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Research Articles

Analysis of public policies for women's social inclusion in Science, Technology and Innovation (STI): training, access and permanence

Análise das políticas públicas para a inclusão social das mulheres na Ciência, Tecnologia e Inovação (CTI): formação, acesso e permanência

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Abstract

The general objective of this work was to analyze public policies regarding the training, access and permanence of women in science, technology and innovation in Latin America. This is a qualitative and descriptive study, delineated by documentary research, aiming at understanding the characteristics of the studied phenomenon. Content analysis was used as a method and categorical analysis as a technique. The results indicate that the measures developed by Latin American countries follow three axes: encouraging training in science, technology, engineering and mathematics, since the earliest childhood stages; access and permanence in power positions and scientific careers; inclusion of the 'gender' perspective in research and innovation contente.

Keywords: women in science; technology and innovation; gender inequalities; public policies.

Resumo

O objetivo geral deste trabalho consistiu em analisar as políticas públicas no que tange à formação, acesso e permanência das mulheres na ciência, tecnologia e inovação, no âmbito da América Latina. Trata-se de pesquisa de abordagem qualitativa, do tipo descritiva, com vistas a compreender as características do fenômeno objeto do estudo, tendo como delineamento a pesquisa documental. Como método, utilizou-se a análise de conteúdo e como técnica a análise categorial. Os resultados indicam que as medidas desenvolvidas pelos países latino-americanos percorrem por três eixos: incentivo à formação na ciência, tecnologia, engenharias e matemática, desde os primeiros passos da criança; acesso e permanência nas posições de poder e carreiras científicas; inserção da perspectiva 'gênero' nos conteúdos de investigação e inovação.

Palavras-chave: mulheres na ciência; tecnologia e inovação; desigualdades de gênero; políticas públicas.

INTRODUCTION

Gender differences and inequalities in the field of science, technology and innovation (STI) emerge during the child's first steps, taking shape along the initial socialization stages, as well as the boys and girls progress through the educational levels (Loch; Torres; Costa, 2021). A significant portion of the population uses sexist ways to educate boys and girls, almost always reinforcing society's expectations regarding the types of behavior and skills considered appropriate and/or inappropriate for men and women. Thus, since the early childhood,

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attributes are imposed on children, which differentiate them from each other and culturally define their nature.

In this case, it is understood that the problem lies in how this framework has been constructed and socially directed in the lives of each group, bringing to light cultural, psychological and social implications that, until today, reinforce sexist stereotypes (Benedito, 2022), defining daily difficulties and impediments to the integration, recognition and advancement of women in the various social, political and working spaces. Despite this debate, López-Bassols et al. (2018, p. 4) argue that "[...] women are less likely to pursue careers in STI". Biroli (2018) says that women have more time in formal education and their university enrollment rate is higher than men's. However, Boffi and Oliveira-Silva (2021) warn that women's participation in higher education is concentrated in university courses that reinforce both the duality of traditional socially established roles and the expectations defined as feminine and masculine.

In practice, women are the majority of those enrolled in social services education (78%), social, behavioral and medical sciences (77%), teacher training and educational sciences (75%). On the other hand, they are a clear minority in the more technical or impersonal, as well as the object-oriented sciences, particularly the engineering and related professions (24%). One example is the panorama found at the University of Panama regarding to STI careers: in 2020, the female population represented 38% of the people enrolled in this segment; between 2016 and 2020, in public and private programs linked to the STI promotion, only 35% of participants were girls and young people, according to a survey by the National Secretariat of Science, Technology and Innovation of Panama (Senacyt) (2023).

Another aspect to consider is the gender gap as women acquire higher qualifications. In Chile, the enrollment rate for women at undergraduate level is 54%; at master's level, 51%; at doctoral level, it drops to 43%; only 35% of women doctors are researchers within universities (Chile, 2021; Ministerio de Ciencia, Tecnología, Conocimiento e Innovación - CTCI de Chile, 2023). In Brazil, this inequality can be observed between the PhD process and the women's participation in the teaching postgraduate programs staff: in physics/astronomy, 26% of women hold a PhD, but only 15% are permanent professors; the same scenario is replicated in engineering, with 35% of PhD graduates and 23% of permanent professors, according to research data from the Grupo de Estudos Multidisciplinares de Ação Afirmativa (2020).

Historically, few women have held the position of vice-rector, director of research centers or manager of the National Secretariat of Senacyt (Panamá, 2024). Similarly, in Brazil, Luciana Santos is the first woman to hold the Minister of Science, Technology and Innovation position; in a recent interview, Luciana highlighted the challenges she has experienced throughout her career in politics and science, spaces hegemonically occupied by white men and areas marked by male culture. Among the obstacles, the minister highlights: implicit aggression, delivering above-average results, the challenge of being heard and respected for her opinions, the need to conform herself to the 'stereotypes' of the political field, among others (Azenha; Testi, 2023).

Women are also invisible in science, technology, engineering and mathematics (STEM) professions. Data from the World Economic Forum (WEF) (2023) show that, while 29.4% of women are entry-level workers, in positions of greater responsibility in the labor market of the future, such as vice-presidents and executive directors, they represent 17.8% (vice-presidents) and 12.4% (executive directors). However, McKinsey & Company (2023) warns that it is black women, accompanied by black men, indigenous people and lesbian, gay, bisexual, transvestite, transgender, queer, intersex, asexual, pansexual, non-binary and other sexual orientations and gender identities (LGBTQIAPN+) who make up the smallest number of people in power and social prestige seats.

In light of these gender discrepancies, this study was guided by the following question: what measures have been developed and used by Latin American countries to boost the inclusion of women in STI spaces? The research aimed to analyze public policies which promote women's training, access and permanence into the STI in Latin America. The methodology used comprised qualitative, descriptive and documentary research, using the content analysis as method, as it brings out aspects of what is being said about a given subject.

This text is organized into four sections: the first introduces the discussion on the phenomena responsible for the low women's representation in STI and STEM, as well as their

respective obstacles in the women's professional and scientific rise; the second presents the methodological procedures used; the third section analyzes and discusses the public policies developed and adopted by Latin American countries to promote the social inclusion of women in STI; finally, the fourth section contains the final considerations and suggestions for future studies.

THE PHENOMENA PERMEATING THE WOMEN'S LOW PRESENCE IN STI: GLASS CEILING, LEAKY PIPELINE AND SCISSORS EFFECT

Faced with gender inequalities within the STI, Olinto (2011) attributes a determining role to two mechanisms in the discussion about the discrepancies between men and women in the professional and scientific fields: horizontal segregation and vertical segregation. According to the author, horizontal segregation is related to the unequal distribution between the sexes in the various areas of science, scientific occupations and the job market, as well as being based on gender stereotypes and the duality of male and female roles, which are cultivated since the early childhood.

The author says that it is through horizontal segregation that women are encouraged to follow different paths from men. Furthermore, due to the influence of the family environment and the scarcity of female role models in science teaching, "[...] girls tend to evaluate themselves as more suitable for certain activities and to establish life strategies for themselves more compatible with what they consider or are led to consider as more suitable for them" (Olinto, 2011, p. 68).

It should be noted that gender inequalities in STI are not only present at the horizontal level and in the different areas of knowledge, but also at the vertical level (López-Bassols et al., 2018). Vertical segregation is a subtle, almost invisible and imperceptible social mechanism that makes difficult for women to progress to higher command, prestige and recognition positions, keeping them under-represented in higher hierarchical positions (Olinto, 2011).

Many studies use another phenomenon to understand hierarchical gender segregation. Despite this debate, Biroli (2018) highlights the so-called 'glass ceiling', which allows to understand the slower rate at which women ascend professionally, this being a recurring phenomenon in the field of STI management, business and scientific organizations, state bureaucracy, politics and other dimensions. According to Carneiro et al. (2022), the term 'glass ceiling' was coined, as first mentioned in 1986, in the United States of America (USA), by the journalists Hymowitz and Schellhardt, who published a paper in the *Wall Street Journal*, entitled *The glass ceiling: why women cant seem to break the invisible barrier that blocks them from the top jobs*? The authors' interest in the subject was related to the profile of American workers, in which women made up the largest workforce in organizations, but were especially concentrated in subordinate positions, while the majority of leadership positions were held by men, a trait that persists in contemporary society.

Since then, the 'glass ceiling' is a metaphor referring to the difficulty of finding women in the highest hierarchical positions, even though they are more educated (Oliveira; Woida, 2018; Fernandez, 2019; Boffi; Oliveira-Silva, 2021), belonging to the population richest strata and accessing "[...] opportunities similar to those of their male colleagues" (Biroli (2018, p. 13). According to Yannoulas (2002), the 'glass ceiling' introduces invisible barriers, almost always insurmountable, which create inequalities between people and positions, limiting women's mobility through formal spaces of power. It is often difficult to identify these barriers, as they are mechanisms of discrimination that become more subtle as organizations naturalize them.

Other studies have focused on understanding the unequal distribution between men and women in scientific professions and in disciplines aligned with the areas of engineering, mathematics, science and technology, based on the phenomenon of 'leaky pipeline'. Bennett (2011) explains that:

> Berryman introduced the "pipeline model", based on an empirical analysis of gender differences throughout the entire training and employment trajectory, rather than at different educational and career stages. By conceptualizing scientific careers as sections of an increasingly narrow pipeline, this model concisely and visually describes

> where occurs the escape of female scientists out of the pipeline and where the volume decreases, leading to a shortage of female supply. It raises questions about the amount of women traveling along the pipeline (horizontal segregation) and the slow speed of their progress along it (vertical segregation), clearly capturing political concerns about women's entry rates and the emerging focus on their progression. (Bennett, 2011, p. 151)

Thus, despite reaching high academic levels, this does not guarantee to the women equal access to positions in the scientific field, since the pipeline expels them from scientific careers, preventing their progression and transition to STI or STEM occupations. On this path, there is a 'loss' which echoes as a significant reduction in opportunities as they advance professionally, at the same time as they evaporate through the pipes when they enter job markets monopolized by the presence of men (Boffi; Oliveira-Silva, 2021).

In addition to this finding, the low presence of women in STI and STEM careers can also be interpreted through the scissors effect lens. According to Boffi and Oliveira-Silva (2021), this phenomenon is similar to the practices that emerge from the leaky pipeline. The scissors effect dynamic 'cuts' women off the academic careers in process of finishing their doctorates, a phase of study in the sciences and occupation as a researcher, in which takes place the professional dedication to research. In this case, the phases of this career are made up of: 1) studies in the sciences; 2) professional dedication to scientific research; 3) recognition for scientific research work; 4) decision-making and science system management. The greater the recognition of professions in a given area of knowledge, the lower the female researchers participation. This is a phenomenon present in most areas of knowledge, except in the following fields: arts and music, nursing, social work and computer science (Cândido, 2023).

Furthermore, the 'scissors effect' model is based, above all, on the inflection point or inversion of the trend in the predominant participation of one group over the other (Boffi; Oliveira-Silva, 2021). The reduction in the number of women increases as the professional career progresses to prominent positions in the scientific field or in the management of the national STI system, generating this scissor-shaped representation (Rodríguez Blanco et al., 2018).

Chart 1 summarizes some of the barriers that make up the referenced metaphors. However, it should be pointed out that, because they affect performance, hindering the progress of girls and women - whether in career choice, higher education, research and teaching in STEM or accessing/acting in STI management - such barriers are not restricted to a single phenomenon and can be manifested in other contexts.

Chart 1. The phenomena and their respective barriers.

Factors	Obstacles
Glass Ceiling	a) Gender stereotypes, cultivated since the early childhood by society in general;
	b) Political exclusion of women in the informal means of communication and information transmission;
	c) Lack of opportunities for women's professional development and experience;
	d) Conflict between work, family and motherhood, within the the lack of conscious and flexible policies on unpaid domestic and care work context;
	e) Prejudice, hostility and male view in business and scientific cultures;
	f) Harassment, malice, humiliation and marginalization, whether frontal or not;
	g) Mistrust and devaluation of women's performance and competence;
	h) Delegitimization of working women's discourse;
	i) The 'queen bee' effect (not necessarily an obstacle of the 'glass ceiling') (Ohayon et al., 2006; Enriquez, 2012; Lima et al., 2013; Oliveira; Woida, 2018; Fernandez, 2019)

Source: The authors (2023).

Chart 1. Continued...

Factors	Obstacles
Leaky Pipeline e Scissors Effect	a) Hegemonic stereotype of STEM workers (white, middle- and high-class men);
	b) Self-fulfilling prophecy effect;
	c) Differentiation between boys and girls/gender stereotypes about 'who does STEM careers', attributed in the expectations and teachings transmitted through family socialization and in school spaces;
	d) Lack of positive experiences, as well as female professionals as role models in science and exact sciences teaching;
	e) A hostile environment for girls/women in science classes;
	f) The scientific organizations culture, which ignores the women's needs and interests, especially the conciliation of work, family and motherhood;
	g) Obstacles to accessing funding for scientific research;
	h) Prejudice and gender discrimination in hiring, promotion and evaluation, which place men in a better position than women in terms of the skills and qualities required for science;
	i) Sociocultural, psychological and stereotyped biases that relate the male sex to the power context, decision-making and authority in public, private and scientific sectors (Blickenstaff, 2005; Bennett, 2011; Boffi; Oliveira-Silva, 2021; Panama, 2023).

Source: The authors (2023).

Among the set of obstacles that make up the 'glass ceiling', shown in Chart 1, the conflict between work, family and motherhood is the most cited. In this respect, women's mobility through the public sphere and formal spaces of power in the corporate world is hampered by the exploitation of work and the expropriation of time and energy (Biroli, 2018), due to the overload of domestic obligations, marriage expectations and childcare, since more results and greater involvement in organizational management are expected of women, but not of men.

Besides that, it is also worth noting that the unequal distribution of responsibilities in the private sphere affects women's health and well-being, with consequences such as stress problems, marital demands and feelings of guilt. Added to this, there are "[...] situations of tiredness, interference from family responsibilities at work, situations of stress and conflict when it comes to, for example, leaving small children to work" (Araújo, 2020, p. 53). Thus, for women, the imperative of unpaid activities and their position in the family relationship have repercussions in terms of less availability and free time to devote to an executive career, as they need to harmonize their professional performance with domestic tasks. So, in order to succeed in their executive careers, many women - especially in the wealthier strata of the population - turn to support networks, such as nurseries schools, outsourcing caregivers, maids, drivers etc.

This also happens in the leaky pipeline and in the 'scissors effect' universe, presenting a barrier to women researchers and teachers. In general, the culture of scientific organizations ignores the women's needs, especially regarding to motherhood. Reflecting on the women's lives outside of the scientific research and universities scope, i. e., looking inside their homes and families, Santos (2016) points out that the motherhood weight has been interpreted as a preponderant factor that can impact or not the knowledge production by women scientists. However, it should be noted that this dynamic alone does not produce the bottlenecks of the unequal women's participation in the hard sciences, but it is considered an additional obstacle in the female researchers' trajectory, as well as in access to resources from research promotion policies; after all, the burden of caring for and raising children falls on women (or their support networks), robbing them of time and energy to work in the research field and, consequently, in the scientific articles production and other activities involving research, such as the demands for internationalization (Santos, 2016).

Returning to the discussion about the 'glass ceiling', another obstacle refers to the political exclusion of women in informal means of communication and information transmission. According to Oliveira and Woida (2018), among the strategies often used by men is not inviting women to certain types of meetings and conversations, in order to prevent them from gaining access to the "boys' club" or to maintain their domination of existing contact networks. The authors state that women miss out on various opportunities to access, use and share information and, at the same time, they have few possibilities to build a recognized career in management, in the sense of bringing good agreements and policies to organizations.

Broadening this discussion, mistrust and devaluation of women's performance and competence is another constituent barrier of the 'glass ceiling'. Due to sexist standards, which interpret female leadership through stereotyped labels labels that place on women attributes such as excessive emotionality, weakness and lack of rationality (Lima et al., 2013), it is necessary for them to prove their capacity, qualifications and competence in order to keep their jobs. In this case, women are not allowed to make mistakes, requiring them greater dedication to their careers and personal sacrifices, from which men are freed (Oliveira; Woida, 2018; Lima et al., 2013). Furthermore, according to Wilkins-Yel et al. (2022), due to the hegemonic stereotype insistence, this context also affects black women working in STEM. Strictly speaking, it is articulated in a field that privileges specific over-represented social segments: white, heterosexual, middle- and high-class men, which leads black women to face psychological and subjective problems regardind to well-being and mental health throughout their academic and professional careers in STEM work (Iwamoto, 2022; Wilkins-Yel et al., 2022).

Finally, it should be noted that the 'glass ceiling'obstacles, as well as the prejudices present in management, are not only located in male attitudes, but can also come from women's behaviors. In general terms, the emphasis is on 'queen bee' effect - which is not necessarily an 'glass ceiling' obstacle - in which, based on male culture, women adopt behaviors that hinder the professional progression of other working women, due to the fear of being replaced by their subordinates (Nunes; Lima, 2021). Therefore, in this case, women have a direct role in the construction of obstacles and this occurs mainly in organizations where leaders are aligned with the patriarchal culture, which can create discrimination experiences against those who manage to progress in their careers. Thus, "[...] once in management positions, these women 'queen bees' are encouraged to reproduce sexist patterns" (Nunes; Lima, 2021, p. 5).

Among the leaky pipeline and scissors effect obstacles, the self-fulfilling prophecy stands out. In general, it has been talked about socially constructed and disseminated learning, which is decisive both for social structuring and for reaffirming traditional gender roles. Girls are encouraged to develop skills associated with support functions, caring for the family and children, i. e., subjective activities and their direct extensions, deposited in the private sphere, which culturally is the women's domain. Boys are always associated with skills and attitudes inherent to coldness and rationality (Loch; Torres; Costa, 2021). Within this debate, the main problem lies in how this panorama has been constructed and socially directed in the lives of each group, bringing to light cultural, psychological and social implications which reinforce gender stereotypes about 'who does STEM' (Bello, 2020; Talsma et al., 2019).

In this sense, López-Bassols et al. (2018, p. 4) state that, to this day, "[...] women are less likely to pursue careers in STI". According to Alfred et al. (2019), there is a prejudice that women have insufficient skills to work in the so-called hard sciences. In turn, Talsma et al. (2019) consider that self-fulfilling prophecy is conditioned from the education earliest stages, in which teachers rely on the common sense that their female students would not have ability to improve their performance in certain fields of study and, therefore, they do not invest efforts in their formation in exact sciences. And, of course, this context is also conditioned by the absence of female professionals as positive role models in the teaching of exact sciences. Regarding to this debate, analyzing female scientists and teachers reports, Barros and Mourão (2020) comment that the influence exerted by teachers since high school, as well as the contact with the scientific world during adolescence, was important in their interviewees' scientific career choice.

Given the context of inequalities described above, this study analyzed public policies, especially measures stemming from the public agendas and national strategies developed and used by Latin American countries to eliminate or reduce the barriers faced by women in the field of STI

and which provide an increase in the entry of women into these areas, encouraging training in STEM, as well as their access and permanence in decision-making positions and scientific careers.

In the next section, considering the examples of obstacles experienced by women in this universe, it is presented the methodological path adopted in this research, followed by the policies aimed at the aforementioned context.

METHOD

This research is essentially qualitative in nature and descriptive in its objectives. Qualitative studies are commonly carried out aiming to analyze the existing meanings and senses of a given phenomenon (Minayo, 2012). Descriptive research seeks to characterize and describe the information about the phenomenon studied (Saccol et al., 2012), in view to drawing inferences during the research results discussion.

The design, in turn, is documental, since documents are direct sources of data collection (Marconi; Lakatos, 2003). In this research, there used the so-called primary sources of information, materials that have not yet received analytical treatment (Gil, 2002). Thus, the documents exempt from third-party analysis and which justify this documentary design were the Latin American countries' public policies on gender equality in science, technology and innovation, as shown in Chart 2:

Chart 2. Latin American countries' public policies on gender and STI.

Countries	Public policies on gender equality in CTI	Reference code
Argentina	*Programa Nacional para la Igualdad de Géneros en Ciencia, Tecnología y Innovación* (National Program for Gender Equality in Science, Technology and Innovation) (Argentina, 2020)	$PNCTI_{ARG}$
Chile	*Política Nacional de Igualdad de Género en Ciencia, Tecnología, Conocimiento y Innovación, y su plan de acción "50/50 para el 2030"* (National Policy on Gender Equality in Science, Technology, Knowledge and Innovation and its action plan "50/50 by 2030") (Chile, 2021)	$PNCTI_{CHL}$
Costa Rica	*Política Nacional para la Igualdad entre Mujeres y Hombres en la formación, el empleo y el desfrute de los productos de la Ciencia, la Tecnología, las Telecomunicaciones y la Innovación 2018-2027* (National Policy for Equality between Women and Men in training, employment and enjoyment of the products of Science, Technology, Telecommunications and Innovation 2018-2027) (Costa Rica, 2017)	$PNCTI_{CTR}$
Panama	*Política Nacional de Igualdad de Género en Ciencia, Tecnología e Innovación de la Republica de Panamá al 2040* (National Policy on Gender Equality in Science, Technology and Innovation of the Republic of Panama to 2040) (Panamá, 2023)	$PNCTI_{PNM}$
Mexico	*Programa Nacional para la Igualdade de Género entre Mujeres y Hombres – PROIGUALDAD 2020-2024* (National Program for Gender Equality between Women and Men - PROIGUALDAD 2020-2024) (México, 2024)	$PNIG_{MXC}$
Peru	*Política Nacional de Igualdad de Género 2019* (National Policy on Gender Equality 2019) (Perú, 2019)	$PNIG_{PRU}$
Dominican Republic	*Política Nacional para la Igualdad y Equidad de Género 2018-2030 (National Policy for Gender Equality and Equity 2018-2030)* (Republica Domenicana, 2018)	$PNIG_{RPD}$
Brazil	*Estratégia Nacional de Ciência, Tecnologia e Inovação 2016-2022 e Diretrizes para a elaboração da Estratégia Nacional de Ciência, Tecnologia e Inovação - 2023-2030 (Portaria MCTI nº 6.998, de 10.05.2023* (National Science, Technology and Innovation Strategy 2016-2022 (Brasil, 2017) and Guidelines for the preparation of the National Science, Technology and Innovation Strategy - 2023-2030 (MCTI Ordinance No. 6.998, of 10.05.2023)	$ENCTI_{BRA}$ e $PMCTI_{BRA}$

Source: The authors (2023).

In general, the documents: Argentina (2020), Chile (2021), Costa Rica (2017), México, Perú (2019) and Republica Domenicana (2018) were selected through the synthesis prepared by

Muñoz Rojas (2021, p. 31-33) on gender and STI policies, as well as the national plans of Latin American countries aimed at promoting equality between men and women and the links with STEM. From this list, the public policies were located via *google.com.br*, in October 2023. The only exception is Panama (2023), whose document was found by searching in Spanish language, with the following keywords: "national policy", 'gender equality', "STI" and "Panama". Regarding to Brazil, it was used the latest document on the subject: *Estratégia Nacional de Ciência, Tecnologia e Inovação 2016-2022* (National Strategy for Science, Technology and Innovation 2016-2022) (Brasil, 2017); although limited, this text is representative of Brazilian State's position. To complement this, it was also used the new Ministry of Science, Technology and Innovation (MSTI) Ordinance nº 6.998, of May 10, 2023, which establishes the guidelines for drawing up the National Science, Technology and Innovation Strategy for the period 2023-2030.

The public policies of Latin American countries were chosen because, according to Muñoz Rojas (2021, p. 33), "[...] these policies have an eminently intersectional character and stand out for having come into force in recent years (including the last few years characterized by the context of the COVID-19 pandemic)". Thus, it is expected that these documents will highlight measures to address or reduce the various inequalities experienced by women in STI universe.

The research method used is Content Analysis, as defined by Bardin (2016):

> [...] a set of communication analysis techniques aimed at obtaining, through systematic and objective procedures for describing the content of messages, indicators (quantitative or not) which allow the inference of knowledge related to the conditions of production/ reception (inferred variables) of these messages. (Bardin, 2016, p. 48).

Bardin (2016) explains that content analysis is a set of data analysis techniques, as well as a cross-cutting and versatile method, responsible for bringing out aspects of what is being said about a given subject. In order to carry out content analysis, few steps are required, which are organized as follows: selection and organization of the material; floating reading - exploration of the collected material (in this phase, coding systems are defined); definition of categories and cut out units, which can be represented by themes, phrases, paragraphs or words. For this study, the cut-off point used was the measures that encourage or promote women's social inclusion in the CTI; the recording units (RU) refers to the excerpts or phrases corresponding to the themes linked to the categories (Bardin, 2016).

Among the numerous content analysis techniques, the data were analyzed by means of the categorical analysis, which consists of "[...] an operation of a set constituent elements by differentiation and then by regrouping according to gender, with previously defined criteria" (Bardin, 2016, p. 199). Categories can be listed either *a priori*, before data collection (exploratory phase), or *a posteriori*, at the time of field research (Minayo, 2012; Bardin, 2016).

In this case, the categories were established a priori, i.e., imported into the research, with four categories and eight subcategories. It should be noted that they all come from the following documents: Convention on the Elimination of All Forms of Discrimination Against Women (Cedaw) (Organização das Nações Unidas, 1979); Santo Domingo Consensus (Comisión Económica para América Latina y el Caribe, 2013; United Nations Educational, Scientific and Cultural Organization, 2018); Muñoz Rojas (2021), Gender Summit (Université du Luxembourg, 2010); Movement Parent in Science (2023); Project Gender Equality in Science, Tecnology and Innovation: bilateral and multilateral dialogues - Gender - STI (European Commission, 2023). The categories of analysis are listed in Chart 3.

Chart 3. Categories and subcategories of analysis.

Categories	Subcategories
1. Encouraging interests and vocations	1.1 To Encourage and cultivate the interest and confidence of girls since the early childhood in STEM education (Comisión Económica para América Latina y el Caribe, 2013; United Nations Educational, Scientific and Cultural Organization, 2018);
	1.2 Measures or actions to facilitate contact between children, young people and adolescents and female role models (United Nations Educational, Scientific and Cultural Organization, 2018);
	1.3 Safe and inclusive learning environments in STEM (United Nations Educational, Scientific and Cultural Organization, 2018).

Source: The authors (2023).

Chart 3. Continued...

Categories	Subcategories
2. Access to and permanence in STI power positions and STEM education	2.1 Gender balance in participation in science education, research and science-related academic employment (Université du Luxembourg, 2010);
	2.2 Attract and increase the women's participation in STI high-visibility areas (European Commission, 2023);
	2.3 Actions or measures to reconcile work, family and personal life and permanence programs for mothers (undergraduate and graduate) (Organização das Nações Unidas, 1979; Movement Parent in Science, 2023);
	2.4 Helping women at work and in scientific research, in view to tackling the culture of discrimination, harassment, obstacles and gender stereotyping (European Commission, 2023; Movement Parent in Science, 2023).
3. Transversal approach and gender dimension in research and innovation content	3.1 To Encourage entrepreneurial institutions to include a gender policy in their actions to promote, finance or carry out STI activities (European Commission, 2023).

Source: The authors (2023).

The use of these categories and subcategories in the informations selection, grouping and organization derives from internationally recognized organizations agreements and projects; therefore, they are characterized as important inputs, above all as guidelines for governments to develop wide-ranging public agendas and national strategies, as well as to confront the leaky pipeline, scissors effect and glass ceiling obstacles.

In light of these observations, the following section presents the results and discussion.

RESULTS AND DISCUSSION

This section presents the results obtained by applying content analysis. Chart 4 shows the organization of the information present or absent from the materials chosen for analysis, followed by a description of the inferences, i.e., what can be concluded from the presence or absence of the recording units (RU):

Chart 4. Category 1: Encouraging interests and vocations.

Subcategories	Recording units	Reference code
1.1 Encourage and cultivate the interest and confidence of girls since the early childhood in STEM education (Comisión Económica para América Latina y el Caribe, 2013; United Nations Educational, Scientific and Cultural Organization, 2018)	"To develop programs, capacities and materials to be used inside and outside the classroom, focused on increasing girls' and young women's sense of self-efficacy in STI subjects, as well as to promote an entrepreneurial scientific-technological vocational orientation, with a gender and intercultural perspective [...]".	$PNCTI_{PNM}$
	"To promote curiosity, scientific exploration and reflective capacity in school education from the earliest ages, in order to attract girls and boys to science, recognizing that both have the same potential for learning and development, independently of their biological and social characteristics".	$PNCTI_{CHL}$
	"To instigate research about gender barriers to women's access, training, permanence and employment in scientific-technological fields, from early childhood and throughout life."	$PNCTI_{CTR}$
	"To boost initiatives of social appropriation of science, technology, engineering, mathematics and innovation for children from an early age, through schools and governmental centers of ICT public access".	$PNIG_{RPD}$

Source: Research data. Organization by the authors (2023).

Chart 4. Continued...

Subcategories	Recording units	Reference code
1.2 Measures or actions to facilitate contact between children, young people and adolescents and female role models (United Nations Educational, Scientific and Cultural Organization, 2018)	"To realize systematic communication campaigns, in media and social networks, aimed at young people and adolescents, which indicate the overcoming of early gender stereotypes [...] and make visible success stories of women scientists, technologists and innovators, who have overcome gender barriers - and open new paths for the younger generations;	$PNCTI_{PNM}$
	To implement Pair Programming for female students of technology paired with working professionals (women and men), to serve as a leverage for their professional development".	
1.3 Safe and inclusive learning environments in STEM (United Nations Educational, Scientific and Cultural Organization, 2018).	"To boost the creation of spaces and programs aimed at girls and young people for the strengthening of STI competences [...], considering their socioeconomic conditions and taking into account their interests, collaboration with Ministries in the social field, INFOPLAZAS, vocational training centers, local governments and other public and private actors;	$PNCTI_{PNM}$
	To develop and implement in the academic curriculum an egalitarian education in computational thinking, with a gender and intersectional perspective, also taking into account cultural relevance, socioeconomic inclusion and territorial cohesion".	
	"To provide friendly and inclusive educational spaces, free of violence and discrimination, which embrace diversity and recognize the cultural change that must be promoted to eliminate violence, gender bias and stereotypical role models".	$PNCTI_{CHL}$

Source: Research data. Organization by the authors (2023).

The first category refers to 'encouraging interests and vocations', in view to find the strategies used by Latin American countries to promote STEM education, contact between children and model professionals in science and exact sciences teaching or active STI specialists, as well as building a diverse, safe and inclusive environment related to STEM learning.

According to Loch et al. (2021), from early childhood, girls and boys are taught in different ways. People almost always use sexist activities to impose social expectations on the lives of each group, reinforcing traditional gender roles defined as female and male. Coming from the private and educational spheres, from the principles preached by the church dogma, from organizations, i. e., from the society in general, these teachings are passed down from generation to generation, adapting to different cultures molds, above all shaping the choice of career or profession for girls, young women and adolescents.

In this way, decisions and choices stemming from their social expectations and family pressures keep girls away from the STI space from the socialization first steps and initial stages. Furthermore, these patterns increase as the boys and girls progress through the educational levels, presenting disadvantages and inequalities for women in the various environments of the technical, impersonal and object-oriented sciences.

In the first subcategory analysis - **encourage and cultivate the interest and confidence of girls since the early childhood in STEM education -** there were four RU, indicating that the primacy of gender inequalities in exact science education from early childhood is a concern in the following countries: Panama, Chile, Costa Rica and Dominican Republic. The measures developed by these countries include programs applied inside and outside the classroom, research into the obstacles which interfere in women's access, training, permanence and employment in scientific-technological areas and initiatives for the social appropriation of STEM and innovation for boys and girls.

Among the set of measures established by public policies, the Panama strategy stands out, which effectively brings together different organizations in Panamanian society to reduce the self-fulfilling prophecy effect. The aim is to boost girls' interest in and development of skills and abilities in STI subjects, as well as to break down the prejudice that women don't have the necessary skills to perform and progress within the hard sciences field (Alfred et al., 2019) or teachers' beliefs that "[...] women shouldn't go into engineering because they want to get married and end up stealing a man's job"; Liedi Bernucci heard this phrase from a male professor when she was an engineering student at the University of São Paulo (USP) and, today, she is the first female head of the institution in 124 years (Nunes; Wanderer, 2021). Other examples consist of cultural insistence on ways to attack women's progress. According to BBC News (2018), nine of Tokyo's most prestigious universities have changed the grades of women selected to study medicine, removing them from the approved list, due to the upper hierarchy prejudice that "[...] many female graduates end up leaving medical practice to give birth and raise children", stealing the place of a working man.

To be more effective, the measure - "[...] to develop programs, capacities and materials to be used inside and outside the classroom, focused on increasing girls' and young women's sense of self-efficacy in STI subjects" - can be related to and complemented by the subcategory **measures or actions to facilitate contact between children, young people and adolescents and female role models**. On this point, the only RU found refers to the programs developed by Panama, namely: developing campaigns to raise awareness, publicize and make visible female examples who stand out in STI, as well as the Pair Programming culture, a way of building an interaction of support, assistance and information sharing between women technology students and active STI professionals.

This is in line with the research by Barros and Mourão (2020), who point out the need for positive experiences, such as the presence of trained professionals as role models in teaching and encouraging the exact sciences. Based on researchers and teachers women's narratives, the authors explain that the participants in the study "[...] attribute to teachers the framework for deciding about the activity areas, as well as the incentive for scientific activities" (Barros; Mourão, 2020, p. 7). However, Talsma et al. (2019) comment that many teachers still do not invest their efforts in training their female students, due to the belief that they do not have adequate capacity to improve their performance, which contributes to the increase in the perception of inferiority internalized by girls in certain subjects, because they have no contact or encouragement in STEM training.

On **safe and inclusive learning environments in STEM**, there are two RU. In general, they talk about the measures taken, once again, by Panama and Chile, which favor the recognition of the multiple pluralities and of the individuals social and cultural characteristics. So, it can be inferred that when public policies offer mechanisms to boost the creation of representative learning environments, made up of such different peoples, sharing and socializing differences, particularities and specificities, they make it possible to transcend gender biases, different forms of discrimination and violence, as well as current patterns of gender stereotypes about 'who does STEM'. Then, there is na accessible social space, open to dialog, free of hostility in the sciences formation, but, above all, of society belonging.

Some countries did not present any RU pertinent to the first category, including Brazil, Argentina, Mexico and Peru. In Brazil, the National Strategy for Science, Technology and Innovation (2016-2022) recognizes the importance of gender equality in STI, but does not describe or develop any measures seeking to move in this direction. Furthermore, the publication of the new MCTI Ordinance nº 6.998, on March 10, 2023, also does not propose to develop the inclusion of women in the various STI environments. However, Iwamoto (2022) points out that the concern to include women in STEM comes only from the MCTI, since there are some programs in the country aiming to work on this point, for example: the Innovative Women Program, an initiative of the MCTI and the Financier of Studies and Projects (Finep), a public company of the MCTI to stimulate startups led by women; the call Women in Science, Technology, Engineering and Computing, whose main objective is to encourage the training of women in science careers and related professions, confronting the dropout of students in university courses in these areas and also developing a reconnection between public schools and Higher Education Institutions (Iwamoto, 2022).

Chart 5 below shows the information provided or absent from the materials chosen for analysis in Category 2:

Chart 5. Category 2: Access to and permanence in power positions in STI and STEM education.

Subcategories	Recording units	Refernce code
2.1 Gender balance in participation in science education, research and science-related academic employment (Université du Luxembourg, 2010)	"To develop a Roadmap, applicable to educational institutions and STI entities and companies, to attract and retain women in fields where the female presence is lower, especially in engineering and computer science, based on their vision and priorities;	$PNCTI_{PNM}$
	To ensure a balanced participation of women and men in research teams (funding and/or putting as a requirement), promoting that women can be the leaders, as well as promoting research projects proposed and/or led by women;	
	To implement programs to promote and support women in technological disciplines teaching careers".	
	"The National Program for Gender Equality arises within the framework of a State policy to ensure the conditions for women and the LGTBI+ community to develop in equality [...]. In turn, it is a response to debates within the system about the women's participation and performance in the labor market and gender gaps in scientific and technological careers [...]"	$PNCTI_{ARG}$
	"To make women visible as leaders in national research, technology and innovation and to recognize their contributions to the creation of knowledge in all disciplines, as leaders who explore and challenge the established, who integrate new understandings and transform their knowledge into solutions for the country's challenges".	$PNCTI_{CHL}$
	"To articulate the support programs of educational institutions towards women who wish to study careers related to science and technology, considering their needs diversityf".	$PNCTI_{CTR}$
	"To strengthen networking and exchange programs among women interested in or pursuing careers related to science and technology, with the participation of women scientists or technologists, who highlight their contribution to national development".	
	"To implement awareness programs and campaigns through the media and in schools aimed at getting women to study STEM careers and linked to the sciences, and that universities universities seek to attract women to technology-related careers".	$PNIG_{RPD}$
	"To increase the women´s participation in traditionally masculinized careers, and to guarantee access, permanence and completion of women and men under equal conditions in technical-productive education, technological higher education".	$PNIG_{PRU}$
2.2 Attract and increase the women's participation in STI high-visibility areas (European Commission, 2023)	"To prepare a Directory of relevant women in Science, Technology and Innovation in Panama, as well as to promote a balanced presence in the existing STI directories".	$PNCTI_{PNM}$
	"To give support to the creation/participation of women innovation entrepreneurs in networks (national and international) and their integration into sectoral clusters, as well as to promote initiatives to make diverse innovators visible (platforms, campaigns, awards, etc.), breaking the predominant elite approach and the cultural myth about "the good entrepreneur".	
	"To promote the women's leadership in CTCI, in high relevance positions, in all areas of development and promotion of research, transfer and dissemination of CTCI, both in universities and research and technological development centers, as well as in scientific-technological companies".	$PNCTI_{CHL}$
	"To build a more diverse and inclusive national science, technology, knowledge and innovation system ensuring the women's access, development and leadership in all social organizations linked to the knowledge creation, dissemination and application".	
	"To promote affirmative actions creation and incentives for educational institutions, as well as companies linked to science and technology, to be credited with the equity stamp".	$PNCTI_{CTR}$
	"To promote strategic actions to favor the incorporation of women in the energy, technology, engineering, communications and transportation sectors in favor of their employability".	$PNIG_{MXC}$
	"Workforce training policies for the ST&I sector have been marked by measures to improve the careers of researchers (especially beginners and women) and to attract new talent from abroad. Several countries have adopted mechanisms to promote a gender policy implementation in scientific institutions, encouraging the creation of formal structures to make women's rights effective within their STI systems. The promotion of parity has been encouraged in order to reduce inequalities and to combat discrimination".	$ENCTI_{BRA}$

Source: Research data. Organization by the authors (2023).

Chart 5. Continued...

Subcategories	Recording units	Refernce code
2.3 Actions or measures to reconcile work, family and personal life and permanence programs for mothers (undergraduate and graduate) (Organização das Nações Unidas, 1979; Movement Parent in Science, 2023)	"To develop measures and services to support reconciliation in the STI sector, promoting reforms in the work regulations of STI entities regarding the consideration of maternity in the valuation of production in STI, flexible schedules for those who are under the family care responsibility, care and breastfeeding arrangements and the promotion of the men involvement in care tasks (co-responsible reconciliation) through the extension of workink paternity leaves, among others".	$PNCTI_{PNM}$
	"To develop systematic communication campaigns on equality between men and women in care and domestic work, so that women advance in the working career, in the science and technology field".	$PNCTI_{CTR}$
	"To design and implement a Care System based on a comprehensive, universal, rights-based and gender equality approach, which articulates and unifies the public mechanisms that provide these services, expanding the existing ones and involving the private sector and the society".	$PNIG_{RPD}$
	"The care policy contained in this Program is made up of seven strategies: strengthening the institutional framework for care; increasing the participation of the State, community and private sector in care; expanding access to care services designed according to the needs of women and men; to promote the regulation and establishment of working conditions compatible with family responsibilities and care needs; to promote the regulation and establishment of decent working conditions in the care and domestic work sector; to estimate and disseminate the social and economic value of care and household work; and to encourage sociocultural practices and norms transformation to provide a fair and equitable distribution of household work".	$PNIG_{MXC}$
	"Development of a national care system with a gender approach".	$PNIG_{PRU}$
	"Compatibilizing educational and employment opportunities whith motherhood and the family and care responsibilities assigned to them."	
2.4 Helping women at work and in scientific research, in view to tackling the culture of discrimination, harassment, obstacles and gender stereotyping (European Commission, 2023; Movement Parent in Science, 2023).	"To impulse the transformation of the STI organizational entities cultures, to make them more inclusive of women, deploying awareness and training plans on gender equality and diversity to the staff of the entities that make up the ecosystem, in order to implement a culture of equality in all fields (subject, content and purpose); to eradicate unconscious gender biases and foster an appropriate work environment where all people feel valued and can effectively incorporate gender equality into their operations. To give special emphasis to the men participation in these entities, particularly those in decision-making positions, as well as to the promotion of healthy and positive masculinities in the exercise of STI".	$PNCTI_{PNM}$
	"To promote zero tolerance cultures to sexual harassment and gender-based workplace harassment, promoting the application of specific protocols to prevent, investigate and punish the STI, in accordance with the minimum parameters established in Panamanian legislation".	
	"To promote the formulation and implementation of sustainable and robust institutional plans which allow monitoring and act to close gender gaps in the STCI and enable them to eradicate harassment and violence practices within universities and research in the country".	$PNCTI_{CHL}$
	"To increase research about gender barriers in the access, training, permanence and employment of women in scientific-technological areas [...]".	$PNCTI_{CTR}$
	"To design a national program articulating national, regional and intersectoral efforts, as well as public-private partnerships, contributing to eliminating gender stereotypes and promoting gender equality in access to science, technology and innovation".	
	"To promote the review and elimination of gender bias in the processes of admission to careers related to science and technology".	

Source: Research data. Organization by the authors (2023).

The second category considers the 'access and permanence in power positions in STI and STEM education', in view to identifying actions seeking to achieve gender parity in scientific education, in decision-making positions in STI, measures which allow to reconcile work, family and personal life, actions to keep mothers in undergraduate and postgraduate courses, as well as confronting the culture of discrimination, harassment, obstacles and gender stereotypes.

The subcategories **gender balance in science education, research and science-related academic employment** and **attract and increase the women's participation in STI high-visibility areas** are the ones with the most RU in all the analyzed documents. This means that these themes are considered priorities and need to be turned into equity scenarios, being approached from different perspectives.

In all the observed dimensions, the measures developed by Latin American countries generally encompass the unequal distribution of sexes in the various science areas or scientific occupations and in labor market. Therefore, it can be inferred that the main problem faced by these countries is the way in which gender stereotypes, the duality of male and female roles, historically cultivated by society, influence women's career decisions and choices. Women often take different paths to those chosen by men (Olinto, 2011). Furthermore, professionally, they progress at a slower rate within the command and leadership hierarchies, both in national STI systems and in scientific research organizations. In this case, public policies have mechanisms to identify and confront the invisible barriers that keep women in subordinate positions.

Five RU were recorded in the subcategory **actions or measures to reconcile work, family and personal life and permanence programs aimed at mothers (at undergraduate and graduate level)**. In general, the family unit and domestic tasks the representation as a social space reinforced and culturally constructed for women results in the expropriation of time and energy from female workers (Biroli, 2018). In contrast, the public dimension representation as a more important unit, of greater value and inherent to the male universe, favors the growth of men in institutions of power and decision-making positions. In this respect, women's access to and activity within the STI is limited by the free time unequal distribution.

It should be noted that the UR content presents a set of measures that establish the sharing of domestic responsibilities and unpaid tasks, in order to break the double or triple working day still carried out by many women. Among the strategies, the following stand out: implementing care systems by creating support services; reforms to the STI entities institutional regulations, with the possibility of the State involvement, local community and business sector; flexible working hours; paternity leave, among others. However, there is a lack of actions to curb the emptying of the scientific research pipeline, due to the conflict between career, family and motherhood.

In this aspect, the women's needs invisibility is frequent in the scientific organizations cultures, especially regarding to the lack of structure to offer subsidies and support to mothers researchers. It is common for these researchers to take the research production dynamics at home, but even so, their productivity in terms of publication and participation in events is hampered due to childcare (Santos, 2016, p. 809-812).

In Brazil, the Chamber of Deputies recently approved the scientists mothers bill (PL 1741/2022), which provides for a 120-day extension of master's and doctoral defense deadlines for the following reasons: childbirth, birth or adoption. However, the text was sent to the Senate for analysis and approval (Gouveia, 2023).

The subcategory **assisting women at work and in research, aimed at tackling the culture of discrimination, harassment, obstacles and gender stereotypes** presents three RU. In general, the Latin American countries willing to work on the women's social inclusion in the STI, particularly to eliminate the barriers they face, have introduced measures to confront the selective mechanisms that promote and privilege the career progression of specific over-represented social segments. In this sense, the actions are focused on gender equality in STI communities and ecosystems, in view to building and developing a representative culture, emphasizing the unconscious gender biases, sexual and workplace harassment elimination, i. e., discrimination frameworks that devalue women's performance and competence in all the STI dimensions analyzed, requiring them to dedicate themselves more to their professional and scientific careers, as well as various personal sacrifices.

Chart 6 shows the information available or absent from the materials chosen for analysis in Category 3:

Chart 6. Category 3: Gender dimension and transversalization in research and innovation content.

Subcategories	Recording units	Reference codes
3.1 Encourage entrepreneurial institutions to include a gender policy in their actions to promote, finance or carry out STI activities (European Commission, 2023)	"To encourage entities toe use tools and methodologies to eliminate gender bias in hiring processes (e.g. blind curricula) and other protocols for selection and recruitment of CTI personnel, working - in the case of the Public Administration - in collaboration with the General Board of Administrative Careers (GBAC)".	$PNCTI_{PNM}$
	To contribute to a greater visibility and coordination of those entities, programs and experiences which work in favor of promoting the integration of girls and young women in STI studies".	
	"To promote, train and support STI entities to provide the inclusion of the sex variable and gender dimension in all their research, technology and/or innovation activity (in the formulation, choice of study subjects/target audience, methods and tools, ethical implications), as well as in their results".	
3.1 Encourage entrepreneurial institutions to include a gender policy in their actions to promote, finance or carry out STI activities (European Commission, 2023)	"To foster science communication with a gender perspective, promoting activities contributing to make visible the work of women and the LGTBI+ population and to generate scientific vocations, advising on the subject to organizations and institutions of the STI National System and promoting an inclusive and non-sexist language".	$PNCTI_{ARG}$
	"The objective is to make visible the instruments and actions with a gender perspective in S&T existing in the STI National System institutions as well as to build and articulate a community of practices to evaluate, improve and strengthen existing actions and instruments".	
	"To advance in updating and expanding the Bank's coverage, in view to identify good practices that can be extrapolated to other agencies of the system which do not have experience in gender and science policies".	
	"To provide a recognition system for companies and institutions which promote parity in their organizational structure, including decision-making positions, in scientific-technological areas".	$PNCTI_{CTR}$
	"To promote affirmative actions to stimulate the formation of working and research groups focusing on gender and led by women, in the public and private sectors related to Science and Technology".	
	"To strengthen the Gender and Technologies Technical Roundtable composed of government institutions responsible for the implementation of policies on digital development, science and technology in the country to ensure the effective incorporation of the gender equality approach in plans, programs and projects".	$PNIG_{RPD}$
	"To ensure and encourage the women's full and effective participation in science and equal opportunities in the STI field is a strong global tendency with direct benefits for society as a whole. France, England and the United States are among the countries that have implemented programs to combat gender inequality focusing on reducing disparities in the development of careers in STI and promoting research including a transversal gender approach. Research into gender relations, labor sexual division and power relations has been encouraged. One of the historical results of this approach is reflected in the inclusion of women in the testing of medicines in research phase".	$ENCTI_{BRA}$

Source: Research data. Organization by the authors (2023).

The last category, 'Gender dimension and transversalization in research and innovation content', is extended into the following subcategory: estende-se na seguinte subcategoria: **encourage entrepreneurial institutions to include a gender policy in their actions to promote, finance or carry out STI activities**. Here, Panama, Argentina, Costa Rica and the Dominican Republic establish actions for organizations to adopt the use of tools or methodologies to promote the inclusion of gender parity in all their activities, projects, debate groups; Mexico, Peru and Chile do not present RU; Brazil presents a generic report about the promotion of transversality actions in research, indicating only the 'inclusion of women in the testing of medicines in the research phase'.

CONCLUSION

In general, women's access to higher education and to the job market has gradually progressed over the last few decades. Today, they have spent more time in formal education and represent

the majority of people enrolled in university courses, which used to be predominantly occupied by men and now have a female predominance in certain areas of knowledge. Reflecting about the tendencies and effective changes in the women's status in Latin American countries, especially regarding to the their entry into job market and higher education institutions, it should be noted that, at present, no country has yet achieved total gender equality (Forum Economico Mundial, 2023). Therefore, the inequalities and differences between men and women and their multiple pluralities are registered in various spaces of contemporary society, especially in the STI environments.

Among the numerous contexts of inequality in the STI, it is possible to quote, as an example, the female expressiveness in courses associated with health activities, arts and humanities, or the weak presence of women in the so-called hard sciences, defined as more technical or impersonal, such as physics, engineering, mathematics, technology and others. So, women are concentrated in university courses that reinforce the gender duality traditional roles and the historically established social expectations defined for male and female. In addition, inequalities persist in the occupation of decision-making positions in STI professions and related areas.

In this sense, three metaphors were presented - the glass ceiling, the leaky pipeline and the scissors effect - which refer to the difficulty of finding women in scientific occupations, command and power positions in the STI, as well as the female scientists evaporation as they advance professionally or go through the transition from PhD graduates to permanent professors/professionals in the job market. Among the obstacles arising from such metaphors, the following stand out: conflicts between family, motherhood, work/scientific career, maledictions and disqualifications of women's performance, stereotypes about 'who does STEM', lack of female role models in science and exact sciences teaching, etc.

Thus, in response to the question posed in this research, the measures inherent in the public policies developed and implemented by the Latin America countries include encouraging interests and vocations in STI matters, fostering the education of girls in STEM from early childhood, the creation of representative, accessible and open spaces for dialog and learning about the sciences and exact sciences; access to and permanence in STI positions and scientific careers related to this field, aiming to identify the main barriers faced by women in entering and in professional exercice; actions to encourage flexible working hours and the domestic responsibilities share; different strategies to promote a culture of equality development within the STI, in order to build a space of belonging, welcoming, free from malice and discrimination; measures to encourage other organizations to include a gender perspective in their activities, major projects, debate groups, among others.

Given the relevance of this theme, other studies could be carried out to analyze the public policies intersectionality and the obstacles that affect women differently, in order to understand the issues of other social minorities (black, indigenous, LGBTQIAPN+ women, among others). After all, the discrimination experienced by women, in their multiple pluralities, in the professional advancement process and in the scientific career construction, highlight how the various axes of oppression are rooted and implicit in social relations and, consequently, in labor and academic policies, expressing themselves in everyday situations, which are not always consistent with explicit aggression, since they are pejorative and silent cases, but generate even stronger discrimination and devaluation experiences, when considering intersectionality.

As future studies, we suggest: the comparision of these policies, identifying what is prioritized in the monitoring indicators in searching for gender equality in the STI; which measures have the greatest impact on women's ability to act effectively in STI areas and its associations; to verify whether the countries actually have put these measures into practice.

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Authors contributions

BOB: study design and preparation; data collection; data analysis and interpretation; text writing and editing; critical revision of the manuscript. ES: study design and preparation; data analysis and interpretation; text writing and editing; critical revision of the manuscript. LMW: data analysis and interpretation; text writing and editing; critical revision of the manuscript. MCCPV: data collection; data analysis and interpretation; text writing and editing; critical revision of the manuscript.

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