers and professions in STEM areas)". Also, articles published in impact factor journals, indexed in databases such as Scielo, Dialnet, Redalyc, Researchgate, Elsevier; in institutional repositories of HEIs, of internationally recognized organizations and institutions, among others.

ce or impact, importance or influence of female leadership on the generations of girls and young women, role models (in STEM careers and professions)", articles outside the LATAM context; articles on women's leadership in research and business fields (see Table 1).

Development

Leadership has been the subject of extensive theoretical inquiry, encompassing both organizational and individual dimensions (Villar-Vargas and Araya-Castillo, 2019). Women's leadership, specifically, continues to be a focal point of research and discussion. The term 'female leadership' is often contested, as it can introduce biases

Table 1.
Number of papers reviewed for theoretical development (selected and excluded)

Sources/Databases /Repositories	Number of papers and articles selected	Number of papers and articles, not selected or excluded	Total number of papers reviewed
International organizations and institutions, governmental and non-governmental organizations or agencies	10	02	12
Private companies	01	-	01
Digital media	02	-	02
IES website	02	-	02
Book chapters	01	-	01
Books	-	04	04
Repositories of indexed academic and scientific journals	12	12	24
Others (projects, events, congresses	01	04	05
Total	29	22	51

Exclusion criteria specified the removal of scientific and academic articles published prior to 2014; articles with information not related to: "leadership", or "women's leadership", or "female leadership", "women's leadership in STEM areas in Latin America", "women scientists in STEM disciplines" and discussion elements such as "the incidenlinked to male stereotypes, cultural variations, and gender-based power conflicts (Moncayo and Zuloaga, 2015; Navarro and Vergara, 2021). Despite the recognition that women's leadership is gender-specific, its labeling can create a false dichotomy with male leadership.

Similarly, Navarro and Vergara (2021) believe that research in recent decades is favorable, as it highlights women's leadership as a "differential" in relation to the leadership exercised by men. By distinguishing it as "female leadership", characteristics attributed especially to the female sex can be seen, such as: sensitivity, understanding, negotiation and conflict avoidance, emotionality and intuition when making decisions or other actions. This distinction, based on sex, provides a specific categorization without explicitly emphasizing existing inequalities. Instead, it offers a broader perspective on the current state of female leadership, acknowledging its complexities while highlighting its significant growth (Navarro and Vergara, 2021).

In this sense, Sendra and López (2022) indicate that good leadership does not understand genders, and emphasize that women have been overcoming challenges and obstacles to gradually incorporate themselves into leadership positions, but it is still not enough and especially in STEM disciplines (Science, Technology, Engineering and Mathematics), a large gender gap persists.

Leadership in the context of equality implies that women and men have access to the same opportunities, in equal conditions, making effective the full exercise of their human rights and responsibilities, without this function depending on the "sex" they possess (Domínguez, 2023). Therefore, it is essential to highlight the importance of female and inclusive leaderships since from this level they contribute significantly with perspectives that address specific needs and interests of women's groups from various areas. Areas of influence and action (Alonso and Langle de Paz, 2019).

Introducing this perspective in the different decision-making spaces in STEM fields during the career, as in the exercise of the profession, would lead to an advance towards the disintegration of the invisible barriers that prevent development and gender equality in professional environments. As Bello (2020) has exposed in his research, in STEM areas men are the ones who access leadership positions more frequently, in contrast to women, even in disciplines where the proportion of men and women could be relatively similar.

In this regard, it is essential to recognize that although female leaderships are varied and do not all follow the same agenda, all women who have aspirations in STEM are exposed to multiple forms of gender discrimination throughout their lives. Likewise, the fight against inequalities is endless, which unfavorably affect their interests and proposals (Inter-American Task Force on Women's Leadership, 2022).

Impact of women's leadership in STEM areas

STEM careers represent today's jobs of the future (Sendra and López, 2022). They are even currently the jobs in the highest demand. Obviously, the younger generations are observing this phenomenon and focusing their interests towards these fields, with a view to personal improvement, in relation to the salaries they can receive for being professionals in these areas.

With respect to the issue of income, it is not the most important in the case of professional women who venture into STEM disciplines. The purposes, goals, their ambitions and aspirations are located around professional progress and personal well-being of each one. Also, their excellent performances promote sustainable development, innovation, development and global social growth. All these criteria prevail over economic interests (Bello, 2020) in which the greatest importance lies and this growth must be inclusive (Sendra and López, 2022). In this particular, it is logical to admit that remunerations are adjusted to the responsibilities and professional skills that women perform in these areas.

Various studies indicate that the presence of women in decision-making positions shapes new leadership models, where they have demonstrated good performance. It is evidenced by the initiative, resilience, capacity and efficiency in the search for results. The presence of women in these contexts produces a great impact for present

and future generations, collaborating with the elimination of existing stereotypes (Inter-American Task Force on Women's Leadership, 2022).

Despite persistent underrepresentation in STEM careers and the workforce, and facing various difficulties, obstacles, and discrimination in historically male-dominated fields, women have achieved significant status and continue to thrive in STEM disciplines, pursuing their professional development (Gómez *et al*., 2024).

The presence, persistence and permanence of women, and the constant demonstration that their gender is not an impediment to reaching hierarchies that give preference to men, represents hard work, but it is an effort that leaves a constructed path to the new generations of young people and girls, who will have other situations to overcome in their path. However, and as a consequence of the undeniable gender gaps in STEM, it is imperative to structure policies and guidelines that are adjusted to the times, with an effective perspective in relation to equity (Gómez *et al*., 2024).

In relation to close the gender gap and eliminate discrimination, it is essential that regulations and public policies include the active participation of women and that they adapt to their needs, in order to modify and eradicate the factors that exclude them (Inter-American Task Force on Women's Leadership, 2022).

The impact caused by important leaderships that women currently exercise in STEM has a favorable impact on many aspects, which can be transformative; especially because they promote the participation of girls and young women in STEM careers. They promote parity between men and women in the workplace and professional field, which in turn leads to sustainable development as an important component of the achievement of justice and social equity (González and Mielgo, 2022; Chávez & Ibarra, 2016).

The group of scientists in Table 2, evidence and represent the leadership capacity that women possess in STEM in Latin America. Their research and field work undeniably produce a transformative impact on present and future generations, inspiring and enabling more girls and young women to pursue and excel in these disciplines.

It should be noted that despite the lag in gender equity in STEM, this group of scientists are buil-

Tabla 2.
Mujeres Científicas, líderes en STEM en LATAM

Latin American Women in STEM	Leadership-Labor-Contributions
María José Bazo. Master in Communication and Marketing. Costa Rica.	Inspirational leader, committed to the equality of people and the integral development of human capital; with an innovative and transformative vision in the development of technological products. From her position she is committed to the promotion of inclusion and gender equality.
Karol Zapata. Biological Engineer. Master in Food, PhD in Biotechnology.	She leads a work focused on scientific research with social commitment (therapeutic properties of cannabis), with which she seeks to transform communities in "Zones most affected by the armed conflict" (Zomac). Project led mostly by women, with the aim of closing the gender gap, persistent in STEM areas. She affirms: ... "science can transform lives, including mine".
Diana Trujillo. Aerospace Engineer. Colombia.	Deputy project engineer and deputy chief of the engineering operations team. She leads the "Curiosity" mission at NASA's Jet Propulsion Laboratory, in charge of the robotic arm of the Mars Perseverance rover. First Hispanic and migrant woman admitted to NASA's academy program. Worked at Goddard Space Flight Center in the Constellation program and has participated in both human and robotic space missions. She has held many leadership roles, including in 2014, as one of the most influential Latinas in the technology industry. She is involved in initiatives to drive and inspire young people in Latin America to study careers in STEM.
Yesenia Madrigal. Biologist. Teacher and Researcher. Colombia.	Donald R. Kaplan Award in Comparative Morphology, given by the Botanical Society of America, and the Women in Science Award 2022; in recognition of the work of women scientists and empowered, doing quality science, with scientific rigor, on the knowledge of orchids. With her work team, they have the responsibility to carry the message to all generations, of what it means to be a Colombian and world scientist, and to motivate them to do the same. She states. "We women scientists are empowered."

Latin American Women in STEM	Leadership-Labor-Contributions
Camila Velloso.	Leader of Chicas en Tecnología. She states that the participation of women in top leadership positions (Vice Presidents and directorships) is only 12.4%. This figure is being surpassed with the "recruitment" of women for STEM careers, reaching already 36.6% the number of women studying these disciplines. From Chicas en Tecnología, we offer opportunities to young people in LAC in the field of technology, guiding them to careers and jobs in STEM areas. We conduct research to measure the gender gap, its causes and effects; we offer free training programs for young people from 13 to 23 years old, at different stages of their education in STEM areas. Our goal is to dismantle stereotypes and bring young women closer to technological areas in a comprehensive way.
Dr. María Alejandra Camacho- Biologist, Taxonomist, Ecuadorian.	Volunteer of the Ecuadorian Network of Women Scientists. Through this network she is interested in promoting the visibility of the scientific work of women in Ecuador with the objective of showing girls and women their work, as an example to follow. She believes that the challenge lies in disseminating and motivating scientific exchange among young people.
Chahim Teny Puac- Young Mayan Tz'utujil-Q'eqchi'a woman. Technologist. Guatemalan.	She participates in UN Women Guatemala, saying that this has strengthened her leadership. Develops an App to digitize Mayan language literacy. Has a personal project to form a technology team to visit remote areas of Guatemala and work with indigenous girls, to encourage their interest in the development of computer systems.
Laila Sprejer. Economist with a master's degree in Data Science with social application. Argentina.	Leader of the Data Science group at Amdocs Technology, a multinational software company. Leader of a monitor that exposed in real time aggressions against female candidates for Congress in Argentina. Stresses that gender violence in politics leaves psychological, physical and economic damage to women, being this a detriment to democratic expression.
Valentina Muñoz. Programmer and Activist, co-founder of the Association of Young Women for Ideas (AMUJI, Chile). Chile.	AMUJI-Chile (Asociación de las Mujeres por las Ideas), feminist activist association, founded in 2019 to support girls with scientific and technological talent and empower them as future generations in STEM. She believes that it is important to involve young people in issues of gender and technological inequality.
Patricia Olivares. Computer Engineer. Director of EDUBOTIC. Arica, Chile.	She participates as a teacher of EDUBOTIC (robotics programming academy for children), through the program: "Originarias" of UN Women, giving robotics workshops for indigenous children, whose purpose is to bring them closer to this world in a simple and practical way. She leads a management program that promotes robotics tournaments; for which she indicates: funding is required for women with initiatives like this one, which encourage girls from rural areas to participate in STEM areas.
Dr. Priscilla Muriel Mera, Katya Romoleroux and Carmen Ulloa, Scientists, Biologists, Botanists, Professors at PUCE, Ecuador.	They have dedicated their lives to science and biodiversity conservation; Muriel is co-editor of the "Encyclopedia of Useful Plants of Ecuador", and author of the "Red Book of Endemic Plants of Ecuador. With her colleagues she leads the Ecuadorian Network of Women Scientists (REMCI), through which they contribute to the sustainable development of Ecuador, and from where they seek to make visible the work of women scientists in this country.
Alyson Berbetty Omiste, Systems Engineer and Lawyer, Advanced Studies in Human Rights, International and Humanitarian Law. CISCO Instructor. Co-founder and national director of Mujeres TICs, Bolivia.	With this organization (CISCO and Mujeres TICs Bolivia), she works to reduce the gender digital gap, training women in rural areas, with digital training programs. With her foundation Mujeres TICs Bolivia, she trains women in digital skills and fosters women's relationships in the STEM field, to overcome the digital and gender gaps that affect girls and women in her country, addressing the needs observed after the pandemic. Berbetty states that "Technologies, especially digital skills, can open doors in the workplace and entrepreneurship" (UN Women, Thursday, March 9, 2023).
Milena D'Atri. Specialist in gender, education and policies. Master's Degree in Gender, Policies and Inequalities; Bachelor's Degree in Educational Sciences.	Consultant of the International Institute for Educational Planning (IIEP) of UNESCO. She designed programs on gender equality and children's rights in the digital area, on gender equality and the work environment; also on comprehensive sexual education, sexual and reproductive rights, among others. She believes that legislation is needed to protect all users of online violence that prevails today, since victims do not receive support, advice or a guide to make complaints.
María Mercedes Zaghi. Engineer, Specialist in Information Systems Management (MIS) at Universidad Francisco Marroquín. MBA from the University of Maryland.	She is highly respected in the STEM area, currently assisting in the definition of actions to promote digitalization and innovation in Guatemala (Guatemala Digital). She participates with ICTs in UN Women Guatemala, and other organizations, working for women's human rights, and greater participation in digital media; she "promotes Digital Kits" for women to use e-commerce spaces and services and sell their products (UN Women, Thursday, March 9, 2023). She believes that today young women have greater opportunities as they are receiving a different education.
Paula Coto. Sociologist, Master in Education and Public Policy. Postgraduate teacher in CTIM and gender. Executive Director of Chicas en Tecnología. Argentina.	She affirms that less than 20% of women in STEM areas, occupy leadership positions, what prevents this positioning is the lack of recognition of their contributions. With her organization she helps to reduce the gender gap in technology. Awarded the "Change Agent ABIE Award" by the Anita Borg organization, in recognition of the positive impact of her work to provide opportunities for girls and women in the world of technology. Believes that we need to invest in mentoring young women to overcome the gender barriers in technology.

Note: based on: UN Women (Thursday, March 9, 2023); Londoño (27, November, 2024), Londoño (15, September, 2024); Bowman (September 15, 2021); Bazo (2024); Velloso (13, March, 2024).

ding the path and leaving a legacy for the next generations. It also serves as a model for young men who have concerns about supporting and making collaboration between men and women a beneficial continuum. In any case, the question arises, will this ever be possible?

The profound global inequalities have resulted in a marked lack of visibility for women scientists, notably within the STEM discipline. This prevents their access to any type of recognition and for obtaining economic awards or funding to carry out their research (Prieto-Echagüe, 2020). It is essential and timely to increase the visibility of women's investigative contributions, functions, and leadership in regional STEM, as well as the impactful international work of Latin women scientists, providing crucial inspiration and models for young people (Prieto-Echagüe, 2020).

For this purpose, there are many initiatives and activities that are being developed worldwide, accelerating the diversity and inclusion of Latin women in STEM (Sendra and López, 2022). Such actions are possible thanks to the number of legal instruments, policies and measures adopted by countries that are focused on reducing the gender gap in STEM, with the support of international and regional organizations such as: UNESCO, UN Women, Inter-American Development Bank (IDB), the International Development Research Center (IDRC), the Economic Commission for Latin America and the Caribbean (ECLAC), the Ibero-American Organization for Education, Science and Culture (OEI), among others (Bello, 2020).

Some of the most important initiatives, implemented in several LATAM countries (Argentina, Brazil, Chile, Colombia, Mexico, Panama, Peru, Uruguay and French Guiana) are the programs developed by UNESCO and L'Oréal, "for women in science" (Bello, 2020).

> ...also: the UNESCO SAGA project (currently active in Argentina, Chile, Haiti, Jamaica and Uruguay), the TeachHER initiative, the IDB project "Gender gaps in science, technology and innovation in LAC countries" (implemented in Colombia, Chile, Mexico and Panama) and Women Entrepreneurs in STEM Careers (STEMPreneurs) (Bello, 2020, p. 42).

At the local level, regional networks standout such as: the UNESCO Regional Chair on Women, Science and Technology; the STEM Entrepreneur Women Program (WISE), which is carried out in: Argentina, Colombia, Ecuador and Peru; receives support from the IDB, FOMIN (Multilateral Investment Fund) and IAE and the Business School of the Austral University, Argentina (Bello, 2020).

Inclusion and diversity in STEM

It is widely acknowledged that being female continues to be a major obstacle in science fields, affecting career development, professional environments, and STEM-related employment. This is especially critical in Latin America, where closing the STEM gap with Anglo-Saxon nations is an urgent priority (López-Bassols *et al.*, 2018). Prieto-Echagüe (2020) emphasizes the need for cross-cutting policies to challenge gender-based role assignments in scientific-technological education. Additionally, initiatives fostering girls' self-efficacy and interest in STEM are vital. Importantly, recent evidence suggests a positive trend in narrowing this gap (UNDP, 2024). See Table 3:

Table 3.
Percentage sample of female participation in STEM careers in LAC

Country	Female gender	Male gender
Antigua y Barbuda	67%	33%
Argentina	63%	37%
Uruguay	54%	46%
Promedio ALC	41%	59%

Note: Excerpted from UNDP (2024).

As observed, some figures have increased, and some of the percentages demonstrate that women graduating in STEM is higher than the percentage of men, in contrast to the average in LAC. However, as mentioned by UNDP (2024), the gap continues in other STEM contexts, especially when analyzing the labor market. These figures observe an advance currently in LAC, since 41% of people graduating in STEM are women, a percentage that is above the world average, between 38% and 37% (UNDP, 2024).

To truly address the long-standing debate on women's inclusion and diversity in STEM, it is crucial to ensure coherence between actions, objectives, and outcomes. The leadership that women legitimately exercise in the different spheres of power, labor, professional, social, cultural, even in the armed forces (Gutiérrez, 2015) is of vital importance, but not enough to overcome inequalities, gaps and disparity between men and women. The visibility of the work and labor of scientist's women, the leadership they exercise in many of these contexts, the significant experiences and contributions to global development, their tireless struggle and persistence in professional achievements, and the aspirations of growth in the female guild should not remain a dead letter.

It is undeniable, within the framework of modernity and global development, that women are trained to occupy important leadership roles in STEM disciplines, as many of our scientists in Latin America already do. It is possible when forming a reference for demonstrating that it is feasible to overcome obstacles, to break down the barriers that still hold back the aspirations, demands and rights that make up women's movements and feminist struggles to date. However, it remains a difficult situation to agree on, since "implicit biases" and "microaggressions" keep many scientists submerged in marginality, as expressed by Urbina-Blanco *et al*. (August 17, 2020), who do not have a suitable support community, a group within scientists women are found.

In contrast with the LATAM region, in the USA, for example, there are models that promote diversity and inclusion in STEM, such as the media and the entertainment industry, also through popular culture, encouraging the association between women, allowing them been able to control gender bias. It is also a true fact that the inclusion of women in STEM fields, providing solutions from their diverse points of view, boosts the economy in a sustainable and equitable way (Kong *et al*., 2020), and in the individual aspect, increases the autonomy and economic independence of women (Morales Inga and Morales Tristán, 2020).

It is important to mention that from the first educational levels strategies are implemented that involve knowledge of STEM areas, to familiarize both boys and girls with this type of content, so that the participation of girls in the acquisition of these skills is feasible, and what is more important, from an early age they begin educationally in these disciplines (Laboratory of Economics of Education (LEE), 2022). An inclusive discourse centered on equality and diversity should be normalized, transforming the analysis from a focus on limitations to one that emphasizes successes and overcome barriers.

CONCLUSIONS

Women's leadership in STEM is a critical area of focus for inclusion and diversity. Despite observed progress in gender equality and some narrowing of the gap, significant underrepresentation persists in LATAM countries. Consequently, ongoing efforts are needed to achieve parity, as gender stereotypes, masculinization, and androcentrism continue to impede women's advancement to leadership roles in science.

Promoting inclusion and diversity in STEM fields requires the restructuring of scientific organizations, higher education institutions, and educational systems in general. The underrepresentation in the case of women in STEM is the major obstacle, due to gender stereotypes. The lack of role models to foster female leadership among younger generations is a premise to be analyzed. Gender equity in STEM is not only a matter of social justice, but also of harnessing the full human po-

tential that is also diverse and must be available for creativity, innovation and progress in science. The visibility of women in leadership roles in STEM can inspire future generations and contribute to a more equitable environment, where all voices are heard and valued.

To overcome persistent barriers, we must prioritize research that amplifies the visibility of women in STEM. This includes disseminating their work through scientific journals, informing macro studies, and highlighting their diverse contributions. Concurrently, reinforcing international advocacy for women's rights and normalizing discussions on these issues in academic and institutional settings are crucial.

Addressing the limited availability of current data on women's participation in STEM is essential. Expanding research and data collection will empower us to dismantle the myths and beliefs that hinder progress towards equality, inclusion, and diversity.

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