



WOMEN IN SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS (STEM) IN THE LATIN AMERICA AND THE CARIBBEAN REGION



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UN WOMEN

May, 2020



An analytical and comparative document containing the main experiences and initiatives implemented in the Latin America and the Caribbean region to encourage and promote the participation of women and girls in the STEM sector

Alessandro Bello

WOMEN IN SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS (STEM)
IN THE LATIN AMERICA AND THE CARIBBEAN REGION

Montevideo, 2020

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United Nations Entity for Gender Equality and the Empowerment of Women

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This document was produced within the framework of a consultancy
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This document compiles and analyses the main experiences and initiatives
implemented to promote the participation of women and girls in the STEM sector
in Latin America and the Caribbean.

The support and contributions from the UN Women team in the region are greatly
appreciated, in particular the ones provided by Adalgisa Bozi Soares, Engell Jaime,
Beatriz García, Soledad García, Caroline Horekens Marin, Isiuwa Iyahen, Gina
Labanca, Nuria Martín Arroyo, Gabriela Mata, Mariana Mojica, Gerald Mora, Bárbara
Ortiz, Marianny Sánchez and Virginia Tarigo.

Likewise, the contributions and support with data collection received from diverse
institutions and experts are acknowledged.

The analysis and policy recommendations contained in this publication do not
necessarily reflect the views of the United Nations Entity for Gender Equality and
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PROLOGUE

The current global pandemic has put sciences under the spotlight with the huge challenge of finding a vaccine to prevent COVID-19. But beyond this particular context, more generally, skills in the fields of science, technology, engineering and mathematics (STEM) have been revealed as fundamental in the construction of our societies.

STEM disciplines are key to tackling some of the greatest challenges of the 2030 Agenda for Sustainable Development and creating more inclusive and sustainable societies. From health-related issues, to fighting climate change, to achieving gender equality at all levels, among many others, their study can provide the knowledge and skills necessary to create inclusive and sustainable societies. As fast-growing sectors, science and technology are vital for national economies and, consequently, STEM skills are necessary for countries to remain economically competitive.

STEM careers are often described as the jobs of the future as they foster sustainable development: beyond innovation, they also drive social welfare and inclusive growth. According to data from the UNESCO Institute for Statistics, a person working in STEM earns two thirds more than people employed in other fields.

Despite the relevance of STEM-related fields, women have been persistently underrepresented across them. The factors that lead to unequal outcomes for men and women in STEM are complex and varied, and the magnitude of their impact changes at different stages. Consequently, addressing them poses a huge challenge. Disparities begin at school, at an early age, and grow to be present in fields as broad

as research, career development and access to STEM jobs, and the use of goods and services produced in STEM-related fields.

In spite of the remarkable progress made in recent decades, the global number of female researchers in the field of science is still very small. In July 2019, the average global rate of female researchers was only 29.3% (UNESCO Institute for Statistics). The gap widens as one moves up in ranking. In fact, only 3% of science-related Nobel Prizes have been awarded to women. Some of the higher-income STEM occupations, such as computing and engineering, have the lowest percentages of female participation in their labour force.

Giving women equal opportunities to develop and thrive in STEM careers helps reduce the gender pay gap, improves women's economic security, ensures a diverse and talented workforce, and avoids biases in these fields and in the goods and services they produce.

To contribute to the objective of gender equality and women empowerment in STEM, UN Women introduces this work, which reflects the multiple dimensions of gender inequality in STEM in Latin America, the practices that have already been put in place by countries in the region to address such inequalities, and a set of recommendations to further these efforts.

We hope that the systematisation of efforts made so far and the compilation of successful experiences will contribute to an accelerated and definite advance towards gender equality in STEM, positively impacting the participation and permanence of girls and women in STEM throughout their entire life cycle.

María Noel Vaeza

UN Women Regional Director for the Americas and the Caribbean

ACRONYMS AND ABBREVIATIONS

AI	Artificial Intelligence
ACFIMA	Physical, Mathematical and Natural Sciences Academy
AGCCI	African Girls Can CODE Initiative
ALAS	Asociación para el Liderazgo y Ascenso Social
ANII	Agencia Nacional de Investigación e Innovación
ANTEL	Administración Nacional de Telecomunicaciones
AUC	African Union Commission
BIST	Barcelona Institute of Science and Technology
CTC	Community Technology Centres
CEB	Chief Executives Board
CICYT	Inter-Agency Council for Science and Technology
CIESAS	Centro de Investigaciones y Estudios Superiores en Antropología Social
CIP	Competitiveness and Innovation framework programme
CNPq	Conselho Nacional de Desenvolvimento Científico e Tecnológico
CONACyT	Consejo Nacional de Ciencia y Tecnología
CONICYT	Comisión Nacional de Investigación Científica y Tecnológica
CONCYTEC	Council for Science, Technology and Technological Innovation
CORFO	Corporación de Fomento de la Producción
DST	Department of Science and Technology
ECLAC	United Nations Economic Commission for Latin America and the Caribbean
ECWT	European Centre for Women and Technology
EIGE	European Institute for Gender Equality
EU	European Union
EURATOM	European Atomic Energy Community
FTE	Full-Time Equivalent
FCC	Federal Communications Commission
FCFM	Faculty of Physical and Mathematical Sciences of the University of Chile
FOMIN	Fondo Multilateral de Inversiones
FQT	Fundación Quirós Tanzi
GICC	Global Innovation Coalition for Change
GII	Gender Inequality Index
GO-SPIN	Global Observatory of Science, Technology and Innovation Policy Instruments
GDP	Gross Domestic Product
GEEW	Gender Equality and the Empowerment of Women
GenderInSITE	Gender in science, innovation, technology and engineering SITE
GSMA	Groupe Speciale Mobile Association

HC	Headcount
HDI	Human Development Index
IaDB	Inter-American Development Bank
IANAS	Inter-American Network of Academies of Science
IBM	International Business Machines Corporation
ICT	Information and Communication Technologies
IDRC	International Development Research Centre
IMOS	Israel Ministry of Science
INDOTEL	Directorate of the Telecommunications Development Fund of the Dominican Telecommunications Institute
INJU	Instituto Nacional de la Juventud - Uruguay
IP	Intellectual Property
ISCED	International Standard Classification of Education
ISRO	Indian Space Research Organisation
ITLA	Technological Institute of the Americas
ITU	International Telecommunication Union
ITU-R	ITU Radiocommunication Sector
LAC	Latin America and the Caribbean
MCT	Ministry of Science and Technology
MCTI	Ministry of People's Power for Science, Technology and Intermediate Industries
MEC	Ministry of Education
MICITT	Ministry of Science, Technology and Telecommunications
MIEM	Ministry of Industry, Energy and Mining
MINERD	Ministry of Education
MINT	Mathematics, Informatics, Natural Sciences and Technology
MinTIC	Ministry of Information and Communication Technologies
MoBSE	Ministry of Basic and Secondary Education
NGO	Non-governmental organisation
NOW	Network of Women
NOW ₄ WRC ₁₉	Network of Women for World radiocommunication conferences
OAS	Organization of American States
OECD	Organisation for Economic Co-operation and Development
OEI	Organization of Ibero-American States for Education, Science and Culture
ONAPI	National Office of Industrial Property
OPP-CIEDUR	Oficina de Planeamiento y Presupuesto - Centro Interdisciplinario de Estudios sobre el Desarrollo, Uruguay
OWSD	Organization for Women in Science for the Developing World
PISA	Programme for International Student Assessment
PRAGES	Practising Gender Equality in Science
PROGEN	Gender Program
R&D	Research and Development
RICYT	Red de Indicadores de Ciencia y Tecnología - Iberoamericana e Interamericana
S&E	Science and Engineering
S&T	Science and Technology

SAGA	STEM and Gender Advancement
SARAS	South American Institute for Resilience and Sustainability Studies
SEB	Secretariat of Basic Education
SECADI	Secretariat of Continuing Education, Literacy and Diversity
SENACYT	National Secretariat of Science and Technology
SETEC	Secretaria de Educação Profissional e Tecnológica
SPM	Special Secretariat for Policies for Women
STEMM	Science, technology, engineering, medicine and mathematics
STI	Science, Technology and Innovation
SDGs	Sustainable Development Goals
STEM	Science, Technology, Engineering, and Mathematics
SWAN	Scientific Women's Academic Network
TIM	Telecom Italia Mobile
TFM	Technology Facilitation Mechanism
TWAS	World Academy of Sciences for the advancement of science in developing countries
UN	United Nations
UNAE	National University of Education
UNDP	United Nations Development Programme
UNESCO	United Nations Educational Scientific and Cultural Organisation
UNOOSA	United Nations Office for Outer Space Affairs
UN-SWAP	United Nations System-wide Action Plan
UN Women	United Nations Entity for Gender Equality and the Empowerment of Women
UIS	UNESCO Institute for Statistics
URM	Underrepresented Minorities
UTEC	Universidad de Ingeniería y Tecnología
UTU	Universidad del Trabajo del Uruguay
VHTO	National Expert Organization on Girls/Women and Science/Technology
WAI	Women in Artificial Intelligence
WEF	World Economic Forum
WIN	Women at Intel
WIPO	World Intellectual Property Organization
WISA	Women in Science Awards
WISE	Women in STEM and Entrepreneurship
WISAT	Women in Global Science and Technology
WomEng	Women in Engineering
WRC	World radiocommunication conferences



1

EXECUTIVE SUMMARY

Tackling some of the greatest challenges of the future, from improving health to combatting climate change and achieving gender equality at all levels, will depend on harnessing all talent out there. Gender equality in Science, Technology, Engineering and Mathematics (STEM) is also key for achieving each one of the 17 Sustainable Development Goals (SDGs) of the 2030 Agenda.

Despite remarkable gains over the past decades, the number of female researchers worldwide in the field of science is still very low. In July 2019, the global average percentage of female researchers was only 29.3% (UNESCO Institute for Statistics) and the gap increases with the level of seniority. In fact, as of now, only 3% of scientific Nobel prizes have been awarded to women. In STEM-related fields, this gap is evident even in tertiary education. This is when specialisation begins and students make choices about which subjects to take, and here, only 35% of all students enrolled in STEM-related fields of study are women.

Latin America and the Caribbean is one of the two regions that achieved parity regarding female and male researchers (45% of all researchers are women). However, horizontal and vertical segregation continues to be high. Female researchers continue to be underrepresented at senior levels in their professional careers and remain a minority in many STEM fields in most countries in the region.

STEM careers are often referred to as the jobs of the future; jobs that will foster sustainable development and that will drive innovation, social wellbeing, and inclusive growth. STEM education is also key to preparing students for the job market of the future. Several sources anticipate as much as 75% of future jobs to be related to these fields (UNESCO, 2018), since 7.1 million jobs are expected to be displaced by 2020, and half of the existing jobs to disappear by 2050 (ITU, 2017).

Despite this, only 22% of all professionals working in artificial intelligence around the world are women (WEF, 2018). The situation is even more critical regarding machine learning researchers, of whom approximately just 12% worldwide are women. If not addressed soon, the gender gap in STEM will widen during the Fourth Industrial Revolution.

The factors that lead to the unequal outcomes for men and women in STEM are complex and varied, and, consequently, are not easy to address. It is an area in which economic, cultural, social, and religious contexts intersect, generating gaps that can become chronic, which in turn fosters a vicious circle of economic and social differences.

The gender gap in STEM education can be visible early on and increases with every education level. Barriers to and in careers in STEM can be encountered at any point in time and they may take a variety of forms; some may be more influential at one stage of life than others. Assumptions and expectations from parents, educators, and peers influence girls' decisions about fields of interest and studies to pursue in order to fit in. Women also experience bias in hiring, promotion, and compensation, and tend to spend more time teaching and less researching than men faculty members.

Although studies on women in science for the last 30 years have shown the consequences of excluding women from science and that sexism has long skewed research, it has been only recently that countries have undertaken efforts to reduce the gender gap in STEM. At a global and regional level, significant efforts to promote gender equality in STEM have been made by the UN and other international organisations.

In Latin America, most countries have undertaken efforts to reduce the gender gap in STEM. By analysing how policies, strategies and laws on science, gender and education are mainstreaming gender equality in STEM, it is evident that, especially in the last decade, the importance of the topic is increasingly being acknowledged and thus progressively being promoted through public policies and included in laws; national Science, Technology and Innovation (STI) plans; and national development strategies in the region.

- At an early stage, the importance of gender equality in STEM was addressed initially in gender equality policies.
- Only recently, national STI plans and strategies have included references to gender equality in STEM (in some countries national STI plans or policies are still not even in place).
- In a kind of third phase of policies, countries have started launching specific gender STI equality policies. This demonstrates that the topic is rising to the top of national agendas in these countries.

Several countries have adopted mechanisms to promote the implementation of gender policies in scientific institutions, stimulating the creation of formal structures for the enforcement of women's rights within their STI systems. Efforts are being made at a different levels, from national governmental institutions to universities, research centres, civil society, and private companies.

The information gathered clearly shows an increase in the number of instruments and activities on the topic over the recent years. Depending on their aim and target beneficiaries, the typology of identified interventions can be grouped into different macro areas:

- Awareness actions and eradication of gender stereotypes.
- Attracting girls and young women to STEM.
- Enabling STEM potential.
- Supporting women in STEM careers.
- Specific programs and inter-institutional committees on gender and STEM.
- Training and strengthening female entrepreneurs in innovation and STEM.

At first, activities were more affirmative actions oriented at supporting the retention of women in STEM higher education and the reinsertion in the labour market after maternity leave or a break. In recent years, attempts at reducing the gender gap through the attraction of more girls and young women to STEM have grown in number and importance, and countries have established specific inter-institutional committees to work on gender equality in STEM.

Despite these advances, numerous challenges remain and gaps still exist at different education and career progression levels in all countries in the region. These gaps were observed at all life stages, from primary school to women in senior positions in STEM research fields, and are a consequence of different aspects, such as social and cultural factors, and policies at various levels, including at a governmental, funding agency, higher education institution, and research centre level. Most activities implemented are sporadic and time-limited, with very limited budgets and focused on reducing the gender gap in science rather than addressing the specificity of STEM fields. Moreover, rural women, parents, teachers, and men tend to be excluded from these initiatives.

Common challenges can still be observed at both the public policy level and the institutional level. The analysis of policies and instruments implemented in the region so far highlighted the need for a new paradigm and a more systemic approach to achieve structural changes and promote and achieve gender equality in STEM. Additionally, there is a need for more specific national STI gender equality policies and long-term national strategies, and for strengthening the coordination between ministries and other key institutions. Activities that address all levels of education and studies and activities related to the gender dimension in research are also necessary. It is imperative to address the different challenges of gender equality and artificial intelligence in the region..



2

INTRODUCTION

The rapidly growing science and technology sectors are vital to national economies. Tackling some of the greatest challenges of the 2030 Agenda for Sustainable Development, from improving health to combatting climate change and achieving gender equality at all levels, will depend on harnessing all talent out there.

In a global marketplace that is increasingly driven by science, technology and innovation (STI), levelling the playing field for women in Science, Technology, Engineering, and Mathematics (STEM) is essential for boosting countries' competitiveness. Moreover, gender inequalities can have adverse consequences on effective policy implementation and strategy (Buré, 2007) because it can lead to gender-blind instruments that are detrimental to science.

Gender equality in STEM is key for achieving each one of the 17 Sustainable Development Goals (SDGs) of the 2030 Agenda. Sustainable development also requires more science and more scientists, resulting in a greater opportunity to achieve a significant increase in the number of girls and women entering and remaining in STEM careers. Ensuring that all students have equal opportunities is key to creating an environment where talent and innovation can flourish in schools, businesses, hospitals, research facilities, and government agencies.

Furthermore, women contribute to research and development (R&D) with their specific perspectives, priorities, and approaches, signifying that gender equality in STEM can also foster better science, technology, and innovation.

Over the past decade, several national policies and programmes have been implemented to promote and increase women's participation in scientific and technological fields in Latin America and the Caribbean. When considering the context and existing gaps, there are great challenges and opportunities to bring about far-reaching changes through the promotion of equal participation of men and women in STEM areas.

STEM careers are often referred to as the jobs of the future; jobs that will foster sustainable development

and that will drive innovation, social wellbeing, and inclusive growth. However, despite all the progress achieved in the last decade, women are still underrepresented among researchers in these fields (horizontal segregation) and their representation still decreases as they advance in their careers as researchers (vertical segregation).

The factors that lead to unequal outcomes for men and women in STEM are complex and varied, and, consequently, are not easy to address. It is difficult to find one single cause or root to explain the horizontal and vertical segregation of women in these fields. Cultural and societal factors, such as stereotypes, as well institutional barriers and economic issues intersect, generating gaps that can become chronic, which in turn fosters economic and social differences in a vicious circle of sorts.

Therefore, it is necessary to identify successful initiatives from governments, civil society, and the private sector and to promote the exchange of good practices among countries; especially those policies and initiatives focused on achieving equality throughout the life cycle. They may range from changing social norms and stereotypes towards women in STEM in societies to engaging more girls and young women in STEM in primary and secondary education. In addition, women starting and during their Science and Engineering (S&E) careers face several challenges. Thus, it is essential to not only promote the attraction, access, and retention of women in STEM education at all levels while stimulating gender equality in career progression in S&E, but also to work towards reducing the gender gap in career progression and "fix the knowledge" by including the gender dimension into research content.

2.1. Objetivos de estudio y estructura del documento

This study is an analytical and comparative document that includes the main experiences and initiatives implemented in the Latin American region to encourage the participation of women and girls in the STEM sector.

The primary objectives of this study are to identify, contextualise, and analyse successful practices and initiatives at national and international levels for attracting, training, and promoting the participation of women and girls in STEM. Accordingly, recommendations to reduce the gender gap in STEM will

be given. The study systematises and compares policies and initiatives focused on gender equality in STEM.

Despite efforts to bridge gender gaps in STEM areas, voids still exist at different levels of education and career progression in all countries in the region, before analysing policies and instruments, the study presents an overview of the situation of women in STEM at a global and regional level. It also discusses the importance of the STEM jobs and the benefit of reaching gender equality as well as briefly reviews what and where the main barriers to reach parity in STEM are.

BOX 1.

Some key definitions

Here are a few useful definitions to ensure a common understanding of the terms and concepts used throughout the document:

• Gender equality

It refers to the equal rights, responsibilities and opportunities of women and men and girls and boys. Equality does not mean that women and men will become the same but that women's and men's rights, responsibilities and opportunities will not depend on whether they are born male or female. Gender equality implies that the interests, needs, and priorities of both women and men are taken into consideration, recognizing the diversity of different groups of women and men. Gender equality is not a women's issue but should concern and fully engage men as well as women. Equality between women and men is seen both as a human rights issue and as a precondition for, and indicator of, sustainable people-centred development (UN Women, OSAGI Gender Mainstreaming - Concepts and definitions).

• Gender parity

It is a numerical concept related to gender equality. It concerns relative equality in terms of numbers and proportions of women and men, girls and boys, and is often calculated as the ratio of female-to-male values for a given indicator (EIGE's Resource & Documentation Centre).

• Gender equality in STI

It is used when referring to policies, decisions, interventions, or activities that have an impact on STEM fields (SAGA Toolkit).

• Gender equality in STEM

The acronym 'STEM' is widely used when referring to the fields of science, technology, engineering, and mathematics. However, the situations where it is useful can vary widely based on the context

in which it is referenced. In this context, gender equality in STEM is used to characterize the equal rights, responsibilities and opportunities of women and men and girls and boys in the corresponding fields of knowledge and study. It refers to the formal education and qualifications individuals acquire throughout their training in the fields of science, technology, engineering and mathematics (UNESCO, 2017).

• **Researchers**

Researchers are “professionals engaged in the conception or creation of new knowledge. They conduct research and improve or develop concepts, theories, models, techniques instrumentation, software or operational methods” (OECD, 2015).

• **Headcount (HC) and Full-Time Equivalent (FTE).**

Research might not be the primary function of some researchers but a secondary function, even a part-time job. FTE is defined as “the ratio of working hours actually spent on research and development during a specific reference period (usually a calendar year) divided by the total number of hours conventionally worked in the same period by an individual or by a group” (OECD, 2015). HC is defined as “the total number of individuals contributing to intramural R&D, at the level of a statistical unit or at an aggregate level, during a specific reference period (usually a calendar year)” (Ibid.). Most of the data in this document are measured in HC, which does not take into consideration part-time employment among researchers and variation in working hours.

According to the International Standard Classification of Education (ISCED), the fields of study that refer to disciplines related to STEM education are those grouped under:

- 05 Natural sciences and mathematics
- 06 Information and communication technology and
- 07 Engineering, manufacturing and construction.

These are three of the 11 broad groups of ISCED that are also divided into subcategories (see Table 1).

TABLE 1.
STEM-variant of ISCED

Broad field	Narrow field	Detailed field
05 Natural sciences, mathematics and statistics	051 Biological and related sciences	0511 Biology 0512 Biochemistry 0521 Environment sciences 0522 Natural environments and wildlife 0531 Chemistry 0532 Earth sciences 0533 Physics 0541 Mathematics 0542 Statistics
	052 Environment	
	053 Physical sciences	
	054 Mathematics and statistics	
06 Information and Communication Technologies (ICTs)	061 Information and communication technologies	0611 Computer use 0612 Database and network design and administration 0613 Software and applications development and analysis
07 Engineering, manufacturing and construction	071 Engineering and engineering trades	0711 Chemical engineering and processes 0712 Environmental protection technology 0713 Electricity and energy 0714 Electronics and automation 0715 Mechanics and metal trades 0716 Motor vehicles, ships and aircraft
	072 Manufacturing and processing	0721 Food processing 0722 Materials (glass, paper, plastic and wood) 0723 Textiles (clothes, footwear and leather) 0724 Mining and extraction
	073 Architecture and construction	0731 Architecture and town planning 0732 Building and civil engineering



3

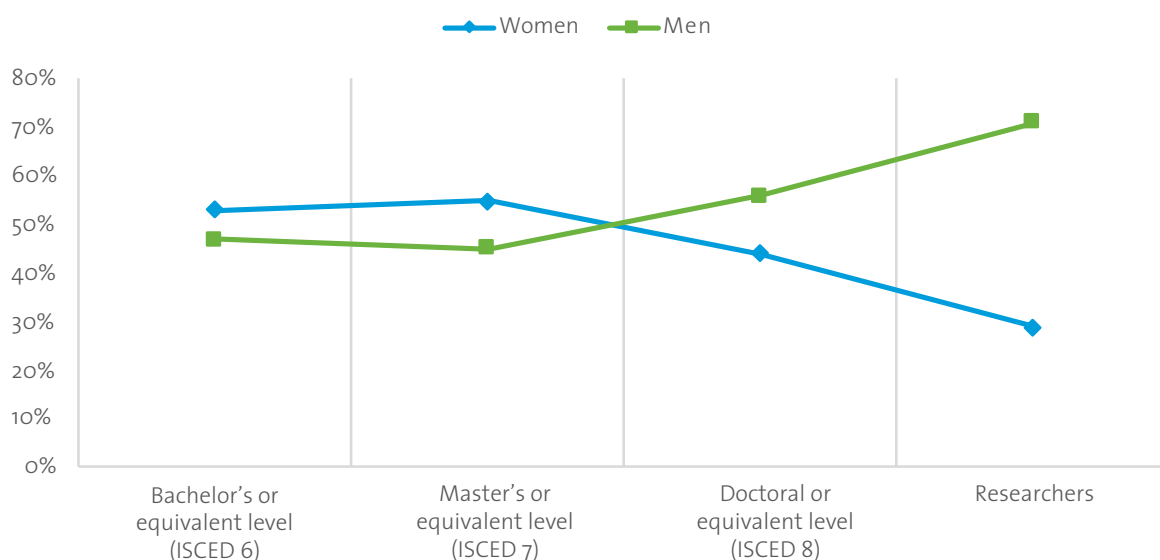
UNDERREPRESENTATION OF WOMEN IN STEM: GLOBAL AND REGIONAL CONTEXTS

3.1. Global gender gaps among researchers and in STEM fields

Despite remarkable gains over the past decades, the number of female researchers worldwide in the field of science is still very low. According to the UNESCO Institute for Statistics (UIS), in July 2019, the global average percentage of female researchers was 29.3%, while at a national level, only around 27% of all countries (according to data available on the national percentage of female researchers) could achieve what is classed as “gender parity” with women making up 45%-55% of all researchers.

Globally and virtually in every country in the world, while a growing number of women are enrolling in university, many continue to drop out at higher levels of education required for research careers. In fact, women represent a slightly larger share of graduates at both the bachelor’s level (53%) and master’s level (55%) (UIS, 2018). However, the gap becomes evident at the doctoral level and widens during the school-to-work transition, where less than 30% of researchers are women, as depicted in the classic gender scissors diagram (see Figure 1).

FIGURE 1. Proportion of female and male graduates in tertiary education by programme level and those employed as researchers, global estimate, 2017 or latest year available.

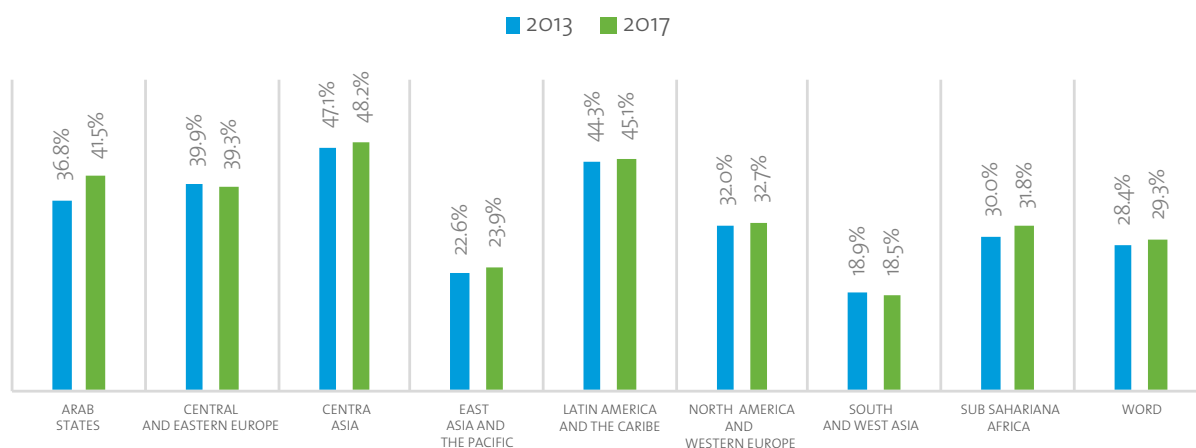


Source: own elaboration based on the UNESCO Institute for Statistics- UIS data (UIS, July 2019)

In spite of the global trend towards parity with an increase in the percentage of female researchers, in regions such as East Asia and the Pacific, and South and West Asia, regional levels of female research

participation are well below 25%¹. Latin America and the Caribbean is one of the two regions² that achieved parity in the percentage of female and male researchers (see Figure 2).

FIGURE 2.
Porcentaje promedio de mujeres investigadoras por región



Source: own elaboration based on UIS data (UIS, July 2019) and the UNESCO Science Report Towards 2030 (UNESCO, 2015)

Even when women are employed, they often face significant glass ceilings (UN Women, 2019). The representation of women decreases as they advance in their careers as researchers, which means that the gap increases with the level of seniority (vertical segregation). In fact, as of now, only 3% of scientific Nobel prizes have been awarded to women.

Women are also better represented in the health sector and still underrepresented in STEM fields (horizontal segregation), both as graduates (especially at the PhD level) and in research professions, with the gender gap particularly apparent in disciplines such as mathematics, engineering and computer science. Actually, when specialisation begins and students make choices about which subjects to take,

only 35% of all students enrolled in STEM-related fields of study are women (UNESCO, 2018). Girls appear to lose interest in STEM subjects with age more than boys do. According to the results of the Programme for International Student Assessment (PISA) 2015 (OECD, 2016), girls are three times more likely than boys to see themselves working in health professions, while boys were twice as likely as girls to see themselves working in engineering. Within STEM, the most male-dominated fields of education are Information and Communication Technologies (ICT) and engineering, in which, globally, female student enrolment is around 27% and 28% respectively (UNESCO, 2017). Even at research level, only a handful of countries (Azerbaijan, Malesia, Mongolia y Venezuela) have achieved parity in terms of female

1 Regional average percentages are calculated based on the latest year of data available to UIS. As a result, the data used are not necessarily based on the same time interval over the two periods. Comparisons between the two periods must be made with caution.

2 UIS divides the world into eight different regions.

researchers as a percentage of total researchers in engineering and technology.

A gender-equality paradox can be identified in both ICT and STEM. Countries with higher gender equality levels do not always have a higher proportion of women pursuing ICT and STEM-related studies: they can have some of the largest STEM and ICT gender gaps in secondary and tertiary education. (UNESCO, 2019) (Stoet G. & Geary, 2018).

The persistence of horizontal segregation in both, educational and occupational fields, contributes to the reinforcement of the stereotype that men are naturally talented in engineering and math-intensive fields while women are naturally talented in more expressive and human-centred fields (Charles & Bradley, 2009). This context is in line with the persistence of institutional and socio-cultural barriers for female researchers, which limit their career development and restrict their access to decision-making spaces.

All over the world, female scientists publish less than their male counterparts (Howe-Walsh & Turnbull, 2016). The most optimistic projection models from a recent study analysing 2.87 million papers on computer science literature through 2018 show that, if current trends continue, parity will not be reached before the year 2100 (Wang , Stanovsky, & Weihs, 2019). Moreover, women are less likely than men to

be first or last authors and women-authored publications receive fewer citations.

Diversity of perspectives and approaches among inventors can foster progress in addressing sustainable development and society's most serious problems. However, despite the fact that 2018 marked an encouraging record-breaking high, the gender gap is still evident and the rate of female inventors in international patent applications is still very low: around 17% (WIPO, 2019). Although the rate of female inventors has grown in every field in the last decade, in those fields related to engineering, the proportion is still below the 20% [such as in civil engineering (18%), machine tools (18%), mechanical elements (16%) and engines, pumps, turbines (16%)], and in terms of ICT patents, 88% have been registered by all-male teams (Botella, Rueda, & López, 2019).

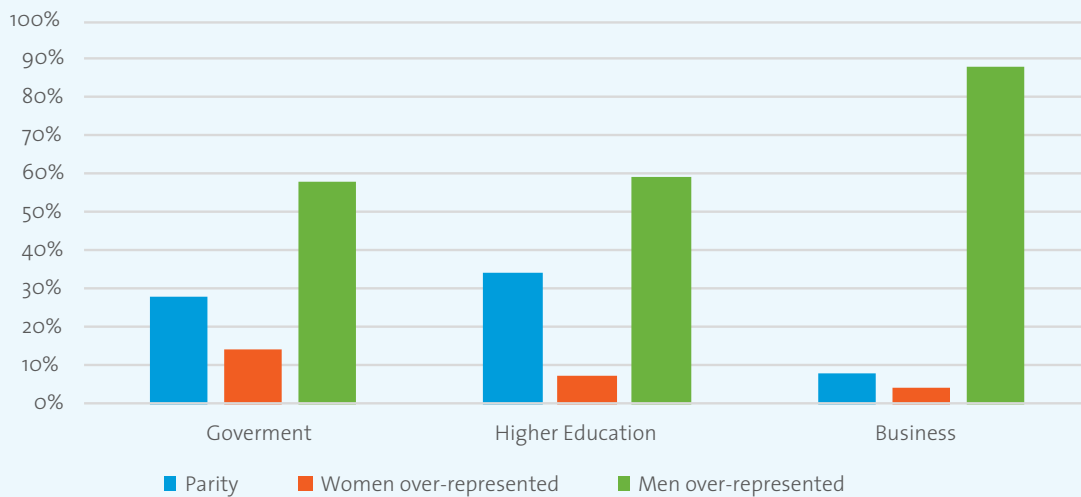
According to the World Economic Forum, women are typically given smaller research grants and find it harder to obtain venture capital for science and technology startups (World Economic Forum, 2017). Furthermore, women are dramatically underrepresented in S&T-based companies because of numerous barriers, even though these areas are central determinants of national productivity and, therefore, of development. In addition, careers in STEM are higher paying and are increasing worldwide.

BOX 2.

Researchers in public and private sectors

Globally, female researchers tend to be employed at higher rates in the public sector than in the private one. In countries such as Argentina and Uruguay, which have achieved gender parity in the public sector, men are still overrepresented in the private sector (see Figure 3), where salaries are often higher. In the business sector, only around 6% of countries (according to available data from the UNESCO Institute for Statistics- UIS) has reached parity, while women are overrepresented in around 4% of the countries around the world. Regarding higher education, women have reached parity in around 34% of the countries and are overrepresented in less than 10%. A similar situation can be seen in government where less than 30% of the countries have reached parity and women outnumber men in around 14%.

FIGURE 3.
Female researchers as a percentage of total researchers (HC) by sector of employment



Source: own elaboration based on UIS data (UIS, July 2019)

3.2. The gender gap in STEM in Latin America and the Caribbean

According to the 2017 UN Human Development Index (HDI), which provides a rough snapshot of the relative developmental status of countries (UNDP, 2018), only five out of 33 regional Latin American and Caribbean countries included in the rankings could be categorised as very high development countries. The highest-ranking country in the region was Chile. Most countries in the region were classified as high development countries, with only

Haiti as a low development one. However, the HDI does not differentiate between men and women. The gender inequality index (GII), which attempts to demonstrate the loss in potential human development due to disparities of achievement between men and women, should be considered as an indicator of inequality. Latin America's overall regional HDI score falls by 22% when adjusted for gender inequality, particularly regarding income, even when, among developing regions, the gender gap is the narrowest in Latin America and the Caribbean (2.3%) (UNDP, 2018).



BOX 3.

R&D expenditure and gender equality

It is interesting to notice that, in most of the cases, countries with higher R&D expenditure relative to GDP (above 0.3%) have lower gender inequality than other countries in the region according to the Gender Inequality Index of the United Nation Development Programme (UNDP). The remaining countries in the region, except for Panama and Peru, are ranked below 110 globally (see Table 2).

TABLE 2.

R&D expenditure and Gender Inequality Index

Country	R&D expenditure in dollars (2016) in millions of current USD	R&D expenditure in dollars as % of the total expenditure of the region (2016) in millions of current USD	R&D expenditure in relation to GDP (2016)	Gender Inequality Index ³ (2017) Value and world rank
Argentina	3,480.32	9.3%	0.55%	0.358 (47)
Uruguay	215.20	0.6%	0.41%	0.270 (55)
Brazil	22,693.06	60.7%	1.27%	0.270 (57)
Costa Rica	246.45	0.7%	0.43%	0.300 (63)
Panama	83.93	0.2	0.14%	0.461 (66)
Mexico	5,031.75	13.5%	0.39%	0.343 (76)
Venezuela	3,044.97	8.1%	0.69%	0.454 (78)
Chile	959.98	2.6%	0.38%	0.407 (79)
Ecuador	450	1.2%	0.44%	0.385 (86)
Peru	230.43	0.6%	0.12%	0.368 (89)
Colombia	850.37	2.3%	0.27%	0.383 (90)
Paraguay	42.14	0.1	0.12%	0.467 (110)
Bolivia	-	-	-	0.450 (118)
El Salvador	35.06	0.09%	0.18%	0.392 (121)
Nicaragua	-	-	-	0.456 (124)
Guatemala	15.27	0.04%	0.03%	0.493 (127)
Honduras	3.14	0.008%	0.04%	0.461 (133)
TOTAL Latin American countries	37,382.07	100%		

Source: own elaboration based on RICYT data.

In spite of the relatively good performance of Latin American countries in terms of their average percentage of female researchers, women still face many challenges when pursuing a career in science (López-Aguirre, 2019) (Bonder, 2015) (Bernan et al., 2019) (Pérez-Sedeño, 2008). Seven countries in the region have already reached parity (namely, Argentina, Cuba, Guatemala, Panama, Paraguay,

Trinidad and Tobago, and Uruguay), while Venezuela has crossed the threshold and has more than 60% of female researchers. Other five countries are moving towards closing the gender gap, Costa Rica (42.8%), Ecuador (41.1%), Honduras (41%), El Salvador (39.2%), Bolivia (37.5%) and Colombia (37.3%). While in Chile, Mexico and Peru the percentage of female researchers is still below 34%.

3 Gender Inequality Index is a metric introduced by United Nations Development Programme (UNDP) in 2010 that shows the percentage of potential human development loss due to gender inequality and ranges from 0, representing “no lost opportunity,” to 1, representing complete opportunity loss. It measures gender inequalities in three important aspects of human development—reproductive health, empowerment, and economic status.

FIGURE 4.

Percentage of female researchers in Latin America and the Caribbean, 2017



Source: own elaboration based on UIS data (UIS, September 2019). Data are for 2017 or latest year available.

In addition, there is a positive trend in almost all the countries in the region. For example, in Panama, progress is particularly evident: the percentage of female researchers increased by more than 30 percentage points in 16 years, reaching 52% in 2013. Similarly, in Trinidad and Tobago, the percentage of female researchers increased from 33% in 2005 to almost 50% in 2016. However, in countries where the population of scientists is relatively small, the percentage of female scientists may fluctuate drastically from year to year⁴.

Even in the region, horizontal and vertical segregation continues to be high. Female researchers continue to be underrepresented at the highest levels of professional careers and remain a minority in many STEM fields in most countries in the region.

Gender gaps are evident in early stages of education, with girls mostly focusing and performing better on fields unrelated to STEM. The latest results of a study by the United Nations Educational Scientific and Cultural Organisation (UNESCO, 2016)

reveal significant gender disparities in the region. The pattern observed in the *Tercer Estudio Regional Comparativo y Explicativo (TERCE)* shows that girls do better on reading tests, while boys do better in maths. On this subject, there is a gap widening in favour of boys in sixth grade. The patterns are more prominent when they get to college, where women are concentrated in social sciences and in certain areas of natural or medical sciences and have limited presence in STEM; this difference is even greater in postgraduate studies.

The underrepresentation of women in STEM-related fields is evident even at a higher education level (see Table 3 and Figure 5). A study by the Inter-American Development Bank (IaDB) shows that in all the countries in the region women are a minority in the fields of engineering, industry, and construction, and in Information and Communication Technologies. The most acute disparities in this regard are present in Chile and El Salvador, where women only account for 17% of total graduates in those fields (Inter-American Development Bank, 2018).

TABLE 3.
Percentage of female tertiary graduates by fields, 2018 or latest year

Country	Year	Arts and Humanities	Social Sciences Journalism and Inform.	Business, Administration and Law	Natural Sciences, Mathematics and Statistics	Information and Communication Technologies	Engineering, Manufacturing and Construction	Agriculture, Forestry, Fisheries and Veterinary	Health and Welfare	Services
Argentina	2011	76	44.4	43.3	70	33	35	62	53.5	
Belize	2015	71.4	69.8	68.6	52.8	19.4	9.1	35.3	69.9	60.5
Bermuda	2018		-	62.1	46.2	33.3	6.3	-	100.0	35.3
Brazil	2017	55.2	70.9	58.0	59.5	14.6	36.7	49.5	75.7	61.4
Chile	2017	56.5	66.7	56.3	46.5	12.7	17.7	47.2	78.0	51.3
Colombia	2018	50.6	69.0	62.7	54.2	23.3	34.6	44.7	72.1	42.8
Costa Rica	2018	59.3	69.0	61.5	51.7	20.3	35.4	42.7	76.0	61.7
Cuba	2016	67.7	73.7	70.3	52.2	33.2	41.6	39.0	59.5	32.6
Domin. Republic	2017	73.8	57.0	60.7	54.1	39.4	38.4	29.0	79.7	57.0
Ecuador	2016	48.8	64.5	59.7	47.9	36.8	20.7	35.0	71.3	45.4
El Salvador	2017	59.1	70.7	60.4	49.2	26.0	18.8	30.3	74.7	60.4
Guatemala	2015	56.0	64.3	54.9	45.2	21.1	35.0	30.9	70.5	47.3

4 This is the case of Bolivia, where the percentage of female scientists dropped from almost 63% in 2010 to less than 38% in 2014.

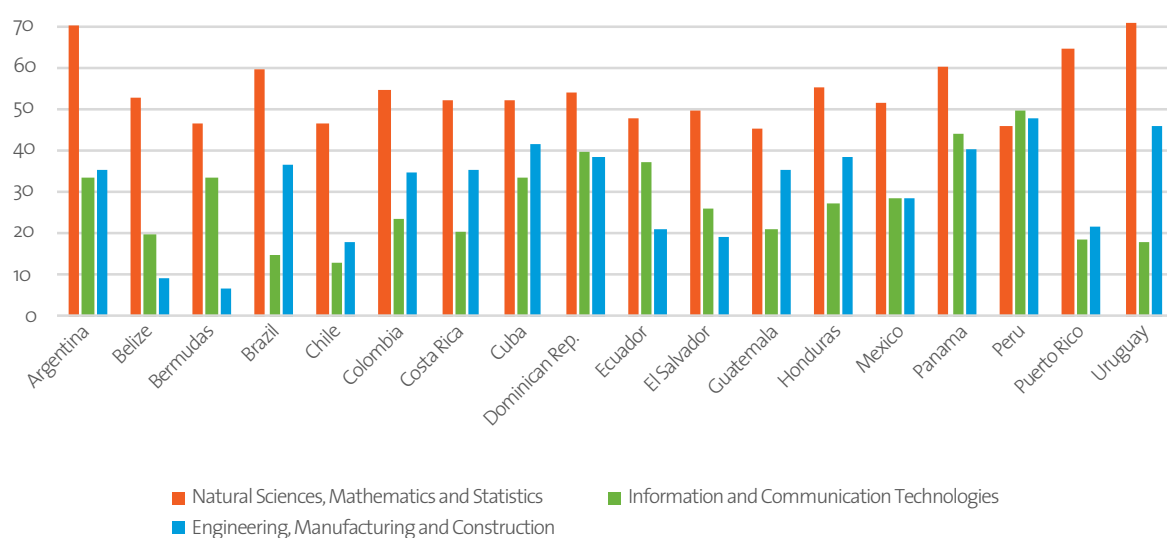
Honduras	2018	62.6	72.9	62.4	54.9	27.1	38.5	24.7	73.5	19.4
Mexico	2017	77.1	70.4	55.1	51.1	28.4	28.5	36.8	68.2	50.0
Panama	2016	64.7	68.8	68.3	59.9	43.9	40.0	42.9	76.7	60.9
Peru	2017	58.1	51.5	58.0	46.0	49.6	47.5	40.6	78.8	39.7
Puerto Rico	2016	55.7	70.0	60.3	64.4	18.6	21.2	49.0	75.5	43.5
Uruguay	2017	64.1	74.3	62.7	70.7	17.7	45.9	39.7	77.5	28.5

Source: own elaboration based on UIS data (UIS, September 2019)

Legend: in green, countries where parity has been achieved; in orange, countries where women outnumber men

FIGURE 5.

Percentage of female tertiary graduates by STEM fields, 2018 or latest year

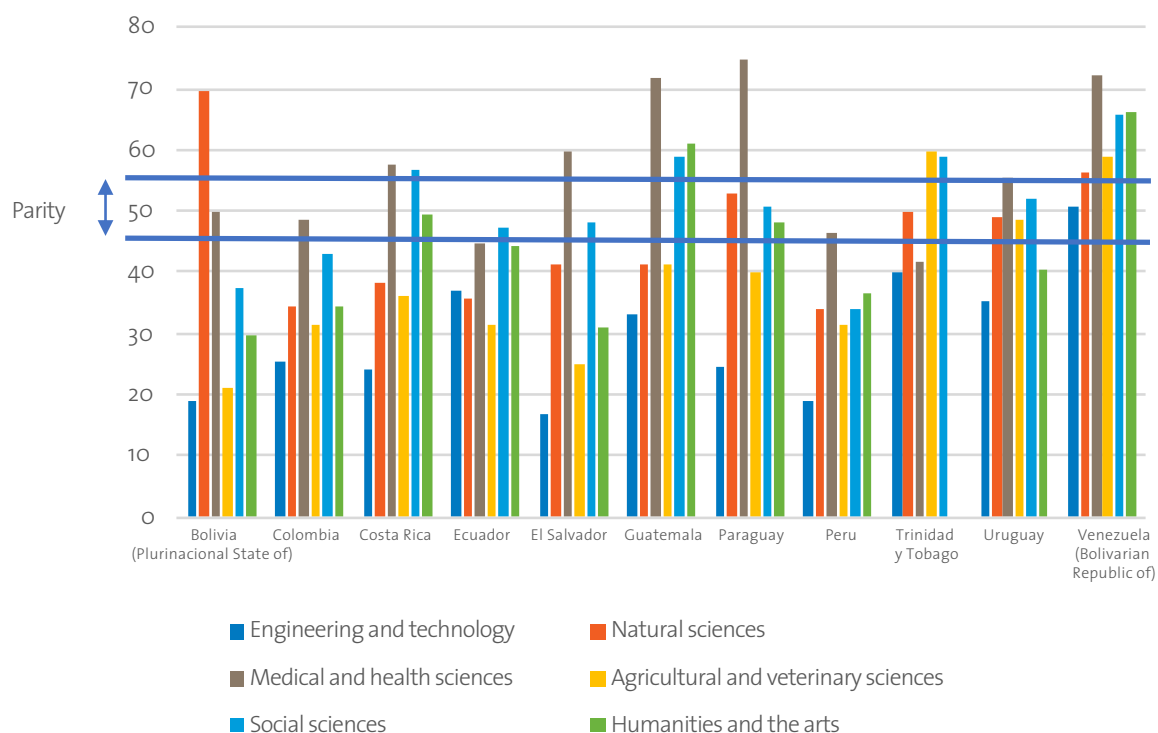


Source: own elaboration based on UIS data (UIS, September 2019)

Similarly, data from the countries in the region show the deep inequality that exists and even a setback in this area. According to data from the Network for Science and Technology Indicators –Ibero-American and Inter-American (RICYT), the percentage of female researchers working on Engineering and Technology in the region is much lower than that of men. In 2017, only 36% of researchers working

on Engineering and Technology were women in Uruguay, 26% in Colombia, 24% in Costa Rica, less than 20% in El Salvador (17%), 21.5% in Honduras, and around 19% in Bolivia and Peru. Women and are also still underrepresented in Agricultural and Veterinary Sciences, while they tend to be overrepresented in Medical and Health Sciences and in Social Sciences in most countries (see Figure 6).

FIGURE 6.
Female researchers as % of total researchers (HC) by field, 2017



Source: own elaboration based on UIS data (UIS, September 2019).

A recent study by the Organization of Ibero-American States for Education, Science and Culture (OEI) also defines horizontal segregation in terms of scientific publications, with female researchers participating in only 38% of physical and chemical science publications and in 30% of engineering publications (OEI, 2018).

Regarding vertical segregation, a clear example is the amount of female memberships in national science academies in the region. According to the Inter-American Network of Academies of Science (IANAS, 2015), women account for less than 20% of total members, with Panama having the highest proportion of female members in its academy (around 40%) and Bolivia having the lowest (less

than 9%). The rate is slightly higher on the Boards of Directors of these organisations, where the average is around 27%.

In the region and globally, a gender gap exists in the number of female inventors regarding international patent applications. According to the latest data from WIPO, only 27.8% of the patents developed in the region include at least one female inventor, very close to the global average (30.5%). This gap is even more pronounced in countries such as Ecuador, where patents in which women participated are only around 9% of the total. In countries such as Barbados (35%) and Argentina (32%) female proportion is higher but it is still far from parity (WIPO, 2019).



4

STEM: THE JOBS OF
THE FUTURE AND
BENEFITS OF ACHIEVING
GENDER EQUALITY

4.1 STEM: the jobs of the future

STEM careers are often referred to as the jobs of the future; jobs that will foster sustainable development and that will drive innovation, social wellbeing and inclusive growth.

STEM education is also key to preparing students for the job market of the future. According to a recent collaborative study effort among 29 UN programmes, by 2020, more than 7.1 million jobs are expected to be displaced, and half of the existing jobs will disappear by 2050 (ITU, 2017). That is to say that more than 60% of children entering primary school today could eventually end up working in jobs that do not yet exist (Ibid). Furthermore, as reported by the World Economic Forum (WEF), the Fourth Industrial Revolution will also impact the labour market, with artificial intelligence (AI), machine learning, robotics, nanotechnology, 3D printing, genetics, and biotechnology all building on and amplifying one another (World Economic Forum, 2017).

Predictions emphasise that future jobs, in light of the current Fourth Industrial Revolution, will require STEM skills, with several sources anticipating that as much as 75% of jobs will be related to these fields (UNESCO, 2018) and almost “no occupation will be unaffected by technological change in the AI era” (Mauro, Maxim, & Whiton, 2019). In 2017, the United Nations Commission on the Status of Women (CSW61 “Women’s economic empowerment in the changing world of work”) recognised the importance of technology and innovations such as AI, advanced automation, robotics, and 3D printing as transforming the world of work and the participation of women in the new digitally-connected workforce. It is essential to consider the gender dimension of technological progress in the sense that advancements can be skewed by, and hence perpetuate, the unconscious bias and prejudices of their designers, programmers and/or creators (UNESCO, 2018).

Another report from the World Economic Forum highlighted that “if current industry gender gap trends persist and labour market transformation towards new and emerging roles in computer, technology and engineering-related fields continues

to outpace the rate at which women are currently entering those types of jobs, women are at risk of losing out on tomorrow’s best job opportunities while aggravating hiring processes for companies due to a restricted applicant pool and reducing the diversity dividend within the company (World Economic Forum, 2017)”. Furthermore, even fewer women are found in software development, technology leadership, or the other kinds of key roles that have a significant influence on future innovation. Therefore, women must be encouraged to participate in STEM fields as creators, entrepreneurs, innovators, and leaders and the obstacles in their paths must be removed (UN Women, 2017).

AI is the field with the highest-paid experts across tech (The New York Times, 2017) and it is growing very fast. Only between 2015 and 2017 the number of workers with AI skills has grown 190% globally and, according to the World Economic Forum, “industries with more AI skills present among their workforce are also the fastest-changing industries” (World Economic Forum, 2018). However, there is a huge gender gap that can be exacerbated by the rise of new technology. According to LinkedIn data released in the World Economic Forum’s Global Gender Gap Report, of the total professionals who work in artificial intelligence around the world, only 22% are female (WEF, 2018).

Regarding machine learning researchers, the situation is also very critical: calculations based on the attendees of the world’s top machine-learning conferences in 2017 indicate that worldwide approximately 12% of machine learning researchers are women (UNESCO, 2019).

A recent report (WISE, 2019) by the programme Women in STEM Entrepreneurship in Latin America (WISE) summarises what the gender gaps in the Fourth Industrial Revolution are:

- Women are choosing fewer and fewer ICT-related studies and, consequently, their participation in the sector is not growing at the necessary pace.
- Among the countries with the highest concentration of a talent pool in AI, Argentina, Brazil and Mexico are the only Latin American countries that ranked.
- Women could obtain one job in STEM out of 20 lost, while men could obtain one job in STEM out of 4 lost.

While female labour force participation rose significantly until 2000, women in the region earn on average 17% less per hour than their male counterparts, who are of identical age and have the same academic background, presence of children in the household, rural status, and type of work (ILO, 2019). This is also because women do not receive as much research grant funding as men do.

Additionally, a study undertaken by the Office of Planning and Budget of the Republic of Uruguay (*Oficina de Planeamiento y Presupuesto de la República*) identified a negative relationship between the productivity levels of the components of each stratum (i.e., the combination of branches of activity and company sizes) and the percentage of women employed in Uruguay (OPP-CIEDUR, 2019). The study suggests that highly feminised sectors have low levels of productivity: there were no cases of high and medium-high productivity sectors in which women accounted for more than 60% of the workforce (Ibid.).

4.2. The benefits of achieving gender equality

The nexus between gender equality, science and development has long been acknowledged. A study from the European Institute for Gender Equality (European Institute for Gender Equality-EIGE, 2017) shows the economic benefits and positive impact of achieving gender equality in STEM education. According to this study, gender equality strongly impacts the Gross Domestic Product (GDP) per capita, which grows over time. By 2050, closing the gender gaps in STEM education would lead to an increase in European Union (EU) GDP per capita by 2.2%-3.0%. It would lead, in monetary terms, to an increase in GDP of €610–820 billion and the creation of between 850,000 and 1,200,000 jobs by 2050.

A report by the McKinsey Global Institute found that \$12 trillion (or 11%) could be added to global GDP by 2025 by advancing women's equality (McKinsey Global Institute, 2015). The results report that "in a full potential scenario in which women play an identical role in labour markets to that of men, as much as \$28 trillion, or 26 percent, could be added to global annual GDP by 2025."

A recent study from the IADB shows that by eliminating gender inequality in the promotion of high academic degrees in Mexico, the national academic system would benefit from a 17% to 20% increase in scientific productivity (number of articles published in peer-reviewed journals) (Inter-American Development Bank, 2017).

Diversity also has benefits for researchers. A study of 2.5 million scientific papers suggests that publications authored by teams of researchers with greater ethnic diversity receive more citations than papers co-authored by individuals with similar backgrounds (Freeman & Huang, 2014).

In short, the work in STEM can contribute towards sustainable development, improving people's lives and promoting prosperity while protecting the planet. However, the rapid technological evolution entails the introduction of new political challenges, creating winners and losers in societies and presenting new ethical and moral dilemmas. The underrepresentation of women in STEM fields is a violation of the general principle of justice and equality, as well as a problem of efficiency because it weakens the scientific system and determines a suboptimal level of functioning. This is why those responsible for education must promote actions to reduce the barriers that limit the participation of women in STEM.



5

BARRIERS AT DIFFERENT LEVELS

Historically, women have faced greater obstacles to reach leadership positions in all societies at all levels of development. Progressively, the underrepresentation of women in politics, business and public administration has been brought to public attention, but gender bias in science and technology remains out of the spotlight (PRAGES, 2009).

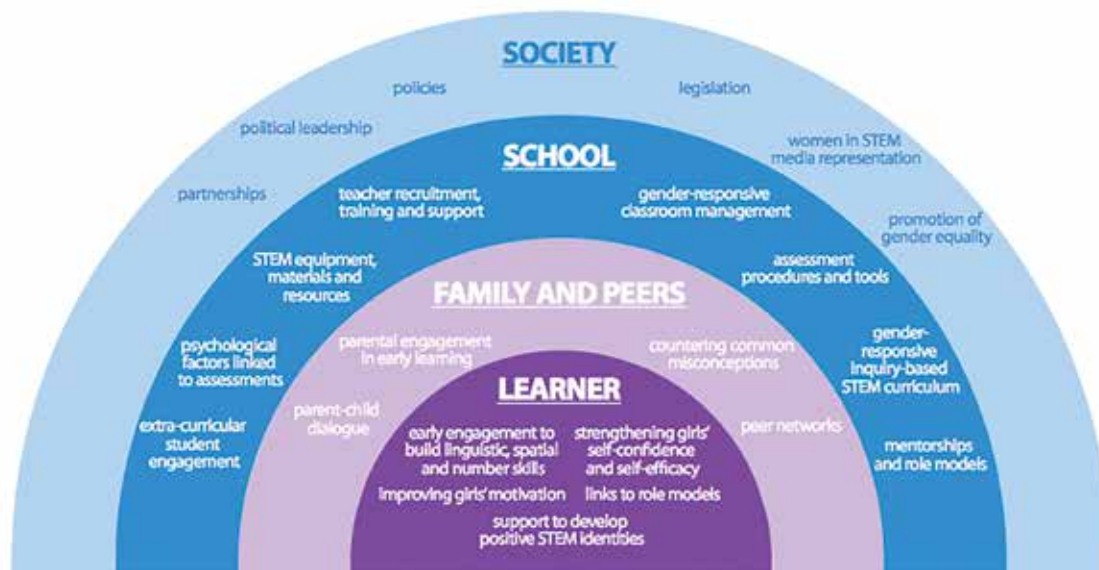
The factors that lead to the unequal outcomes for men and women in STEM are complex and varied, and, consequently, are not easy to address. It is an area in which economic, cultural, social, and religious contexts intersect, generating gaps that can become chronic, which in turn fosters a vicious circle of economic and social differences. Undeniably, barriers to, and in, careers in Science and Engineering (S&E) can be encountered at any point in time and they may take a variety of forms; some may be more influential at one stage of life than others (García & Perez-Sedeño, 2002).

Research from the past decade concludes with certainty that gender differences in ability do not

account for the gender gap in STEM (Ceci, Williams, & Barnett, 2009). However, the first symptoms of gender bias appear during early childhood, when girls are generally neither encouraged nor trained to perform in science-related fields in the same manner boys are (UNESCO, 2018).

Among the factors influencing girls' and women's participation, progression, and achievement in STEM education the most common explanations for inequalities include four main dimensions (UNESCO, 2017): student, family and peers, school, and society (see Figure 7).

FIGURE 7.
Ecological framework of factors influencing girls' and women's participation, achievement, and progression



Source: UNESCO, 2017

The gender gap in STEM education can be visible early on and increases with every education level and PISA 2015 has shown that girls lose interest in STEM subjects with age (see Chapter 0). It is not a surprise that by the time girls reach higher education, they are only 35% of all students in STEM-related fields of study. Therefore, early interventions are critical and essential to bridge the gap.

Another aspect to consider is gender stereotypes, which attribute different, or more/less developed abilities to boys and girls regarding performance in different disciplines (Cátedra Regional UNESCO Mujer Ciencia y Tecnología en América Latina, 2019). Media and social networks also reinforce the idea that STEM fields are not family-flexible, since the typical image of the scientist in most TV programmes is a highly intelligent and unmarried white man without children (Long, et al., 2010), thus reinforcing stereotypes that discourage girls from entering the world of science and tech. The expectations and assessments of skills transmitted through family and school environments, as well as peers' opinions can have great influence on the self-perception of boys and girls regarding their capacities in certain fields of study and influence their performance and professional choices. A recent study revealed that, between the ages of 6 and 8, 9 out of 10 girls associate engineering with male skills (Cátedra Regional UNESCO Mujer Ciencia y Tecnología en América Latina, 2019). In addition, while at that early age about 30% of boys and girls are considered good at mathematics, at 9 and 10 years old this proportion drops to 20% of boys and 11% of girls (Ibid.).

Assumptions and expectations from parents, educators, and peers influence girls' decisions about fields of interest and which studies they should pursue in order to fit in. Professors may –consciously or unconsciously– perpetuate stereotypes since they are generally unaware of their own gender biases. Teachers' stereotypes may also influence girls to underperform in math and self-select into less demanding high-schools (Institute of Labor Economics, 2018). Other social markers such as age, socioeconomic condition, geographical context, among others, also intervene in this process (Bonder, G., 2013).

Women also experience bias in hiring, promotion, and compensation. A study on gender equality undertaken by the Massachusetts Institute of Technology found that women in STEM fields are paid less,

promoted less often, and awarded fewer resources than men (Massachusetts Institute of Technology, 1999).

In general, female faculty members also tend to spend more time on teaching and less time on research than male faculty members (Winslow, 2010) and, as discussed in chapter 0, men in STEM are more likely to advance to leadership positions even in fields with roughly the same number of men and women (Diekman, Weisgram, & Belanger, 2015).

Regarding science and technology more broadly, it is in the course of postgraduate studies (especially at a PhD level) where the differences and inequalities between women and men increase (CEPAL, 2014).

The following are some of the barriers faced by women at entry and for their development and permanence in scientific careers (CEPAL, 2012):

- Work-life balance and reconciliation of work and family, especially maternity and care, when it coincides with the incorporation of women into research.
- Male predominance in the power structure of science, an androcentric construction that does not value knowledge generated by women in the same way.
- Permanence of gender stereotypes rooted in the academic and scientific community.

Besides, the gender dimension is not usually taken into account in the definition of priorities, contents, projects, methodologies and use of results of the research, which has a negative impact in the quality and relevance of research and innovation. Not considering sex and gender in research can lead to poor results, the loss of resources and even put lives at risk. The United States General Accounting Office provides a clear example of this: between 1997 and 2000, 10 drugs were withdrawn from the U.S. market because of life-threatening health effects, eight of which posed “greater health risks for women than for men” (United States General Accounting Office, 2001). Gender bias can also lead to missed market opportunities (the website <http://genderinnovations.stanford.edu> further explains the added value and missed opportunities that the gender dimension can bring to research). Several national science funding agencies (such as the Irish Research Council or the Swedish Research Council)

have already revised their policies to ensure that that all funded researches do include the gender dimension (UNESCO, 2018).

As remarked by the UN Women Deputy Executive Director, Yannick Glemarec, during the Global Science, Technology and Innovation Conference in 2017, “making innovation works for women is a key objective of UN Women.” Many barriers create and sustain the gender gap in innovation and technology, including underrepresentation of women as STEM professionals, innovators and entrepreneurs; perceived high risk/low reward profile of investing in innovations for women and girls; limited awareness of the market potential of gender responsive innovations; lack of dedicated methodologies and tools for gender responsive innovation; and adverse social norms.

In conclusion, barriers and challenges can be encountered at different levels of the life cycle. It is not just a matter of overcoming structural barriers, but also cultural barriers. To reduce the gender gap in STEM and reach parity among scientists and gender equality, efforts should be focused towards changing social norms and stereotypes but also towards engaging and attracting more girls to STEM fields. Given that women face challenges to enter a career in science and throughout such career, gender equality in career progression should be fostered and measures must be implemented to attract and retain women in STEM education at all levels.

Chapter 6 considers policies, instruments and measures intended to address all these aspects and all the different phases of the education and career cycle (see Figure 8).

FIGURE 8.
Phases of the education and career cycle



Source: own elaboration



6

POLICIES AND
MEASURES FOCUSED
ON GENDER
EQUALITY IN STEM
AT THE GLOBAL AND
REGIONAL LEVELS

Following the objectives of the study, this chapter identifies and analyses, several initiatives focused on the inclusion, training, and promotion of women in STEM at a global, regional and national level for the Latin America and the Caribbean region. To gain a more complete overview of the strategies applied to reduce the gender gap in these fields, the issue should be addressed on multiple levels. In this respect, the UNESCO global project STEM and Gender Advancement (SAGA) has designed a holistic conceptual framework of seven different areas to overcome gender gaps in STEM (UNESCO, 2016), which can be used as a reference and framework.

It is essential to emphasise that the promotion of gender equality in STEM is among the top priorities of several United Nations agencies. The importance of the reduction of the gender gap in STEM is also recognised as a priority for organisations and private companies operating internationally and nationally. This chapter includes some of the most important initiatives and programmes that have been implemented in recent years by UN institutions and international and national organisations.

This analysis is followed by the core section that presents a study of the most successful experiences of gender inclusion in STEM in several Latin American countries. Among the policies and initiatives implemented, those that had the greatest impact on the reduction of the gap were highlighted and analysed.

6.1. Gender equality in STEM as a global priority: UN agencies' activities

At global and regional level, significant efforts to promote gender equality in STEM have been carried out by the UN and other international organisations. A clear sign of these efforts is the declaration by the United Nations General Assembly in 2015 of 11 February as the *International Day of Women and Girls in Science* (resolution A/RES/70/212) to recognise the critical role women and girls play in science and technology communities. UN Women and UNESCO have been designated to work together to facilitate the implementation of the International Day in collaboration with all relevant organisations already involved in the promotion of women and girls in science. In the same framework, on the fourth of April the *International Girls in ICT Day* is celebrated every year, which aims to encourage and empower girls and young women to consider

studies and careers in the growing field of ICTs, enabling both girls and technology companies to reap the benefits of greater female participation in the ICT sector.

The United Nations is strongly committed to the empowerment of women and promoting gender equality in science. Although the first World Conference on Women was held in 1975 in Mexico City, it was only in 1995, at the fourth World Conference on Women in Beijing, that the declaration and platform for actions included specific recommendations to increase women's access to and retention in science and technology. Nowadays, the important role of gender equality in science has been recognised in several fora and conferences (such as the Twenty-third Special Session of the General Assembly in 2000, in a number of sessions of the Commission on the Status of Women and the declaration of the World Science Forum in 2017) and stressed in the UN 2030 Agenda for Sustainable Development, where girls and women are considered contributors and drivers of change and not just beneficiaries.

UN agencies are playing a key role in promoting women and girls in and for STEM through a range of initiatives, such as the following:

- The *EQUALS Global Partnership*, launched in 2016, is a ground-breaking global network of over 55 partners who have committed to work together to improve women's access to technology, build relevant digital and STEM skills, and promote female leadership in the tech sector. Established by the International Telecommunication Union (ITU), UN Women, the International Trade Centre, GSMA (Groupe Speciale Mobile Association) and the United Nations University, EQUALS provides a holistic, data-driven approach to achieving gender equality in tech. Each year, the EQUALS in

Tech Awards recognise the great efforts around the world to empower women in the world of ICTs. By promoting awareness, EQUALS seeks to achieve digital gender equality and, through this, to improve the livelihoods of millions around the world.⁵

- Making innovation works for Women is a key objective of UN Women. To address barriers in an integrated manner and build coalitions for change, UN Women launched in 2016 the *Global Innovation Coalition for Change (GICC)* with leading private sector, academic and not-for-profit institutions. In partnership with several UN agencies, the GICC released a set of Women Innovation Principles to promote gender responsive innovation. The initiative has a gender-responsive approach that goes beyond acknowledging and raising awareness of gender gaps, it ensures that women's and men's concerns and experiences are equally integrated in the design of innovative products and services.⁶
- UN Women and ITU, in collaboration with the African Union Commission, launched in 2018 the *African Girls Can CODE Initiative (AGCCI)* to equip girls and young women in Africa with digital literacy skills. The AGCCI is a four-year programme that aims to train and empower girls and young women between 17 and 20 years old across Africa to become computer programmers, creators and designers – and in so doing, enable more girls and young women to take up studies and careers in the ICT sector. The initiative plans to encourage African countries to mainstream ICT studies, including coding, into their national curricula to provide girls and young women with more opportunities to learn digital skills.
- In 2016, the *ITU 'Network of Women for WRC' (NOW)* initiative was launched to encourage gender balance in decision-making bodies, panels, statutory committees, and study groups at ITU-R events. The NOW4WRC19 initiative aims to encourage a larger participation of women in roles such as delegates, chairs, and vice-chairs at WRC-19. The NOW4WRC19 initiative builds on the success of the WeLead mentoring programme

launched by the Federal Communications Commission (FCC) at the WRC-15.

- In 1998, UNESCO and L'Oréal launched the "*For Women In Science*" programme, a pioneering activity for the promotion of women in science that support and recognise accomplished women researchers and encourage more young women to enter the profession.
- In order to strengthen its work in support of gender equality in STEM, UNESCO launched in 2015 the *STEM and Gender Advancement (SAGA) project*. SAGA is a global project that offers governments and policymakers a variety of tools to help reduce the current global gender gap in STEM fields existing at all levels of education and research.
- To achieve the disaggregation of Intellectual Property (IP) data by gender as a key performance indicator for policies that aim to promote innovation and creativity and to spur economic, social, and cultural development, WIPO compiled in 2016 the *Worldwide Gender Name Dictionary*. The Worldwide Gender Name Dictionary is an inventory of traditionally male and female names. WIPO constructed the tool using 14 different sources containing 6.2 million names used in 182 countries and covering 12 languages. Using the Dictionary, WIPO was able to attribute, with a high degree of certainty, 96% of the 9 million names of inventors and individual applicants in the Patent Cooperation Treaty (PCT) System data to either women or men. The names are also cross-referenced with nationalities and other factors in order to take into account national and cultural differences. WIPO is also undertaking awareness activities in countries around the world as well as carrying out studies and measures to increase the number of women inventors and to understand and measure a little more carefully the gender gap.
- Since 2018, WIPO has also been organizing *training courses on IP* for laureates and participants in the L'Oréal-UNESCO For Women in Science Programme. The main objective of these courses is to provide female scientists with the IP

5 For more information on this initiative visit: <https://www.equals.org/>

6 For more information on this initiative visit: <https://www.giccprinciples.org>

knowledge they need to protect and add value to their research in physical sciences.

- ‘Space for Women’ is a global project launched in 2017 by the United Nations Office for Outer Space Affairs (UNOOSA) to facilitate the strengthening of the awareness, capacity and skills of individuals and institutions related to the importance of promoting gender equality in the space sector and its fundamental educational fields by:
 - Facilitating access to the space sector education as well the space sector itself.
 - Providing policy-relevant advice and raising awareness to institutions and governments on ‘Space for Women’ and ‘Women for Space.’
 - Facilitating capacity-building/training of individuals on access to and use of space technology.
 - Promoting a mentoring platform on ‘Space for Women’ Champions.

In order to increase synergies and collaboration among the UN, its agencies, funds and programmes on issues pertaining to STI and gender, the *Interagency Task Team on Gender and STI for the Sustainable Development Goals (SDGs)*, comprised of 11 UN entities, was established in 2018 under the Technology Facilitation Mechanism (TFM).

Furthermore, many UN agencies are implementing policies within the organisation, providing guides on how organisations should ensure that a gender equality perspective is reflected in all their policies, programmes and processes so that gender equality is advanced both within institutional processes and in their work with Member States.

6.2. International, regional, and national activities and programmes worldwide

In the last decades, especially in the last few years, several activities have been launched at a global, regional, and national level to reduce the gender gap in STEM. Numerous organisations have supported institutional transformation that aims to remove structural barriers to gender equality, from governments to civil society organisations, from

international organisations to private companies (see Annex II for more information on the activities and for a list of other initiatives).

- **Governments** around the world have implemented a variety of initiatives focused on attracting more women in STEM, changing stereotypes or, more broadly, reducing the gender gap in STEM at different stage of the lifecycle. Some of the successful initiatives include the launch of specific programmes such as the *Women in STEM and Entrepreneurship (WISE)* programme in Australia, which, with an annual budget of USD 9.5 million, is providing funding to support women in STEM and to eliminate barriers for women’s participation in STEM education and careers, including entrepreneurship. Additionally, dedicated national councils and funds have been launch, such as the *National Council for the Advancement of Women in Science and Technology* in Israel, the *Austrian Science Fund’s Gender Mainstreaming programme*, or the *National Commission for Women in Science* in Slovenia. Another important initiative is the *Educate to Innovate campaign*, launched in the U.S. in 2009 by former President Obama, which has resulted in over USD 700 million in financial and in-kind support for STEM programs specifically including women and minorities. Specific programmes for minorities, such as special grants in STEM for indigenous women, are also implemented in the LAC region (see 6.3.2).
- **Academic institutions** have worked to attract women to STEM, remove gender bias from hiring and promotion, prevent gender-based discrimination and harassment, advance women in leadership, and facilitate work/life balance. Notable practices around the world are the *International Women’s Computer Program*, initiated in 2000 by the Women’s Department of the Hochschule Bremen (University of Applied Sciences) and that provides excellent training in technological education, exclusively for women, based on the principles of education differentiated by gender; the *Athena SWAN (Scientific Women’s Academic Network)*, an accreditation programme that recognises and celebrates good practices in higher education and research institutions towards the advancement of gender equality, or the *Mothers of Science supporting*

grant of the Barcelona Institute of Science and Technology (BIST) that is addressing the gap that exists between the number of women in the BIST Community who are research associates or senior postdoctoral researchers and the percentage of women who are group leaders.

- **Industry and private sector corporations** have programs aimed to improve the representation of women in upper management and to engage and attract more women into their companies. Some private companies working in the science field are implementing interesting activities at a national level, among them are the *Fraunhofer Gesellschaft* in Germany, an ICT research leader in Europe that is working through a mentoring programme in schools to motivate and inform girls, or Mastercard that launched *Girls4Tech* in 2014 to inspire girls to pursue STEM-based careers through a fun and engaging curriculum based on global standards of science and math. So far, it has reached more than 400,000 girls in 25 countries.

Google launched the initiative *Made with Code* to inspire teen girls to see that code can help them pursue their passions by providing online activities for young girls to learn coding on its website. Since 2010, Google has invested in initiatives to increase diversity in computer sciences, developing new ways to get girls interested and involved in computer sciences at a young age.

Foundations, social enterprise, and grassroots organisations. The Soronko Foundation has founded a successful mentorship programme in Ghana called *Tech Needs Girls*, which is creating an environment for young women to learn computer skills and a mentorship programme to get more women and girls to create technology. In South Africa, *WomEng*, a social enterprise founded in 2005 and now operating in 13 countries, is connecting over 10,000 girls to mentors and role models, and contributing to change mindsets around engineering and technology in Africa. *Million Women Mentors* is a movement launched in 2014 that provided over one million STEM mentoring relationships to girls and women worldwide, helping them to choose, persist and succeed in STEM programs and careers. *500 women scientists* is a worldwide

grassroots organisation launched in 2016 that works to build communities and foster real change that comes from small groups. It is dedicated to making science open, inclusive, and accessible. Over 20,000 women of STEM and supporters from more than 100 countries have signed in support of 500 Women Scientists.

- **Other institutions.** In India there was a substantial increase in women studying and working in engineering, once seen as a “masculine” discipline, thanks to initiatives such as *India’s Rocket Women*. This is an activity that has been widely celebrated and which was carried out at the Indian Space Research Organisation (ISRO), where role models and mentors break down barriers by connecting young people with those working in STEM fields. 431 PhD fellows from 33 developing countries have been awarded by the *Organization for Women in Science for the Developing World (OWSD)*, an international non-profit organisation supported by UNESCO and founded in 1987 providing research training, career development, and networking opportunities for women scientists throughout the developing world at different stages in their careers. *The European Centre for Women and Technology (ECWT)*, a multi-stakeholder partnership of more than 130 organisations, is working on measurably and significantly increasing the number of girls and women in STEM and computing and integrating a critical mass of women in Europe in the design, research, innovation, production, and use of ICT.

6.3 Learning from success: main experiences and initiatives implemented in the region

6.3.1. Key regional actors

Over the past few decades, there has been an increase in the number of policies, instruments and measures focused on reducing the gender gap in STEM in Latin American countries (Baptista, 2017) (Sarhou, 2019). Despite these advances, numerous challenges remain, and there is still much work to do to close the gaps.

International and regional organisations, such as UNESCO, UN Women, laDB, the International Development Research Centre (IDRC), the United Nations Economic Commission for Latin America and the Caribbean (ECLAC) and OEI, are playing an important role in fostering gender equality in STEM in Latin American countries by conducting various activities and studies.

Some of the initiatives established by these organisations have been implemented in more than one country. These include, among others, the *L'Oréal-UNESCO For Women in Science Fellowships programme* (implemented in Argentina, Brazil, Chile, Colombia, Mexico, Panama, Peru, Uruguay and French Guyana), the UNESCO *SAGA project* (currently active in Argentina, Chile, Haiti, Jamaica and Uruguay), the *TeachHER initiative*, the laDB 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)*.

These international and regional organisations also support national initiatives, such as the *Studies on Peruvian Women in Science* (supported by the OEI) or the *Mulher e Ciência* programme in Brazil in collaboration with *UN Women*. IDRC, in collaboration with the Centre for Research and Higher Education in Social Anthropology (Centro de Investigaciones y Estudios Superiores en Antropología Social; CIESAS), supports indigenous women in STEM careers in Mexico and Central America through funds to support high-quality research, professional development and networking opportunities.

Regional and national networks, such as the Regional UNESCO Chair on Women, Science, and Technology, have also played a crucial role by performing pioneer studies and activities. Another significant initiative in the region is *Women in STEM Entrepreneurship (WISE)*, which is implemented in four countries: Argentina, Colombia, Ecuador and Peru and seeks to strengthen the entrepreneurial ecosystem for greater integration of women as creators of innovative projects and impacting STEM areas. laDB, FOMIN (Fondo Multilateral de Inversiones) and the IAE Business School of the Austral University are supporters of this programme.

Accompanying the relevance of the topic in the agendas of the countries in the region, RICYT has published a comprehensive set of gender indicators that includes a dozen indicators with a very good coverage of Latin American countries.⁷

The Inter-American Network of Academies of Sciences (IANAS) is another institution fully committed to generating equal opportunities for women in science and technology in the region. It is implementing specific activities such as the *Women in Science programme* and the *Women for Science Working Group (WfS-WG)*. The IANAS WfS-WG has the mandate to advise IANAS and its member academies on fostering a climate in the sciences that is welcoming to women. It develops actions that increase the visibility of the contributions of women scientists and engineers in the region and provides these women with opportunities for networking by means of the WfS-WG website.

Other institutions active in more than one country include OWSD, which has national chapters in Bolivia, Mexico and Uruguay, and *Women in Global Science and Technology (WISAT)*, an international non-profit promoting women's development of STI. WISAT has undertaken a cross-national comparison of the status of women in national knowledge economies – the *National Assessments on Gender and STI* – in multiple countries in the region, including Argentina, Brazil, Panama and Mexico. *GenderInSITE* is also very active in Latin America and the Caribbean and is one of two regional focal points in the region, with the other being Africa.

Over the past few years, projects financed by the European Union in the context of Horizon 2020 and the Erasmus+ programme also play a role in the region. Such projects include *ACTonGender* and *Building the Future of Latin America: Engaging Women into STEM (W-STEM)*. *ACTonGender* focuses on promoting practice communities to advance knowledge, collaborative learning, and institutional change for gender equality in the research area. In contrast, *W-STEM* seeks to improve the strategies and mechanisms of attraction, access, and orientation of women in Latin American STEM higher education programmes.

7 For more information, please visit: <http://www.ricyt.org/category/indicadores/>

Private enterprises also support the implementation of specific activities in multiple countries in the region, either alone or in collaboration with other institutions. INTEL in Costa Rica conducts technical strengthening programmes, such as *Women at Intel* (WIN), and vocational activities in STEM to engage students in their penultimate year of study in a STEM career. Oracle in Colombia promotes leadership projects for women, such as the *Women Leadership Initiative*, by conducting motivational talks for men and women. To encourage the vocation of girls and young women in science and technology, Uber launched the *Ellas* programme in Costa Rica, Mexico and Peru. This programme provides STEM workshops that seek to reach 1,200 girls in Latin America in its first implementation. Other private tech companies, such as Accenture, Google and IBM (International Business Machines Corporation), are implementing actions in the workplace by organising meetings, face-to-face conferences, virtual chats, and camps to promote inclusion. Only a couple of companies in the region (Accenture [Argentina] and Microsoft [Costa Rica]) have quota policies in place (CEPAL, 2014b). IBM Colombia is also developing activities that aim to make women in hierarchical positions publicly visible. Some companies have tried to improve the base of female applicants by disseminating personnel searches through routes that are supposedly 'more related to them' (Ibid.). Other companies are also offering flexible time policies and remote work or working from home to all employees, as well as specific talks on issues such as youth, childhood, adolescence and problems that parents encounter with their children. A network of companies working on gender equality (Red de Empresas por la Equidad de Género) was created in Chile to work toward engaging more women in STEM.

The work performed by NGOs is also relevant. Some examples are *Coderise.org*, which focuses on providing upward social mobility to the underprivileged in Latin America through software programming education, and *Geek Girls LATAM*, which promotes and offers opportunities for Latin American women to use, appropriate and actively link with the creation of technology. Another organisation with a sub-regional scope is R-Ladies Matemáticas en el Cono Sur. R-Ladies is an international organisation that promotes gender diversity in the research community through in-person meetings, virtual meetings and mentoring in a friendly, safe and non-hostile

environment. It aims to achieve balanced representation by encouraging, inspiring and empowering people of genders currently underrepresented in the research community.

6.3.2. Policies, instruments, and measures at the national level

At the national level, efforts are being made at different scales, from national governmental institutions to universities, research centres, civil society, and private companies. Several countries have adopted mechanisms to promote the implementation of gender policies in scientific institutions, stimulating the creation of formal structures for the enforcement of women's rights within their STI systems. The promotion of equality and parity has been fostered to reduce inequalities and combat discrimination.

Because all public policies concern the population in some way, no policy is gender neutral (UNDP, 2007) and gender-blind instruments are detrimental to science. Including gender equality in STEM within public policies is also clear evidence of the importance that a country has given to the topic. Moreover, the legal framework ruling the institutional procedures that promote gender equality in STEM is another major mechanism for enhancing women's representation (Pell, 1996). Therefore, to have a clear regional overview on the topic, it is essential to assess how gender equality in STEM is addressed in national and subnational policies, as well as in plans and laws.

The analysis of the main operational instruments, experiences and initiatives implemented in Latin American and Caribbean countries to encourage the participation of women and girls in STEM fields will contribute to providing a comprehensive regional overview.

- **6.3.2.a Public Policies and gender equality in STEM**

The decision to analyse public policies that have a positive impact on the achievement of gender equality in STI is based on the conviction that, as a key condition for achieving development, the State must play an active role in building egalitarian societies. In this context, public policies are a

fundamental tool for promoting transformations towards greater levels of justice, as well as expressing the political decision of governments to address gender equality in STEM.

The following table considers how gender equality in STI has been mainstreamed in policy agendas (see Table 4). It considers seven dimensions:

- whether a country has a specific STI gender equality policy;
- whether a national STI plan, policy or strategy includes mentions of gender equality in STEM;
- whether a national STI law considers or includes any references to the topic;
- whether the national gender equality policy includes references to STEM;

- whether a national law on gender equality includes references to gender equality in STEM;
- whether a national network of female scientists exists;
- whether the national education policy includes references to gender equality in STEM; and
- whether a national education law considers or includes any references to the topic.

The time axis was considered to avoid portraying a simple photograph of the current situation and to instead reflect the evolution of policies and laws over time. More than 200 policies, plans, documents, and laws were consulted to elaborate the following table.

TABLE 4.
Gender equality in STEM in national policies and laws

Country	Specific STI gender equality policy	Nat. STI plan or strategy includes gender equality in STEM	National STI Law includes references to gender equality in STEM	National law on gender equality includes references to STEM	Gender equality policy includes references to STEM	National network of women scientists	Education policy includes references to gender equality in STEM	Education law and science ⁸
Argentina	-	X (2013)	X ⁹ (2001)	-	-	X (1994)	-	- (2006)
Bolivia	-	-	-	-	-	X (2000)	-	- (1994)
Brazil	-	- ¹⁰	-	-	X (2008)	-	-	- (1996)
Chile	X (2013; 2017)	-	-	-	X (2010)	X (2012)	-	- (1990)
Colombia	-	-	-	-	X (2012)	X (2015)	-	- (1992)
Costa Rica	X (2018)	X (2015)	-	-	X (2012)	X ¹¹ (2016)	-	- (1957)
Cuba	-	-	-	-	-	-	-	-
Dominican Republic	-	-	-	-	-	X (2016)	-	- (2000)
Ecuador	-	-	-	-	-	-	-	- (1996)
El Salvador	-	X (2014)	-	-	X (2009)	X (2018)	-	- (1991)

8 Education laws refer to STI rather than gender equality in STI.

9 Although it is a very generic “guarantee equal opportunities for people, organizations and regions of the Nation.”

10 The *Estratégia Nacional de Ciência, Tecnologia e Inovação* recognises gender equality in STI and has one of the key global policy trends; however, there is no mention of it in the part regarding national challenges.

11 It is the national chapter of the international network “500 Women Scientists.”

Guatemala	-	-	-	-	¹²	-	-	-
Jamaica	-	X (2014)	X (2015)	-	-	X (2014)	-	-(1993)
Mexico	-	-	-	-	-	-	-	-(2006)
Nicaragua	-	X (2015)	-	-	X (2016)	-	-	-(1995)
Panama	-	-	-	-	X (2008)	-	-	-(1998)
Paraguay	-	-	-	-	X (2019)	X (2019)	-	-(2003)
Peru	-	¹³	-	-	-	-	-	-(1997)
Uruguay	-	-	-	X (2007)	X (2007)	X ¹⁴ (2019)	-	-(1985)
Venezuela	-	-	-	-	X (2014)	-	-	-(1980)

Fuente: elaboración propia (ver Anexo III)



¹² Equality is considered a value in the policy; however, there are no other references or measures regarding it throughout the STI Strategic Plan 2008-2018.

¹³ It rather includes references to ICT.

¹⁴ It is the national chapter of the international network OWSD. Uruguay became the first country to establish an OWSD National Chapter in South America.

By analysing how policies, strategies and laws on science, gender and education are mainstreaming gender equality in STEM, it is evident that, especially in the last decade, the topic has gained visibility and is being mainstreamed in national policies, laws and strategies:

- At an early stage, the importance of gender equality in STEM was addressed initially in gender-equality policies.
- Only recently, national STI plans and strategies have included references to gender equality in STEM (in some countries national STI plans or policies are still not even in place).
- In a kind of third phase of policies, countries (Chile and Costa Rica) have started launching specific gender STI equality policies. This demonstrates that the topic is rising to the top of the national agenda in these countries.

However, most of the plans, policies, and laws make references to science and technology rather than STEM.

It can also be observed that:

- Argentina was the first country to mainstream the topic in its policies. In fact, it was the first country in which a national network of women researchers was created –almost a decade earlier than other countries. In addition, Argentina was the first country to incorporate gender equality to the national STI plan.
- Mexico was the first country to explicitly include references to promoting the inclusion of gender perspective in the national STI law, making references also to the importance of the equal participation of women and men in all areas of the National System of Science, Technology and Innovation (Art. 2.VIII). Other STI laws, such as the one in Argentina, make more generic references to guaranteeing equal opportunities.
- Uruguay is the only country in the region to incorporate gender equality in science in its national law on gender equality.
- In some cases, as in Panama, the gender equality policy only included references to STEM recently; previous plans contemplated the need to promote equality in the use of ICTs and fight the digital divide between men and women, but did not consider women's participation in science.

- Recent years have seen the launch of a national network of female scientists in almost every country, except for a few countries.

Furthermore:

- None of the education policies reviewed include references to gender equality in STEM, rather they make more generic references to science and technology.
- All education laws include references to science, technology, and innovation. This is not a new phenomenon, considering that laws were already referring to STI since the late 1950s. However, they do not address gender equality in STEM.

• 6.3.2.b Instruments, activities, and measures carried out at national level

In Latin America, most of the countries have undertaken efforts to reduce the gender gap in STEM. In fact, most LAC countries have implemented policies related to women and science, committing to gender mainstreaming, creating national committees on women and science, publishing sex-disaggregated statistics and promoting gender studies and research.

For decades, studies on women in science have shown the consequences of excluding women from science and that sexism has long skewed research. While the first programs and initiatives on STEM education were developed at the end of the 90s (an example is Small Scientists project of the STEM Academia in 1998), it was only over the past decade and a half that steps towards progressive gender and STEM policies in the region began and the first measures were implemented towards reducing the gender gap in STEM and overcoming these challenges.

In the last decade, more attention was given to the issue of not having enough women in STEM even in tertiary education and that countries began to implement measures to attract girls and young women to the STEM initiative, especially in the last few years.

The good practices and instruments with a gender approach in science and engineering identified in

several countries have been implemented through several mechanisms, including:

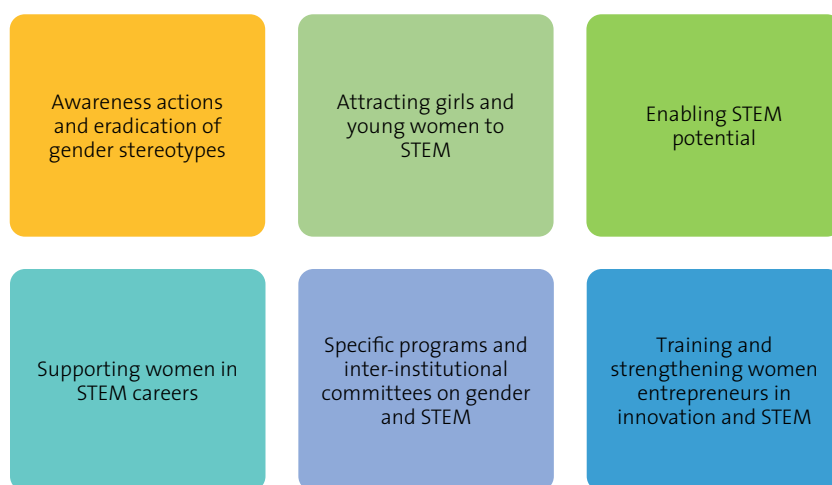
- Ad hoc programmes (such as *Mulher e Ciência* in Brazil or the *Science and Gender Programme* in Costa Rica);
- Scholarships for girls and women researchers;
- Maternity and paternity leave and extensions to the duration of scholarships, grants and allowances for maternity and child care;
- Competitions and contests;
- The creation of ad hoc institutions and national gender and STEM committees (such as those in Argentina, Chile and Uruguay);
- National surveys on gender in science and technology;
- Networks of women scientists; and

- Fora, workshops, and other activities (such as Editathon, scientific cafes, roundtables, etc.).

The information gathered and included is not an exhaustive list of every single instrument and activity ever implemented at a national level in LAC countries, but it shows how the work to reduce the gender gap in STEM involves multiple levels of actors, including governments and national agencies, international organisations, and civil society organisations. This work also involves various levels of beneficiaries, including students, vulnerable populations, decision-makers, trainers, and teachers. The tables include over 80 instruments, activities, and measures focused on reducing the gender gap in STEM from 16 countries in the region.

Depending on their aim and target beneficiaries, the typology of interventions identified can be grouped into different macro areas (see Figure 9).

FIGURE 9.
Typology of interventions



Source: own elaboration

- **Awareness actions and eradication of gender stereotypes** (see Table 5). Some instruments have been developed to eradicate bias against women in STEM and the beliefs that alienate women from jobs in STEM sectors. These initiatives highlight, on the one hand, the equality of abilities between genders and the importance of having equal opportunities

for accessing STEM-related careers and jobs, and, on the other hand, give visibility to the work of women scientists in STEM. Activities such as *STEM es para chicas* in Peru have been effective in helping reduce gender stereotypes in STEM among men and women aged 14 to 16 through motivational talks to schoolchildren. Another interesting activity focused

on promoting girls' interest in scientific careers and bringing down stereotypes is *Women scientists of the past, present and future* implemented by the Universidad Nacional del Litoral in Argentina, which is sensitizing primary and secondary school students

to gender and science. Other specific activities or seminars, such as the *Forum on gender equality in STI in Panama*, are implemented in different countries with the purpose of increasing awareness on the importance of reducing the gender gap in STEM.

TABLE 5.
Awareness actions and eradication of gender stereotypes

Name of the instrument/measure	Institution	Description and aim	Mode of support	Country	Year of creation
Building Gender Equality Award	SPM in partnership with CNPq; the Secretariat of Continuing Education, Literacy and Diversity (SECADI/MEC); the Secretariat of Basic Education (SEB/MEC) and UN Women	Contest of essays, scientific articles, and educational projects in the area of gender, women and feminisms. It stimulates and strengthens critical reflection and research on existing inequalities between men and women in the country and raises awareness on the topic in society.	Award	Brazil	2005
Contest to support actions for the promotion of women in STI	Explora Program of CONICYT 2009 (not ongoing)	Co-finance the implementation of dissemination activities, such as workshops, congresses, conferences, and seminars, around topics related to the gender approach in STI. It raises awareness and generates debate among those who are part of the scientific and academic community about the relevance of a full incorporation of women in this area in the development of the country. Around USD 55,000.	Grant	Chile	2009
Mulheres Mil	Secretaria de Educação Profissional e Tecnológica do Ministério da Educação (Setec/MEC)	It aims to promote equity, and gender equality, reduce violence against women and accessibility to education. It also aims to promote the vocational and technological training of one thousand disadvantaged women in the Northeast and North regions of Brazil.	Specific programme	Brazil	2011
Portraits of Women in Engineering and Science Contest (Concurso Retratos de Mujeres en Ingeniería y Ciencias)	Explora Program of CONICYT	This project raises the visibility of accomplished female scientists in the country through highlighting women who have excelled in STEM throughout their lives. The programme targets women particularly.	Contest	Chile	2013

Free Women and Information Technologies Forum (Foro de Mujeres y Tecnologías de Información Libres)	Ministry of People's Power for Science, Technology and Intermediate Industries (MCTI)	It implements several activities such as meetings, trainings, and roundtables whose aim is to show how little participation women have in the world of technology and especially in free technologies.	Technical assistance	Venezuela	2013
Bringing Down Stereotypes. Women scientists of the past, present and future	Universidad Nacional del Litoral	It is an initiative focused on changing stereotypes towards women in STEM, making the work of women researchers visible throughout history and sensitizing primary and secondary school students to gender and science. Concrete actions with didactic material are especially elaborated for this proposal, which works on the stereotypes generated around the figure of women in science. The project includes recreational activities, talks and workshops aimed at girls and young women who are about to enter university.	Technical assistance	Argentina	2016
Women and Science Meetings	MICIT, CONICIT and other institutions	Lectures on women in the history of science and technology, training, and work experiences of women in science and technology and a round table of outstanding women in science and technology to raise awareness on their importance.	Technical assistance	Costa Rica	2016
Initiative NiñaSTEM Pueden	Secretary of Public Education and OCDE	It is focused on changing gender stereotypes in STEM. It also introduces STEM fields to girls in secondary school grades through educational opportunities outside the classroom supported by mentors and graphic material. The objective is to promote the conviction in girls and adolescents that they can undertake successful careers in STEM, regardless of their gender status, empowering them to recognise and use their knowledge and skills.	Technical assistance	Mexico	2017
Editathon of women Argentine scientists	CICYT and Wikimedia	A day per year aimed to improve the representation of women in the scientific and technological field in the Wikipedia encyclopaedia, through an attentive look at gender issues.	Technical assistance	Argentina	2018
"STEM es para chicas" initiative	The NGO "En Órbita", with the British Embassy in Peru, UNESCO and the OEI	The activity has been effective in reducing gender stereotypes in STEM among men and women aged 14 to 16. The project offered motivational talks to some 5,000 schoolchildren from nearly 30 public schools in peripheral and poor areas of the Peruvian capital chosen by the Regional Directorate of Education of Metropolitan Lima to be below the national average in mathematics and science. It seeks to encourage girls in the last two years of public high school in Lima to study STEM.	Technical assistance	Peru	2019

Source: own elaboration

- **Attracting girls and young women into STEM careers** (see Table 6). These actions aim to get students from different school levels interested in STEM-related subjects. An example is the activity *Quiero*

Ser Científica in Uruguay, developed by OWSD Uruguay, Plan Ceibal, and U.S. Embassy in Uruguay. It aims to strengthen vocations in order to favour the participation of women in science. Also noteworthy

is the implementation of E-girls and Supermáticas clubs in public schools in Dominican Republic. This step is developed and executed by the Ministry of Education. Other countries, such as Paraguay, are organizing campaigns that promote women's access to education in science and technology, for the care of the environment and the rational use

of natural resources. Another remarkable initiative is the *Meninas e Jovens fazendo Ciências Exatas, Engenharias e Computação* (Girls and Youth doing Exact Sciences, Engineering and Computing) campaign that is raising the vocational interest of female students of basic education and higher education in STEM professions in Brazil.

TABLE 6.
Attracting girls and young women to STEM

Name of the instrument/measure	Institution	Description and aim	Mode of support	Country	Year of creation
Ingenio para Armar tu Futuro	Asociación para el Liderazgo y Ascenso Social (ALAS) and INTEL	Aims to reduce the gender gap in STEM sectors by motivating schoolchildren, mainly girls, to take an interest in engineering. The project developed monthly mechanical, electronic and computer games in different educational centres and offered accompaniment workshops for teachers on gender and technology issues. Mixed workshops.	Technical assistance	Costa Rica	2015
Red MenTe	Ideas en Acción (NGO)	To promote the income, participation, and growth of women in science and technology in Costa Rica. It is a 12-week programme designed to engage more women in science and technology. Part of the work focuses on attracting younger women to the field of science and technology.	Technical assistance	Costa Rica	2015
Promoting ICT careers in high school adolescents in Uruguay	Faculty of Engineering	Female teachers from the Institutes of Computing and Electrical Engineering organise workshops on robotics, electrical circuits and geographic software for groups of adolescent women from secondary schools, so that the adolescents can make direct contact with elements of these careers and with teachers and female students of this area. It is a role model approach whose slogan is "doing instead of seeing."	Technical assistance	Uruguay	2016
"E-chicas" and "Supermáticas" clubs	Ministry of Education (MINERD)	The e-girls clubs for girls in grades 6-8 and Supermáticas for girls in grades 1-4 are spaces for training and promoting academic excellence and vocational guidance in the areas of STEM. Since 2016 is maintaining and increasing the interest in science subjects among girls and adolescents in Dominican public schools.	Technical assistance	Dominican Republic	2016

Name of the instrument/measure	Institution	Description and aim	Mode of support	Country	Year of creation
Verano innovador	National Office of Industrial Property (ONAPI)	The innovative Summer Camp aims to expose young people to the experience of innovation and STEM careers, just before they make their career choice. It seeks to demystify the patent process, bringing ordinary citizens closer to patenting and technology transfer tools. It brings inventors closer to society through meetings and competitions and promotes careers in STEM in order to increase the number of potential national patent applicants.	Technical assistance	Dominican Republic	2016
Tecno-girls Programme	Universidad Gerardo Barrios	It fosters skills in STEM in young ladies aspiring to begin studies in these areas. Young women with high academic performance in their high school studies will have options of scholarships in technology at UGB.	Scholarships	El Salvador	2017
Pedagogical guide on gender and science	Mexican Network of Science, Technology and Gender	The Mexican Network of Science, Technology and Gender developed a pedagogical guide for teachers of Higher Secondary Education, with the purpose of encouraging the interest of young women in the areas of science and technology and promote female vocations for STI. The final goal is to contribute to reducing student dropout at this educational level.	Methodology	Mexico	2017
Girls and Youth doing Exact Sciences, Engineering and Computing (Meninas e Jovens fazendo Ciências Exatas, Engenharias e Computação)	CNPq and the Ministry of Science, Technology, Innovation and Communications (MCTIC)	It aims to contribute to the scientific and technological development of the country, by encouraging the participation and training of girls and women in careers in exact sciences, engineering, and computing. The main objectives of the campaign are: - To stimulate the training of women in careers in Exact Sciences, Engineering and Computing in Brazil. - To increase the vocational interest of female Basic and Higher Education students in these professions. - To fight the drop, especially occurring in the first years, of girls from undergraduate courses in these areas.	Campaign	Brazil	2018
Vocational STEM	INTEL	It consists of taking students in their penultimate year of studies to an activity in which Intel engineers tell their life stories and then the young people visit stands, while having the opportunity to interact with the collaborators. The idea is that they enjoy themselves while learning more about STEM.	Technical assistance	Costa Rica	2018

Name of the instrument/measure	Institution	Description and aim	Mode of support	Country	Year of creation
Coalición STEM	Inter-institutional team composed by different institutions, including the Ministry of Education of Ecuador and the National University of Education – UNAE	Its goal is to eradicate mathematical anxiety in boys and girls. It aims to increase the motivation, interest, persistence, and hard work of all members of the educational community in STEM.	Technical assistance	Ecuador	2018
TECHNOLO-chica	Fundación Televisa	It seeks to inspire girls, young women and their families to consider careers in science and technology. The goal is to close the gender gap by training new generations of girls and young women to consider studying these careers and find a great ally to fulfil and impact their future goals.	Technical assistance	Mexico	2018
Epic Queen	Epic Queen is a social enterprise	It encourages the participation, mainly of women and children, in STEM and related areas through events, workshops and educational programmes hand in hand with companies, institutions and schools. The goal for 2030 is to have worked with more than 100,000 girls and women.	Technical assistance	Mexico	2018
Competition for school children “Genias de las ciencias”	ANTEL	The initiative aims to attract girls and boys to science (5th and 6th grade students from all over the country). It gives relevance to female scientists, provides female models in this area, promotes new tools for disseminating knowledge and encourages teamwork and creativity. Students need to select a female scientist, investigate her trajectory and make a video of up to 3 minutes.	Contest	Uruguay	2018
Women and Science Programme	Medialab and the Bolivian Association of Video Games	It is a series of workshops aimed at women between the ages of 15 and 60 who have an interest in the world of Science and Technology to promote and encourage women to get involved with the world of science and technology.	Technical assistance	Bolivia	2019
MujerES Ciencia	Administrative Department of Science, Technology and Innovation (Colciencias)	A stage where Colombian women can tell their stories, challenges, and achievements to empower the public to replicate these testimonies in order to increase the percentage of women and girls in science in Colombia.	Technical assistance	Colombia	2019
Quiero Ser Científica	OWSD Uruguay, Plan Ceibal and U.S. Embassy in Uruguay	The objective of this project is to awaken and strengthen vocations in order to favour the participation of women in Science, both in the field of research and technological entrepreneurship.	Technical assistance	Uruguay	2019

Name of the instrument/measure	Institution	Description and aim	Mode of support	Country	Year of creation
Campaign For More Women In Science	Ministry of Science and Ministry of Women's Affairs	Inter-ministerial campaign that seeks to encourage more girls and young women to opt for careers related to STEM areas, not only to increase female labour participation, but also to increase the participation of women in historically male-dominated careers.	Campaign	Chile	2019
Acompañamiento Mujeres en STEM	Ministry of Education within the Education with Gender Equality Program and the "Fundación Ingeniosas y Woomu"	Female students from 8th to 2nd year of public schools are accompanied by STEM students in Higher Education institutions. The purpose of the accompaniment is to bring them closer to scientific-technological areas and to dispel associated myths. Through this program, role models are being made visible and new spaces are being opened to generate new perspectives in students who are about to choose their future careers. In total, 1,000 school students were mentored by nearly 350 STEM career students.	Assistance	Chile	2019
Specific computer clubs for girls	Upcoming	To introduce STEM fields to girls. It will be focused on activities such as robot programming.	Technical assistance	Panama	Upcoming

Source: own elaboration

- Enabling STEM potential through education, training workshops and studies (see Table 7). These activities focus on generating inclusive spaces to provide women with education and skills in STEM and ICT, or aim to promote scientific research that addresses women's problems and needs. In Costa Rica, the *Girls in Technology Program*, developed by Parque La Libertad and Emerson Costa Rica, is generating and offering more inclusive and free spaces where girls would see themselves as subjects of rights who are capable of learning about technology. The initiative *Hackers girls* in Colombia was the first training programme for Colombians in strengthening women's knowledge on hacking tools associated with ethical cybersecurity. A similar training initiative is *Tecnochic@s* in Dominican Republic, which trains girls aged 12 to 17 in programming, multimedia, and telecommunication tools. Another successful activity is TIC-as *La Ciencia*

nos Necesita of Sulá Batsú. It is supported by UN Women and is creating spaces for women to insert themselves integrally into the digital economy. The project is one of the few activities that focus on rural young women who address the social problems of their communities, supporting them to develop their technology-driven ventures. Several studies are being developed to analyse the situation of women in STEM in a comprehensive manner to develop solutions appropriate for each particular socio-economic context, and to improve public policies by including a gender perspective. One interesting activity, in this sense, is *CIENCIATIVA – The Study on Peruvian Women in Science*, whose objective is to promote research projects on the trajectory, participation, opportunities, and challenges of Peruvian women in STI. It also seeks to promote the involvement of young researchers in the study of STI public policies with a gender focus.

TABLE 7.

Enabling STEM potential through education, training workshops, and studies

Name of the instrument/measure	Institution	Description and aim	Mode of support	Country	Year of creation
Competition to support and finance actions for the advancement of women in STI	CONICYT	This initiative aims to promote scientific research and the development of school technology projects in educational establishments, promoting communication between the educational, scientific, and public communities. It organises workshops, conferences, symposiums and so on that will deepen knowledge. It looks towards incorporating good practices in processes related to female and male roles within the research teams, gender and scientific excellence, and institutional support for research and gender projects.	Contest	Chile	2009 (not ongoing)
Tecnochic@s	CTC	It trains girls aged 12 to 17 with programming tools, multimedia, and telecommunication networks, helping Dominican women to benefit from the advantages offered by this sector, in order to close the existing digital gender gap.	Technical assistance	Dominican Republic	2012
Fund for Research and Development	National Council for Science (CONACYT) and Technology and the National Women's Institute	The purpose of the Fund is to promote scientific research, technological and innovation development through financing research projects that can generate knowledge, and technological developments or innovations for the sector that addresses the problems and needs of women.	Fund	Mexico	2012
"Mujeres en la Red" programme	CTC	It integrates students from ICT-related careers to the area of advanced telecommunications through training as a Cisco Certified Network Associate, a certification granted by the company Cisco Systems based on the development of network infrastructure. To date, the project has impacted 13,703 girls, adolescents, and women.	Technical assistance	Dominican Republic	2014
Girls in Tech	Girls in Tech is a non-profit organisation	It aims to provide the local women's community with education in information and communication technologies (ICTs), generating quality professionals with technical knowledge essential in the era of artificial intelligence, robotics, and big data. It offers several activities such as DigiGirlz, a Microsoft YouthSpark programme that provides girls and teens with opportunities to learn about careers in technology, connect with mentors, and participate in hands-on computer and technology workshops.	Technical assistance	Ecuador	2015

Name of the instrument/measure	Institution	Description and aim	Mode of support	Country	Year of creation
Pioneras Developers	Network of Women Programmers in Medellín	It is a self-managed community for learning and updating technologies for programming computers and web programming. It seeks to amplify initiatives and processes related to the inclusion in technology, as well as individual and collective efforts and achievements related to the ecosystem, through digital strategies, dissemination and consolidation of social media.	Technical assistance	Colombia	2016
Chicas Click	Fundación Quirós Tanzi (FQT)	It seeks to provide girls and their mothers with a space for the design, exploration and construction of technological projects, using programming platforms with which they can exploit their creativity in a collaborative environment that promotes positive leadership and improved self-esteem.	Technical assistance	Costa Rica	2016
Studies on Peruvian Women in Science – CIENCIAACTIVA	National Council for Science, Technology and Technological Innovation (CONCYTEC) in partnership with the Ministry of Women and Vulnerable Populations, co-organised by the National Fund for Scientific, Technological and Technological Innovation Development, and OEI	The contest “Studies on Peruvian Women in Science” aims to promote research projects on the trajectory, participation, opportunities and challenges of Peruvian women in STI activities, in order to make their contribution to the generation of knowledge visible and, at the same time, to contribute with relevant information to the incorporation of the gender perspective in STI public policies. It also seeks to promote the involvement of young researchers in the study of STI public policies with a gender focus.	Contest	Peru	2016 (not ongoing)
Open Chair on Gender Perspective in Science, Technology, and Innovation	Universidad Nacional del Litoral	A series of workshops for UNL researchers who are currently conducting studies on gender, sexual diversity, and feminism.	Technical assistance	Argentina	2017
Innova for equality	UN Women and MediaLab Prado	Technical and methodological support for the development of an innovation laboratory in Nariño, which includes 3 prototypes supported by the technology service for women and girls.	Technical and methodological assistance	Colombia	2018
Hacker girls	Ministry of Information and Communication Technologies (MinTIC), the Organization of American States (OAS), and Trend Micro	It is the first international training programme for Colombian women on hacking tools. It supports and generates spaces for education and job opportunities for Colombian women based on strengthening their knowledge in areas associated with ethical cybersecurity.	Technical assistance	Colombia	2018

Name of the instrument/measure	Institution	Description and aim	Mode of support	Country	Year of creation
TIC-as La Ciencia nos Necesita	Sulá Batsú supported by UN Women	It creates spaces for women to insert themselves integrally into the digital economy, focusing on rural young women who have the potential to develop their technology-driven ventures and who address the social problems of their communities. The mission is to position women in the world of digital technologies, creating equal footing conditions from early ages to the professional field.	Technical assistance	Costa Rica	2018
Girls in Technology Program	Parque La Libertad and Emerson Costa Rica	To generate and offer more inclusive and free spaces where girls would see themselves as subjects of rights and as capable of learning about technology. The programme seeks to achieve two particular objectives: to develop technical skills in programming, robotics, and mathematics in participants between the ages of 4 and 12, which favour their subsequent insertion in careers in technology and science, and, on the other hand, to develop social skills that strengthen their leadership skills, self-determination, teamwork skills and permanence in the educational system.	Technical assistance	Costa Rica	2018
More Women in Science Project (Lavalleja, Maldonado, Rocha Department)	Ministry of Education and Culture (MEC) through its Scientific Culture Direction and city halls	The objective of the programme is to generate experiential and bonding encounters between young Uruguayan women and women scientists, in order to promote an exchange space where the experiences and educational trajectories of role models linked to the areas of STEM are reviewed. This project is framed in affirmative positive actions within the framework of an intersectional approach, which takes into account variables such as age, sex, and geographical location. It is part of the inter-institutional work between the MEC Centres, the City Hall of Lavalleja, INJU, Telefónica, the Education Commission, and the Teacher Training Students' Centre.	Technical assistance	Uruguay	2018
Jóvenes a Programar	Plan Ceibal	The aims of the programme are training and job placement of young people in the area of information technologies, with programming and testing courses. The 2019 programme was exclusive for 700 women.	Technical assistance	Uruguay	2019

Name of the instrument/measure	Institution	Description and aim	Mode of support	Country	Year of creation
W@TT	Texas Tech University Costa Rica, Microsoft and Women in Artificial Intelligence (WAI)	The centre functions as a tool and vehicle for accelerating women's empowerment in both soft skills and technical issues in STEM areas. The objective is to generate knowledge and empowerment through education, research, events, and content, to bring career advancement opportunities to women and men interested in learning about inclusive and diverse artificial intelligence.	Technical assistance	Costa Rica	2019

Source: own elaboration

- Supporting women in STEM careers (see Table 8). These are activities focus on supporting the retention of women in STEM higher education and their reinsertion in the labour market after maternity leave or a break. One of the greatest challenges women face in developing a scientific career is the difficulty of reconciling their reproductive role with their scientific career. Women often interrupt their careers for reasons related to pregnancy or childcare, thus losing the opportunity to participate in scholarships or being forced to give them up. To overcome this problem, most countries in the region have implemented ad hoc measures, such as maternity leave and requests for an extension of the scholarship, which grant more rights to pregnant women than to those who decide to adopt a child, extending the term of the scholarship itself or of the application. Extensions during pre- and postnatal periods, parental leave (i.e., also for men), and monthly childcare allowances are other implemented instruments. Chile has recently

included paternal leave benefits for future fathers in the postnatal period. Another example is the National Graduate and Overseas Scholarship Program Scholars in Chile, carried out by the executive secretary of the Bicentennial System of Postgraduate Scholarships and the initiative Absence for Maternity and Request for Extension of Scholarship developed by multiple universities, which grants benefits to women applying for pre- and postnatal leave and postnatal parental leave, in which men can apply for postnatal parental leave following the mother's pre- and postnatal leave, extending the grants for a period of 30 weeks. These important measures are not yet implemented in all the countries. Since it requires an inter-institutional effort, the lack of coordination between ministries sometimes can be an obstacle to its implementation. Moreover, the stop the clock policies in the evaluation are an important and useful mechanism for both researchers and teachers.

TABLE 8.
Supporting women in STEM careers

Name of the instrument/measure	Institution	Description and aim	Mode of support	Country	Year of creation
Stop the clock policy	CSIC, PEDECIBA and ANII	Stop the clock policy in the evaluation of teachers when they have children.		Uruguay	
National Graduate and Overseas Scholarship Program Scholars	Executive Secretary of the Bicentennial System of Postgraduate Scholarships	Pre- and postnatal funding.	scholarship extension	Chile	2006
Extension during maternity leave	Agencia Nacional de Investigación e Innovación (ANII)	3 months in which scholarship holders continue to be paid, but their activities are suspended and can be resumed afterwards.	Extension of scholarship	Uruguay	2008
Absence due to maternity and request for extension of scholarship	Several universities	Benefit to women applying for pre- and postnatal leave and postnatal parental leave, and men applying for postnatal parental leave following the mother's pre- and postnatal leave and extending the implementation period of a 30-week project.	Maternity leave	Several countries	2009 (or before)
Childcare benefit for teachers, and administrative and service personnel	Universidad Nacional de Quilmes	Economic benefit in the form of childcare for teachers, and administrative and service personnel, scholarship holders and undergraduate students.	Economic benefit	Argentina	2010
Gender Equality Priority Income Program	Faculty of Physical and Mathematical Sciences (FCFM) of the University of Chile	In 2013 the Faculty was a pioneer in the country in establishing an affirmative action policy to improve the participation of women in income through launching 40 extraordinary vacancies available only for women.	extraordinary vacancies	Chile	2013
Call to support Mothers Heads of Family	CONACyT	Postgraduate Scholarship Program in science careers for mothers heads of family	Scholarships	Mexico	2013
Academic Strengthening Programs for Indigenous People (National Scholarships)	CONACyT	CONACyT implements three support instruments aimed specifically at female students from indigenous communities who wish to study or who are already doing postgraduate studies: Post-Graduate Fellowship Programme for Indigenous Women Incorporation of Indigenous Women for Regional Strengthening Complementary Support for Indigenous Women participating in CONACyT Scholarships.	Scholarships	Mexico	2015

Name of the instrument/measure	Institution	Description and aim	Mode of support	Country	Year of creation
Nicaraguan Women Scientist Award research	Nicaraguan Council for Science and Technology (CONICYT)	It is an award for Nicaraguan female scientists and researchers, with the aim of highlighting the participation of women in the production of scientific knowledge.	Award	Nicaragua	2015
Programa de Innovación y Capital Humano (PINN)	MICITT, laDB and National Council for Scientific and Technological Research (CONICIT)	Additional points for women with the aim of encouraging the application and obtainment of postgraduate scholarships.	Incentive	Costa Rica	2017
MICITT Master's Scholarships - CORNELL	MICITT and Cornell University	To encourage the training of high-level human resources in scientific-technological areas by means of effective articulation between academic offer and labour demand in order to boost the availability of competences in research and development, and their integration into innovation processes. Additional points are given to women for stimulating the insertion of women in science and technology.	Incentive	Costa Rica	2017
Supporting indigenous women in science, technology, engineering and mathematics careers in Mexico and Central America	IDRC, National Secretariat of Science and Technology (SENACYT) and CIESAS	This project supports indigenous women in the fields of STEM at the postdoctoral level. In addition to regular salary stipends, CIESAS will provide and coordinate support for these fellows through funds to support high-quality research; professional development and networking opportunities, namely through annual discussion fora; and support for postdoctoral fellows to engage with indigenous communities and students through innovative research and training projects. The project also includes a research component, led by CIESAS, which aims to better understand the social and structural barriers faced by indigenous women pursuing careers in STEM in Mexico and Guatemala.	Scholarships	Guatemala	2018
Post-doctoral Program for Indigenous Mexican Women in STEM	IDRC-CONACYT-CIESAS	Scholarships for indigenous women who are enrolled in the last year of their PhD in STEM or who have completed their studies.	Scholarships	Mexico	2018
Extension of scholarship for paternity leave	Universidad de Chile	The regulations allow female students to postpone their studies during the pre- and postnatal periods (6 weeks before delivery and 24 weeks from the date of delivery); while the future father student may make use of the benefit as well as in the postnatal period if he needs to take charge of the care and accompaniment of the pregnant woman, for the same time prescribed in the respective medical certificate.	Scholarships extension	Chile	2018

Name of the instrument/measure	Institution	Description and aim	Mode of support	Country	Year of creation
Women in ICTs project	Directorate of the Telecommunications Development Fund of the Dominican Telecommunications Institute (INDOTEL) and the Vice-presidency of the Republic and Community Technology Centres (CTC)	Its goal is to train and integrate girls, adolescents, and women from vulnerable communities into the world of technology. It is a full scholarship initiative granted by INDOTEL to benefit female high school graduates, including people with different abilities, allowing them to pursue a study programme and to obtain a technician or technologist degree in telecommunications at the Technological Institute of the Americas (ITLA).	Technical assistance	Dominican Republic	2019

Source: own elaboration

BOX 4.

The key role of universities

Among the most important actors in recent years that have been involved in reducing the gender gap in STEM are universities. In several Latin American countries, universities have created instruments for the institutionalisation and mainstreaming of the gender equality approach, particularly with the creation of offices or commissions dedicated to gender equality integration in different sectors (authorities, teachers and students). At the Autonomous University of Yucatan, the Gender Program (PROGEN) was created in 2010, and in July 2019, a Protocol for the Prevention, Attention and Sanction of Gender Violence, Discrimination, Harassment, and Sexual Abuses was established. Another example is the Gender Equity Office of the Technological Institute of Costa Rica, which was created in 2013 to promote equal opportunities among genders by improving the conditions for women's access to education and work in the fields of science and technology. At the University of Chile in 2013, a diagnosis was made of the trajectories of women at the university. The results of the study contributed to the creation of the Office of Gender Equality. In Argentina, the National University of San Martin has a Directorate of Gender and Sexual Diversity, while the University of the Republic in Uruguay has an Open Commission on Gender Equity that began operating in 2012.

Apart from universities and research centres, advisory commissions working on the analysis and inclusion of the gender perspective in the redesign of all areas such as production, education, research and others are being set up even in some Ministries and National Councils for Science and Technology. An example is the launch in 2012 of the *Gender Commission of SENACYT*, which contributed to mainstream gender and STI into the last national STI Plan, making the issue visible in an explicit and specific way (SENACYT, 2018)..

- **Specific *ad hoc* programs and inter-institutional committees on gender and STEM** (see Table 9). Closing the gender gap in STEM is a complex problem that requires efforts from different actors. To overcome these challenges, countries have, in recent years, set up interinstitutional teams to advance the development of policies and actions focused on reducing the gender gap in science. Several countries, such as Argentina, Chile, and Uruguay, have already created these spaces for inter-institutional articulation. With the purpose of carrying out different initiatives aimed to reduce the gender gap and increase women's participation in STEM, countries have launched

specific programs on women in science: The *Programa Mulher e Ciência*, in Brazil, was the first one to be launched. Additionally, in Costa Rica and Venezuela, similar *ad hoc* programs have been launched. An interesting example of programs implemented at a sub-regional level is the *Strategic Gender Program* in the province of Santa Fe in Argentina, funded by the Ministry of Education, Culture, Science and Technology, which has the objective of identifying the main problems faced by women in science based on a solid knowledge of the system to delineate a strategy to transform these risk factors into spaces for positive action.

TABLE 9.
Specific *ad hoc* programmes and inter-institutional committees on gender and STEM

Name of the instrument/measure	Institution	Description and aim	Mode of support	Country	Year of creation
Women and Science Programme (Programa Mulher e Ciência)	Inter-ministerial group composed by the Special Secretariat for Policies for Women (SPM), the Ministry of Science and Technology (MCT), the National Council for Scientific and Technological Development (Conselho Nacional de Desenvolvimento Científico e Tecnológico -CNPq), the Ministry of Education (MEC), UN Women among other participants.	Since 2005, it seeks to promote the participation of women in the field of sciences and academic careers, stimulating the scientific production and reflection on gender relations, women and feminisms in the country.	Specific programme	Brazil	2005
Science and Gender Programme	Ministry of Science, Technology and Telecommunications (MICITT)	The aim is to promote scientific and technological vocations on equal conditions for women and men. It also seeks to: analyse different gender gaps in the existing production, use and access to CTI; disseminate women's contributions to CTI; coordinate with different institutions, organisations and companies interested in closing the gender gaps in CTI.	Specific programme	Costa Rica	2010

Name of the instrument/measure	Institution	Description and aim	Mode of support	Country	Year of creation
Women in Science programme	Physical, Mathematical and Natural Sciences Academy (ACFIMA)	Activities aim to recognise and value the contributions made by Venezuelans dedicated to the consolidation of scientific and technological activity within or outside the country, through the production of knowledge, training of specialised human resources, and academic and institutional management. It implements several activities such as: - Census of Women in Science, - Award (sponsored by Francisco Dorta & Sucre C.A.), - Book dedicated to pioneering researchers and another to young scientists, - Videos and surveys.	Technical assistance	Venezuela	2012
Gender Agenda in Science and Technology (Agenda de Género en Ciencia y Tecnología)	Committee of experts from different institutions and multi-disciplinary led and coordinated by the Ministry of Education, Culture, Science and Technology	Activities to strengthen analysis and improve instruments for measuring and assessing the situation with regard to gender equality in the national scientific and technological system, such as the implementation of UNESCO's SAGA project	Technical assistance	Argentina	2016
Interinstitutional team on Women in Science, Technology, and Innovation	Several institutions	It is a space for inter-institutional articulation. The objective is to advance the development of policies and actions focused on reducing the gender gap in science.	Technical assistance	Uruguay	2016
Inter-institutional team on gender equality in STEM	Several national institutions	It is a space for inter-institutional articulation. The objective is to advance the development of policies and actions focused on reducing the gender gap in science.	Technical assistance	Chile	2017
Strategic Gender Program of the Province of Santa Fe	Province of Santa Fe, funded by the Ministry of Education, Culture, Science and Technology	It aims to: - Identify the main problems faced by women in science, based on a solid knowledge of the system. - Delineate a strategy to transform these risk factors into spaces for positive action. - Move from strategy to concrete action through the establishment of objectives, indicators, and actions.	Specific programme – sub national	Argentina	2018

Name of the instrument/measure	Institution	Description and aim	Mode of support	Country	Year of creation
Women in STEM Programme	Ministry of Education within the Education with Gender Equality Program	To promote the early incorporation of girls and women into STEM careers and curricula. The programme is committed to achieving its main objective through the following actions: - By awarding the scholarship “Woman with a scientific-technological vocation” to promote the vocation and development of women in these areas. - By supporting initiatives so that role models of these industries meet with interested students. - By implementing UNESCO SAGA project to make visible and improve gender gaps in STEM areas. - By making role models visible and opening new spaces to generate new perspectives in students who are about to choose their future careers.	Specific programme	Chile	2019

Fuente: elaboración propia

- Training and strengthening women entrepreneurs in STEM (see Table 10). The amount of information and activities that can be found related to the topics of “women in STEM” and “entrepreneurial women” contrasts with the much smaller amount of information available on the topic “entrepreneurial STEM” (WISE, 2019). However, in the last decade, some activities have been put in action aimed at training and strengthening women entrepreneurs in STEM. In Peru, through the *Women, Entrepreneurship and Innovation Competitions*, entrepreneurship projects receive funds for development. In Mexico, CONACyT (Consejo Nacional de Ciencia y Tecnología) provides scholarships for women heads of family to access scientific careers.

The initiative The S Factory developed in Chile by CORFO (Corporación de Fomento de la Producción) is a programme that promotes start-ups directed by women. The programme offers support through workshops, mentoring, and funding the development of innovative ideas by women. Non-profit organisation Girls in Tech is identifying, connecting, and giving visibility to women who lead the technology sector in several Latin American countries, turning them into sources of inspiration and specific knowledge for other women. Another regional activity is WeXchange, a regional platform that connects women entrepreneurs from Latin America and the Caribbean with mentors and investors.

TABLE 10.

Training and strengthening women entrepreneurs in innovation and STEM

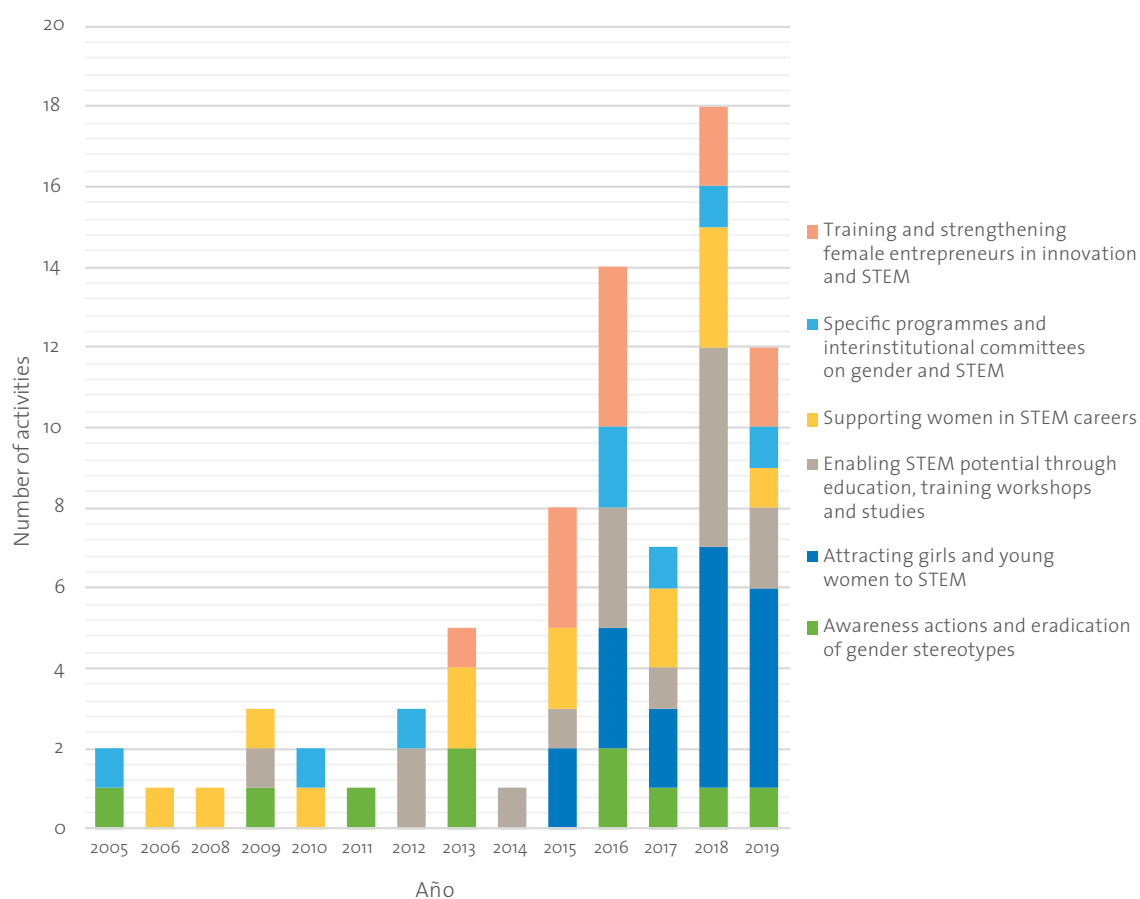
Name of the instrument/measure	Institution	Description and aim	Mode of support	Country	Year of creation
WeXchange	IaDB	It was founded in 2013 as an initiative of the IDB Lab, the innovation laboratory of the Inter-American Development Bank, with the purpose of unleashing the growth potential of women entrepreneurs in STEM in the region. It was born to bring women entrepreneurs of different communities together in one place and time, with two main objectives: To recognise and strengthen women entrepreneurs. To connect women entrepreneurs with mentors, investors, role models and other successful entrepreneurs. Its annual 2-day event directed at LAC STEM entrepreneurs helps them expand their network of contacts, access, mentors, and investors, and offer trainings on key topics to develop their skills. Over 1,000 female entrepreneurs have participated in WeXchange and have become active and outspoken role models in Latin America.	Platform	Regional	2013
Girls in Technology (Chicas en Tecnología)	Argentine non-profit civil society organisation	It seeks to reduce the gender gap in technology since 2015. The activities aim to motivate, train and accompany the next generation of female leaders in technology.	Technical assistance	Argentina	2015
Mujeres ProActivas	Buen Trip Hub (NGO)	It aims to strengthen the capacities of professional women, multiply the number of women-led enterprises and contribute to improve the conditions for their success (growth, escalation and chaining) through mutual learning, presentation of success stories of female entrepreneurs and generation of opportunities for the technology sector at the national level.	Technical assistance	Ecuador	2015
Women in Technology	Women in Technology is a non-profit organisation	It tries to unify the various initiatives that are occurring in technology and entrepreneurship communities in Peru. Always encouraging greater participation of women in the technology field.	Information services	Peru	2015
Human capital for Innovation in Women's Enterprises	Production Development Corporation (CORFO)	This instrument is aimed at companies headed by women or companies that are owned by women to facilitate the hiring of a professional (master's degree or doctorate) in the areas of science, technology and/or innovation, to develop projects that meet productive challenges.	Grant	Chile	2016
The S Factory	CORFO	Pre-acceleration programme for startups led by female founders. It seeks to support, through workshops, mentoring and funding, the development of innovative ideas by women. The S Factory programme looks at women leaders who turn innovative ideas into functional prototypes. It looks for technology-oriented projects that have potential for high impact. The objective is to contribute to the diversification of the productive matrix. Up to USD 25,000 funding to help women to get off the ground.	Grant and Technical assistance	Chile	2016

Name of the instrument/measure	Institution	Description and aim	Mode of support	Country	Year of creation
Innovation Voucher for Women's Enterprises	CORFO	This instrument seeks to develop innovative solutions in small and medium-sized enterprises (SMEs) to increase productivity and/or overcome competitiveness challenges. To this end, it links knowledge providers such as Universities, Research Centres and other specialised institutions by hiring expert services to develop solutions for specific complex innovation projects. Depending on the size of the company, this co-financing covers up to 90% of the project cost.	Grant	Chile	2016
InspiraTEC Award	Undersecretary of Economy, and Undersecretary of Science Technology, Knowledge and Innovation, Start-Up Chile program of CORFO	It aims to recognise outstanding women in the technology sector who have had a positive impact on their environment as well as to promote the visibility of women participating in the digital economy and inspiring other women to study, undertake and work in the technology sector.	Award	Chile	2016
INNOVA mujeres programme	Ministry of Industry, Energy and Mining (MIEM) and the UNESCO Chair in Sociocultural Anticipation and Resilience at the SARAS (South American Institute for Resilience and Sustainability Studies) Institute	It seeks to promote capacities and competencies with a gender equality approach in productive activities. It also aims to stimulate the networks of innovative businesswomen. Among the activities developed are training and accompaniment in the form of coaching to entrepreneurs. The programme works towards following core objectives: achieving cross-section policies for gender equality within the Uruguayan State.	Technical assistance	Uruguay	2017
Mujer Innova	Puerto Rico Science, Technology and Research Trust and the organisation INPRENDE	It is a platform focused on empowering all women who want to innovate and initiate a startup. The platform has two components: a free digital platform that provides empowerment tools, business training and a support network of organisations and mentors, and a face-to-face component consisting of regional events and in-person training for the development of business ideas.	Technical assistance	Puerto Rico	2018
#NosotrasInnovamos	UNESCO Regional Chair Women, Science and Technology in Latin America in cooperation with the Economic Development Agency of Barcelona City Council	It is a competition for women who are developing a technology-based enterprise with some social or environmental impact. The aim is to highlight the importance and creative potential of the collective work of young women involved in technology-based ventures.	Contest	Argentina	2019

Name of the instrument/measure	Institution	Description and aim	Mode of support	Country	Year of creation
Women, Entrepreneurship and Innovation Competitions	Innovate Perú Programme	It includes six competitions through which innovation and entrepreneurship projects will be co-financed with grants and non-reimbursable resources. These are: Entrepreneurial Innovation Contest, Technological Internship Contest, Contest to Recognize Innovation by Women's Enterprises, Contest to Organize Events to Link Actors of the Ecosystem of Innovation and Entrepreneurship, Innovative Entrepreneurs of Women and Dynamic Enterprises of Women.	Grants	Peru	2019

Source: own elaboration

FIGURE 10.
Instruments, activities, and measures carried out at a national level by year and aim



Source: own elaboration

The information gathered¹⁵ clearly shows how the number of instruments and activities on the topic has grown in recent years (see Figure 10). Although the figure does not represent an exhaustive list of every single instrument and activity ever implemented at a national level in LAC countries, it is still a useful map of some of the most important activities implemented in the region.

At first, activities were more affirmative actions and oriented at supporting the retention of women in STEM higher education and the reinsertion in the labour market after maternity leave or a break. Universities, in most of the countries in the region,

included the extension for maternity leave in their scholarships, while paternal and parental leave have been mentioned only recently. Parental leave also plays an important role in breaking the gender stereotype that caregiving should only be the responsibility of women and not shared by men.

In recent years, attempts at reducing the gender gap through attracting more girls and young women to STEM have grown in number and importance and countries have established specific inter-institutional committees to work on gender equality in STEM.

BOX 5.

Intersectionality

It is important to recognise that women and men are not homogeneous groups and they vary when it comes to background, age, sexual orientation, ethnicity and other dimensions. Too often when talking about STEM, the contributions of indigenous peoples, particularly indigenous women, are left out. However, indigenous women are at the front line of climate change; therefore, their knowledge of science and scientific research should also be considered. In the last decade, efforts have been made by governments, international organisations, civil society, and the private sector to address the challenges faced by indigenous people, particularly women, in many countries in the region. Mexico and Guatemala, for instance, are developing projects to support indigenous women in the fields of STEM at the postdoctoral level. Panama is disaggregating data by sex and ethnicity (indigenous/non-indigenous) for an intersectional analysis of gender and ethnicity. The region is a pioneer in implementing instruments to support female students from indigenous communities who wish to study or who are already undertaking their postgraduate studies.

¹⁵ The list takes into consideration some of the most successful activities carried out by different actors in the region. Please be aware that this list is not intended to be exhaustive but to underline relevant points in line with the objective of the document



7

PROGRESS, GAPS AND COMMON CHALLENGES IN THE REGION

The following chapter is a summarised and systematised list of the central conclusions and findings from the information gathered and analysed. It is based on the desk review as well as on interviews conducted (see Annex IV) with selected key experts and institutions in the LAC region and includes progress, gaps and common challenges in the region.

7.1. Progress

It was possible to identify various instruments, activities and measures implemented in the countries of the region that have contributed to increasing women's participation in STEM activities and to narrowing the gender gap. However, the increase in the number of female researchers corresponds to several variables that subsisted in recent years, such as social, cultural, and economic changes, and it is hardly influenced by a single initiative. Furthermore, the adoption of an instrument must be uncritical, it should be adopted, considering the endemic characteristics of a country and the composition of its national STI system.

The implemented initiative aims to reduce the gender gap in STEM at different life stages, from those focused on encouraging the participation of women in STEM fields to those avoiding dropping out of the career and pushing the recognition of women in STI. Some activities are focused on stimulating scientific production and reflections on gender relations, women, and feminism, and assessing the situation with regards to gender equality in the national scientific and technological system. Others are rather focused on challenging stereotypes of women in STEM and on promoting girls' interest in scientific careers. Nevertheless, not every country is implementing actions to achieve all these aspects and some of these activities may "aim" at more than one of these macro areas.

It is worth mentioning some of the most significant developments achieved in the last decade in the region:

- The importance of reducing the gender gap in STEM is increasingly being acknowledged and, thus, progressively being promoted through public policies and included in laws, national STI plans, and national development strategies.

- There is a proliferation of instruments and measures focused on addressing gender equality in STEM and addressing the barriers mentioned in Chapter 5 (although many times these are micro activities with time limits). These instruments and measures are implemented by a variety of different actors, such as governments (through e.g. ministries of science and technology and education), universities, foundations, non-profit organisations, and, as shown in section 6.3.1, by UN agencies and private companies.
- Universities and scientific institutions have begun implementing measures that address difficulties and barriers at different levels, from attraction and access to STEM careers, to retention and progress of female students and researchers, including measures that respond to their reproductive role, through licenses, specific awards and the addition of crèches and kindergartens to their premises.
- Many of the policy instruments that have been applied are not necessarily based on legal provisions but result from the many recommendations, resolutions, action programmes, and roadmaps produced over the years in many reports and policy briefs.
- In a process of continuous progress and strengthening of gender equality, some countries are conducting national mapping processes and national assessments on gender and STI (as in Uruguay and Panama)¹⁶ to detect possible asymmetries in the insertion of women and men in research activities, which could also favour the identification of more adequate instruments and measures.

7.2. Gaps and common challenges in the region

Despite efforts to bridge gender gaps in STEM areas, voids still exist at different levels of education and career progression in all countries in the region (see Chapter 3). These gaps were observed at all life stages,

¹⁶ See, for instance, el "Diagnóstico de Género sobre la Participación de las Mujeres en la Ciencia en Panamá (SENACYT, 2018)" developed by the SENACYT in Panama and the diagnostic "Mujeres en ciencia, tecnología, e innovación, un problema de justicia" (Oficina de Planeamiento y Presupuesto, 2017) prepared by the inter-institutional committee on gender equality and science in Uruguay.

from primary school to women in senior positions in STEM careers, and are a consequence of different aspects, such as social and cultural factors, and policies existing at various levels, including at a governmental, funding agency, higher education institution, and research centre level.

The fact that gender perspective was practically absent from the agendas and policies of the institutions that are part of countries' science and technology systems is evidence of the lack of visibility that the topic of gender equality in STEM has had until a few decades ago.

Common challenges can still be observed at both the public policy and institutional levels. In terms of policy and instruments the most pressing challenges are:

- There is a lack of specific national STI gender equality policies (only Chile and Costa Rica have one) and of specific national strategies to attract girls and women to pursue STEM careers.
- There is a need for the enforcement of gender-related laws (such as in Uruguay) and for mainstreaming gender equality into national STI laws (such as in Mexico).
- Only a few countries (such as Brazil and Costa Rica) have a specific programme dedicated to the promotion of women in science.
- While some countries have implemented national policies on gender equality in education, with some specifically focusing on STEM, it remains unclear how much various governmental organisations are working to develop a specific policy framework on STEM education for girls and women.
- High-level policy instruments that define mandatory goals should be combined with incentives and regulations that aim to change institutionalised procedures, as, currently, there is a lack of synergy and coordination between policies and instruments.
- The national STI system is an integrated system that requires the dynamic integration and involvement of all actors. Despite this, many countries in the region have only a few initiatives on gender equality in STEM that link the academic world with the private sector.
- There is a lack of awareness-raising policies that focus on cultural change and specific initiatives for

advocacy and awareness to attract more women and girls to pursue careers in STEM.

- There is a lack of gender-responsive actions from governments through education and labour market policies to attract more women and girls to pursue careers in STEM.
- Gender observatories that are present in some countries are not developing actions towards reducing the gender gap in STEM.
- Several countries are requesting more assistance to develop specific policies and instruments to address the gender gap in STEM.

In general, at the institutional level, it can be observed that:

- There is a need for more and deeper interinstitutional coordination.
- Some institutions or high-level authorities do not consider gender equality to be an important issue.
- Others have measures formally oriented towards this goal but do not apply or evaluate them systematically.
- In some institutions, when an activity is carried out, it is driven by motivated employees rather than supported by the institution with key resources, such as a budget, which also does not ensure sustainability.
- However, there is an increase in the number of organisations that implement well-developed activities focused on gender equality in STEM that are integrated into organisations' budgets with teams designated to implement them and evaluate their impact.

Despite the proliferation of initiatives at different levels over the last few years, it is possible to identify some constraints common to most of them:

- They are usually sporadic and limited in time. In the last decade, several initiatives have been implemented *una-tantum* or for one or two years without long-term continuity.
- The budgets in most cases are very limited.
- They are fragmented and rarely include the participation of more than one institution.
- They lack a holistic approach.

- Most of the measures focus on reducing the gender gap in science rather than on addressing the specificity of STEM fields.
- Most of the activities have a focus on “women in science” rather than having a “gender equality” approach.
- Only a few efforts have been made to address the challenges and barriers faced by girls and women in rural areas.
- Only a few activities aim to include parents in their activities. Parents play an important role in promoting gender equality and building children’s resilience to rigid gender stereotypes in early childhood.
- Only a few measures involve men in their strategies to reduce the gender gap in STEM.

BOX 6.

Lack of indicators and gender pay gap in STEM

The lack of data from which to draw useful indicators and proceed to analytical studies can obstruct the design, monitoring and evaluation of STI policies aimed at gender equality. Indeed, effective STI policies need to be evidence-based to allow for the design of policies that adequately address the gender imbalance in STEM. The lack of indicators can be a huge impediment to the implementation of policies focused on gender equality in STEM, especially in nations with low R&D expenditure.

Further data disaggregated by sex are needed to conduct depth analyses at the national level to provide a clearer picture of women’s and girls’ participation in STEM fields, which would inform policies and programmes for increased participation of women in STEM-related education and employment sectors. Data should also be gathered on other variables that limit or influence the access and participation of women and girls in STEM, such as ethnicity, age, and origin (rural or urban), since they can help us conduct a more exhaustive analysis of the situation to address persistent difficulties in a more effective way.

The gender pay gap issue goes far beyond equal pay for work of equal value. There is a gap between women’s educational development and professional development all over the world. Female PhD recipients in the United States expect to earn less than male colleagues. In the UK, according to the 2019 New Scientist/SRG salary survey, on average, female scientists and engineers earn less than their male counterparts, and the difference is getting bigger. In LAC, no studies have been carried out to further understand the extent and the impact of the gender pay gap in science and there have been few measures implemented to address it.

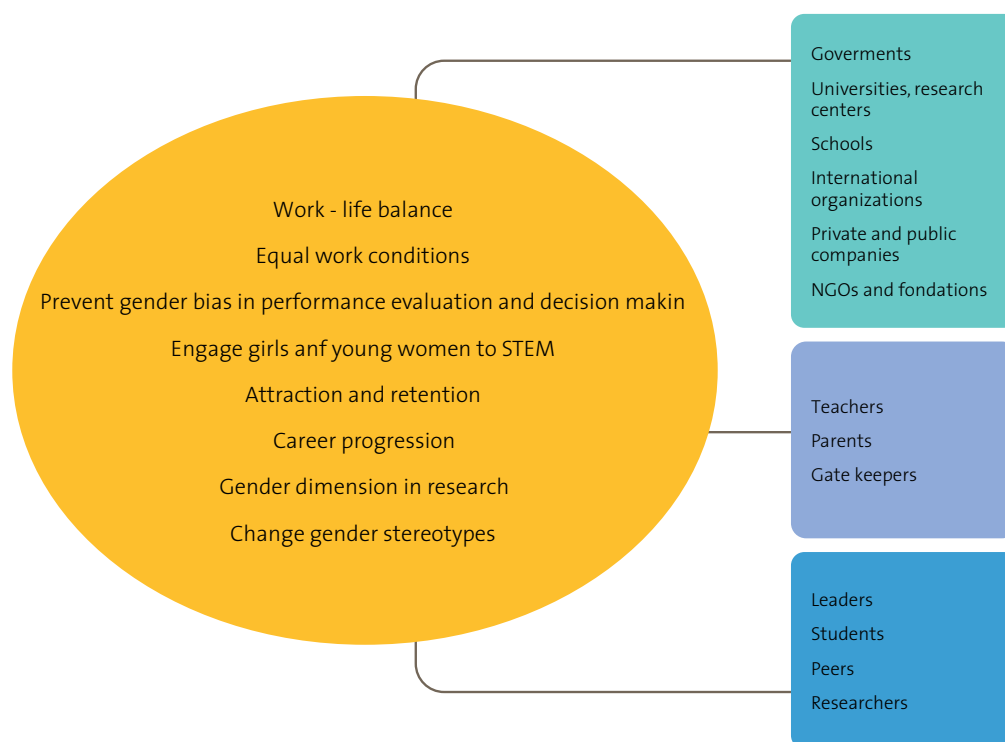
7.3. What can be done: a systemic approach

Despite over ten years of interventions being made to reduce the gender gap in STEM in the region and to promote parity among women and men in scientific research, women still face personal,

educational, and occupational barriers within STEM processes and the gender gap remains wide.

The analysis of policies and instruments implemented so far in the region highlights the need for a new paradigm and a more systemic approach to achieve structural changes and promote and achieve gender equality in STEM (see Figure 11).

FIGURE 11.
A systemic approach



Source: own elaboration

Different actors, from governments to private sectors, play an important role in reducing the gender gap in STEM. The analysis highlighted that only a few initiatives have been implemented in collaboration with multiple institutions at different levels. Thus, to ensure the effective implementation of policies and instruments, coordination between actors should be strengthened. This may also involve joint programmes across various government sectors, such as ministries of education, women’s affairs or gender equality, science, technology and innovation, and labour, as well as the establishment of national inter-institutional committees.

Stereotypes and social norms play an important role in reducing the gender gap in STEM, considering that they can discourage young girls from taking STEM subjects, or pursuing STEM careers. Activities and massive awareness campaigns to advocate for an awareness to change stereotypes and to tackle persistent, subconscious, and unconscious, biases are strongly encouraged.

Since barriers can be encountered at any point in time, from early childhood to the highest level of research careers, policies and instruments throughout the education system should be promoted and implemented to generate greater involvement of girls and young women in primary, secondary, and technical education in STEM.

1. As shown in Chapter 5, girls appear to lose interest in STEM subjects with age more than boys do; thus, it is important to introduce STEM and computer science at an early age (*primary and secondary education*).

- Early childhood initiatives are needed to attract more girls and young women to STEM.
- Activities should include parents. Parents can play an important role in promoting gender equality and building children's resilience to rigid gender stereotypes in early childhood.
- Initiatives should also be focused on training teachers in gender-responsive teaching strategies so that both female and male students can develop their full potential in STEM-related subjects.
- It should be ensured that curricula and learning materials in STEM do not perpetuate gender stereotypes. Such initiatives would ideally involve a representative group of stakeholders with male and female experts to ensure the inclusion of multiple perspectives.

2. Women are under-represented in STEM fields in *tertiary education*. Activities focused on attracting more women into STEM should be implemented taking into consideration the causes contributing to recruitment failure, such as social factors, institutional structures, and poor advising. These activities could be:

- Attraction campaigns and strong outreach programs within the K-12 sector, which could include summer bridge, orientation programs, open days, and school career talks.
- Admissions policies could be revised to send a more inclusive message
- Additional points could be given to women for stimulating the insertion of women in STEM (such as MICITT and Cornell University in Costa Rica).
- Action towards preventing gender bias in student admission processes should be developed, such as through gender training for admissions counsellors or having gender-balanced selection committees.

3. Women also disproportionately drop out from their *early career as researchers, and their career*

progress is slower than that of their male colleagues. Initiatives aiming to retain women, to help them advance in their careers, to make institutional changes and to hold organisations accountable should be implemented. For instance:

- Initiatives with STEM role models to inspire girls to pursue careers in STEM, and inclusive mentorships programs for young researchers.
- Measures to ensure work-life balance (such as stop the clock policies, day care/childcare facilities for students, and paternal leave) and gender equality regarding access to opportunities in the workplace.
- Preventing gender-based discrimination and harassment through protocols and awareness-raising sessions for students and young researchers.
- Clear criteria for evaluation and prevention of gender bias in performance evaluation and decision making through, for instance, gender-sensitive workshops.
- Awards and scholarships aiming to increase women's visibility.
- Accreditation programmes like Athena SWAN in the region that recognise and celebrate good practices of gender equality advancement in higher education and research institutions.
- Structured and formalised gender-responsive career counselling programmes that offer support and objective guidance as girls and women begin to shape career choices.
- Activities aiming to increase gender knowledge and awareness and provide methods and tools for structural change in leadership positions in order to achieve sustainable gender equality.
- Gender awareness workshops for leaders, from principles to practice, training for leadership for rectorate, deans, gender equality commissions, professors, and senior researchers.

The gender dimension in research. Achieving gender equality in research is not just a matter of parity among researchers. Research should also include

the gender dimension in its content. There is abundant evidence that sex and gender analyses lead to new ideas and excellence in research in several fields, such as health and medicine, environment and climate change, food and nutrition, and transport and technological development (European Commission, 2013). To increase the general awareness of the importance of the gender dimension in research and science, specific studies are needed, particularly in areas where gender inequality has not yet been acknowledged as a problem.

It is also recommended to implement in the region:

- STEM gender action plans to support the design and implementation of specific instruments and activities.
- More ad hoc national strategies and policies to attract girls and women to pursue STEM careers.
- More and better laws on gender equality in STEM.
- Activities that cover all educational stages (from primary to tertiary), involving all the relevant stakeholders, from students to parents and teachers.
- Reinforced collaboration with the private sector through, for instance:
 - Campaigns to advocate and raise awareness to promote gender equality in STEM-related fields in the private sector; and
 - Public-private partnerships to translate education into STEM employment.

- Activities with a regional scope in coordination with different actors. Incentivisation for the promotion of the debate and exchange of experiences and good practices of gender equality in STEM should be implemented at the local, national, regional, and international levels.
- Long-term policies that address and monitor changes.
- Specific training courses on intellectual property, patents, and copyrights for women.
- Media representation and advertising. Only a few campaigns in the region are focused on changing stereotypical roles or eradicating harmful gender stereotypes.
- Reinforced national networks of women scientists and launch a regional network of networks.
- Specific studies and activities on gender equality and artificial intelligence.

While the initial steps have been taken, much more is needed to reduce the gender gap in STEM. It will require efforts at different policy and institutional levels, but also at the educational level. Different actors, including governments, universities, and the private sector should also be involved. Today, more than ever, we need to keep working for a better world in which women and men have the same opportunities and can reach their full potential for the benefit of society, as gender equality is a major precondition for advancing towards sustainable development in the region.



8

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11-3-18	20.-	-	20.-
1-4-18	5	-	25
8-4-18	5	-	30

TOTAL AHORRADO FIRMA/HUELLA (PRESIDENTA)
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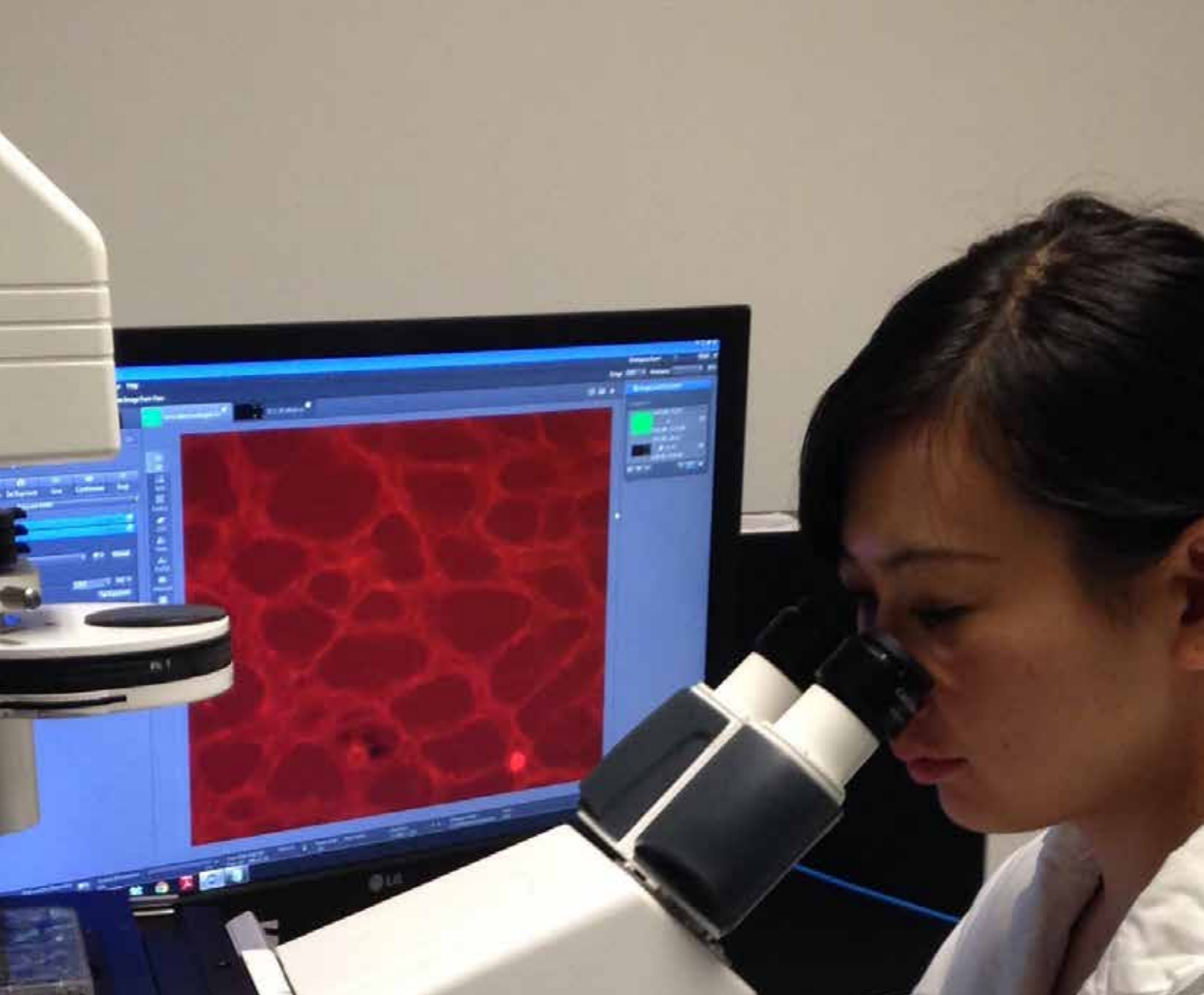
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- Organization for Economic Co-operation and Development (<http://www.oecd.org>)
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9

ANNEXES

ANNEX I. Concepts and methodology

The desk review is based on information collected through a systematic analysis of available documents relevant to Latin America and the Caribbean at a national level in light of gender equality in STEM and STI (Science, Technology and Innovation), as well as from web research, focus group discussions, and consultations with experts in the relevant area. The present study is descriptive and was performed through qualitative research, analysis, and interpretation of the most significant aspects of the experiences studied. It aimed to:

- Identify government structures and key players in gender equality in STEM in the Latin American context.
- Understand regional and national contexts about policies on women in STEM in LAC.
- Outline existing good/best practices within individual countries.
- Analyse national policies, strategies, laws, and documents relevant to gender equality in STEM.
- Identify key themes, gaps, and opportunities.
- Understand who the key players are.
- Examine the current environment for future initiatives related to women in STEM.

Desk review activities included the following steps.

1. Elaboration of a conceptual framework, which will help to define the boundaries of the investigation.
2. Scanning of the literature and analysis of secondary data to obtain a more comprehensive overview.
3. Mapping of key stakeholders at a national and regional levels, including, but not limited to, ministries in charge of science, technology, and innovation, as well as education and women's affairs; research institutes; universities; and the private sector; and of policies, instruments, and initiatives undertaken by the identified key stakeholders.

To complete and support the information collected, interviews were conducted by conference and telephone calls with the main stakeholders working at national and regional levels on women in STEM.

Based on the information gathered from the desk review and interviews, the main successful experiences and initiatives implemented in Latin America to encourage and promote the participation of women and girls in the STEM sector were identified.

- Literature and analysis of secondary data

The literature review covers:

- General literature on women and gender equality in STEM (white and grey literature).
- Literature and reports from UN agencies, including, but not limited to, UNESCO, UN Women, the World Intellectual Property Organization (WIPO), as well as global publications (such as the ones from the World Economic Forum).
- Policy and gap analysis reports, analysis of women in STEM at regional and national levels, including papers on the culture and national context of a country.

The range of documents also include:

- Education policies, plans, laws, and directives; related legislation; and programming.
- Science, technology, and innovation policies, plans, laws, and directives; related legislation; and programming.
- Policies, plans, laws, and directives from women's affairs ministries, institutions, and departments.
- Review of existing documents including policy papers, project proposals, progress reports, and project completion reports.
- Reports from partner organisations/non-governmental organisations (NGOs).

At the national level, the range of information collected and analysed includes:

- National and subnational policies and plans.
- Legal and institutional frameworks.

- Policy instruments designed to promote gender equality in STEM, as well as those with indirect or differential effects.
- Plans, initiatives, and measures implemented by national research institutions, universities, and international organisations.

Different databases, including information on policies and instruments, such as the UNESCO GOSPIN (Global Observatory of Science, Technology and Innovation Policy Instruments) and SAGA platforms as well as the RICYT and the Organization of Ibero-American States for the Education, Science and Culture (OEI) database, were analysed. Desk research covering relevant websites and reports of non-institutional organisations encompassing the countries in the region was also undertaken. In addition, several national directories were scanned to identify relevant organisations. Main publications, journal articles, reports, and other grey literature, as well as regulations related to women in STEM in the region were also used.

Secondary quantitative data available from official government sources and trusted research organisations were also examined.

- Key stakeholders at national and regional levels

In many countries, various authorities and institutions undertake activities aimed to pursue gender equality in STEM at different stages of life and career path. The list of key institutions should include, but not be limited to:

- Ministry or high authority in charge of science, technology, and innovation.
- Ministry or high authority in charge of education.
- Ministry or high authority in charge of gender equality or women's affairs.
- Other relevant ministries and high authorities in charge of industry and labour.
- National agencies and institutions such as academies, research centres, and universities.
- Private companies, especially those working on innovation.
- International and regional organisations.
- NGOs.

This list represents a potentially useful road map in identifying key authorities; however, it varies across countries and over time.

The analysis was performed using a holistic approach considering all factors, where possible, that may have a direct or indirect impact on the attraction, inclusion, and exclusion of women in STEM activities. Correspondingly, instruments and policies, both explicit and implicit, that concur and influence the integration of women were studied and analysed, with the objective of mitigating mismatches and overcoming obstacles in the professional lives of women. The general context was analysed to identify in detail the situation of women in STEM in the region and at a national level.

In summary, part of the study was performed through a process of knowledge management, beginning with identifying parts that characterise the reality of conditions in the countries studied. Contrarily, a cause and effect relationship was established between the elements analysed and the data collected. Thus, it is possible to observe the evolution of the efficiency and effectiveness of measures and activities of greatest impact, as well as to orient the debate at the regional level.

ANNEX II. Good practices at a national level worldwide

At a national level, a variety of initiatives focused on attracting more women to STEM, changing stereotypes or, more broadly, reducing the gender gap in STEM have been implemented in several countries. The following policies and initiatives are an example of activities implemented by a range of actors (governments, universities, private companies, NGOs, etc.), in different type of countries (from developed to developing), aimed at different life stage. Among the most impactful activities the following are worthwhile mentioning:

- In India, there was a substantial increase in women studying and working in engineering, once seen as a “masculine” discipline. Parents have played a key role, because they have often encouraged their daughters to study engineering because of good employment prospects, and the perception that it is a “friendlier” area than computer science. An interesting activity that has been widely celebrated is India’s Rocket Women, carried out at the *Indian Space Research Organisation (ISRO)* where role models and mentors break down barriers by connecting young people with those working in STEM fields.
- *Indian Girls Code*, a free programme in India led by robotics education company Robotix, is inspiring girls to become involved in computer science and technology. It focuses particularly on girls who come from underprivileged backgrounds.
- *Women in STEM and Entrepreneurship (WISE) in Australia*. The programme provides funding to support women in STEM and to eliminate barriers for women’s participation in STEM education and careers, including entrepreneurship. Its annual budget is USD 9.5 million. The program’s objectives are to:
 - Increase awareness and participation of girls and women in STEM and entrepreneurship education and careers, from schools through to university and to the research sector.
 - Increase participation of girls and women in other parts of the innovation ecosystem including innovative businesses, startups, and entrepreneurial activities and careers.
- Stimulate an increase in the number of women in senior leadership and decision-making positions in government, research organisations, industries, and businesses.
- *The African Girls Can CODE Initiative* is a four-year programme designed to equip young girls with digital literacy, coding, and personal development skills. They will be trained as programmers, creators, and designers, placing them on track to take up education and careers in ICT and coding. The initiative is a joint programme of the African Union Commission (AUC), UN Women Ethiopia and the International Telecommunication Union (ITU).
- *Go MINT* in Germany is a National Pact for Women in MINT (Mathematics, Informatics, Natural Sciences and Technology) careers, which brings together politics, business, science, and the media. It is designed to change the image of MINT professions in society. More than 300 partners are already supporting this aim with a wide range of activities and initiatives to advise young women on their studies and careers. The pact focuses on close cooperation and the network creates links and provides opportunities to exchange information between them and government bodies, companies, foundations, research institutes, universities, associations and, last but not least, women’s technological organisations such as the “deutscher ingenieurinnenbund e.V.” (German Association of Female Engineers).
- The *EU Prize for Women Innovators contest* is open to all women in the European Union and gives out cash prizes from the EU to women who have founded or co-founded their company and who have at some point in their careers benefitted from the EU’s research framework programmes, the EURATOM (European Atomic Energy Community) Framework Programme, the Competitiveness and Innovation framework programme (CIP) or actions relating to research and innovation under the European Structural

and Investment Funds. Its budget is EUR 200.00 per year.

- The *Gender Equity Initiative* in Gambia. The initiative was started by the Ministry of Basic and Secondary Education (MoBSE) in 2000 when gender parity was a big issue. It helps by:
 1. revising textbooks in a gender-sensitive manner.
 2. Training teachers in gender-responsive pedagogy.
- *The South African Women in Science Awards (WISA)*. Every year, the Department of Science and Technology (DST) rewards women researchers' scientific excellence at the Women in Science Awards (WISA) as part of the National Women's Month celebrations. The total budget is approx. USD 80.000.
- In the United States in 2010 the Congress passed the *America Competes Reauthorization Act* with stipulations to increase the number of underrepresented minorities (URM) in STEM fields. This act follows the America Competes Act of 2007 to invest in STEM research and education for students from kindergarten to graduate school.
- In 2009, former President Obama launched in the U.S. the *Educate to Innovate campaign*, which had among its three overarching priorities specifically "expanding STEM education and career opportunities for underrepresented groups, including women and minorities" (Office of the Press Secretary, the White House Briefing Room). The campaign has resulted in over USD 700 million in financial and in-kind support for STEM programs.
- The *Korea Women Inventors Association* was created to assist women to grow and obtain economic independence based on intellectual property by helping them fulfil their creativity, potential, and goals.
- *Portray her: representations of Women STEM Characters in Media* was launched by The Lyda Hill Foundation and Geena Davis's Institute on Gender in Media launch, which shows that entertainment media has a long way to go to improve stereotypes about pursuing STEM careers.
- In Ghana, the mentorship programme *Tech Needs Girls*, creates an environment for young women to learn computer skills. The activity is founded by the Soronko Foundation and it is a movement and a mentorship programme to get more women & girls to create technology. The mission is mentoring women & girls to lead and innovate through learning to code.
- *Rails Girls* is another widespread programme that operates in countries such as Germany, China and Singapore, though a company originally launched in Finland. The organisation hosts workshops and events to rally for women who want to become programmers, offering tools to learn valuable skills and establish a foothold in the tech world.
- *#TIMgirlsHackathon* has become one of the most renowned women's technology competition in Italy. It aims to bring women closer to coding through coding hackathons in the biggest Italian cities. It is promoted and carried out by TIM (the mobile branch of the biggest telecommunications company) in collaboration with the edu-tech startup, Codemotion.
- *The International Women's Computer Program* was initiated in 2000 by the Women's Department of the Hochschule Bremen (University of Applied Sciences). Its purpose is to provide training of excellence in technological education, exclusively for women, based on the principles of education differentiated by gender, a curriculum applied to practice, studies in other countries and online components.
- *Primary education: 'Talent Viewer'* is a project implemented since 2011 by VHTO, the Dutch national expert organisation on girls/women and science/technology, and the Amsterdam-based Science Centre NEMO. During a series of lessons, both boys and girls at primary school (grade 5 & 6, 9-12 years) explore their talents, meet STEM professionals, and discover what talents are needed for a variety of jobs in STEM. The pupils are also given a practical assignment.
- *Mothers of Science*. The Barcelona Institute of Science and Technology (BIST) opened the Mothers of Science supporting grant in order to address the gap that exists between the number of women in the BIST Community who are research associates or senior postdoctoral researchers and the percentage of women who are group leaders.

- The *STEM Talent Girl programme* in Spain aims to mentor projects for the development of STEM talent and promotion of scientific-technological vocations (aimed at 3rd and 4th year students through masterclasses, shadowing sessions) with the purpose of inspiring and empowering the next generation of female leaders in science and technology.
- *National Council for the Advancement of Women in Science and Technology* in Israel. It conducts various basic diagnostics and reports, and also created the function of Counsellor on the situation of women within each university, with an advisory function to the rector. Additionally, it launched a scholarship programme for doctoral and postdoctoral students at higher education institutions, in the field of science and engineering. To consolidate and strengthen the foundations of scientific research in Israel, IMOS (Israel Ministry of Science) has established various research centres on gender and women's knowledge around the country in various fields.
- *The National Commission for Women in Science* in Slovenia mainly focuses on:
 - Data collection and awareness-raising.
 - Networking with researchers from different scientific disciplines who are dealing with gender issues.
 - Cooperation with other relevant organisations in the country, as well as in the Helsinki Group.
- *The Athena SWAN (Scientific Women's Academic Network)* is an accreditation programme that recognises and celebrates good practices in higher education and research institutions towards the advancement of gender equality: representation, progression and success for all. In order to advance the representation of women in science, technology, engineering, medicine and mathematics (STEMM) in UK, in 2005, the Equality Challenge Unit (UK), a unit of the Advance HE, launched the Athena SWAN Charter. Athena SWAN is a process where organisations collect comprehensive data on women's progression, critically analyse the information, and implement action plans to address the reasons behind the underrepresentation of women, even at senior levels, in their organisation. The accreditation is now used in UK, Ireland, Australia and is being developed in Canada and the USA.
- *CoderGirls* is an international non-profit organisation, founded in 2012, to educate and enable female K-12 students in computer science. It has 43 chapters in over 10 countries, such as Bangladesh, Nepal, Ukraine and the Philippines. Its main focus is for national chapters to connect computer science to community outreach and their passions. 85 Girl Scout councils and over 350 schools have been involved so far.
- *Million Women Mentors* is a movement with the goal of providing one million STEM mentoring relationships to girls and women worldwide, helping them to choose, persist and succeed in STEM programs and careers. It sparks the interest and confidence of girls and women in STEM careers and leadership through the power of mentoring with more than 1 million mentor relationships and more than 2 million pledges to mentor since 2014.
- *500 women scientists* is a worldwide grassroots organisation, launched in 2016, that works to build communities and foster real change that comes from small groups. It is dedicated to making science open, inclusive, and accessible. Over 20,000 women of STEM and supporters from more than 100 countries have signed in support of 500 Women Scientists.
- *Girls Who Code* is a non-profit organisation, founded in 2012, which focuses on closing the gender gap in technology and changing the image of what a programmer looks like and does. It supports and increases the number of women in computer science worldwide by equipping young women with the necessary computing skills to pursue 21st century opportunities.
- *Women 2.0* is a media and tech company focused on gender equality and inclusion in the tech space that was founded in 2006. It creates content, community, and events for aspiring and current innovators in tech with city meetups globally, allowing women to meet other like-minded women in countries including the UK, USA, Canada, Ireland, Singapore, Argentina, Mexico and Belgium.
- *WomEng* is a South African social enterprise, founded in 2005, now operating in 13 countries.

WomEng has been working to develop the next generation of women engineers and leaders through connecting girls to mentors, role models, and practical exposure to projects and careers. Over the last 12 years, WomEng has been “igniting the engineering flame” with female high students through the GirlEng programme. After ten years, they had over 10,000 girls in the programme, and we were able to change mindsets around engineering and technology. Specific scope: Africa.

- *Made with Code* is a worldwide Google’s initiative to inspire teen girls to see that code can help them pursue their passions. Since 2010, Google has invested in initiatives to increase diversity in computer sciences, developing new ways to get girls interested and involved in computer sciences at a young age. It revolves primarily around providing online activities for young girls to learn coding on its website.
- *The European Centre for Women and Technology (ECWT)* is a European multi-stakeholder partnership of more than 130 organisations and a rapidly growing member of individuals representing high-level expertise in women and technology development from government, business, academia and non-profit sectors, since 2008. ECWT is working to measurably and significantly increase the number of girls and women in STEM and computing and integrating a critical mass of women in Europe in the design, research, innovation, production and use of ICT. Specific scope: Europe.
- *GenderInSITE* (Gender in science, innovation, technology and engineering SITE) is an international initiative that, since 2012, promotes the role of women in science, innovation, technology and engineering worldwide. It also seeks to demonstrate how applying a gender lens to these fields can provide deeper insights, more effective programmes, and more sustainable outcomes in the context of development.
- *The Elsevier Awards for Early-Career Women Scientists in the Developing World* was launched in 2012 by the Elsevier Foundation, TWAS, and OWSD. These awards are designed to promote and celebrate the achievements of women scientists in the early stages of their careers, with the objective of creating role models for girls to identify with and follow. Five Awards, 20 so far, are conferred annually, each to a female scientist from one of the following regions: Latin America and the Caribbean, the Arab region, Sub-Saharan Africa, Central and South Asia, and East and South-East Asia and the Pacific. Specific scope: developing countries.
- *The Gender Summit* is a platform for dialogue where scientists, policymakers, gender scholars and stakeholders in science systems examine new research evidence showing when, why, and how biological differences (sex) and socio-cultural differences (gender) between females and males impact outcomes. The GS was launched in 2010 with the aim of reaching consensus where improvements to science knowledge and science practice are needed and who should take action. The aim is to make gender equality in research and innovation the norm and to embed gender as a primary dimension of quality.
- *The Women in Global Science and Technology (WISAT)* is an international non-profit organisation, launched in 2012, to promote women’s development of science, technology and innovation. WISAT is actively involved in influencing policy at national, regional and international levels by promoting information, knowledge, science and technology strategies which enable women, especially those living in developing countries, to actively participate in knowledge and technology for development. Specific scope: developing countries.
- *The Organization for Women in Science for the Developing World (OWSD)* is an international non-profit organisation, supported by UNESCO, based in the offices of the World Academy of Sciences for the advancement of science in developing countries (TWAS). OWSD was founded in 1987 and is the first international forum to unite eminent women scientists from the developing and developed worlds with the objective of strengthening their role in the development process and promoting their representation in scientific and technological leadership. OWSD provides research training, career development and networking opportunities for women scientists throughout the developing world at different stages in their careers. So far 431 PhD fellows have been awarded from 33 developing countries. Specific scope: developing countries.

- Regarding engaging and attracting more women to their companies, some private companies working in the science field are implementing interesting activities at a national level, among them:
 - *Fraunhofer Gesellschaft*, in Germany, a leader in ICT research in Europe, works through mentoring programme in schools, guides to motivate and inform girls, training for young women and doctoral programmes. Although the number of women in executive positions is still low, it is one of the most integrated approaches to gender equality.
 - *Motorola* in Poland has developed and implemented a university project, with the aim of attracting more women. It awards a prize to secondary school girls who learn how to design and create websites. The company is very active in fighting against a very traditional and stereotyped culture about women and their approach to science and ICT, which influences a low participation in the IT labour market.
 - Germany's leading telecommunications company, *Deutsche Telekom*, introduced in 2011 a quota policy in middle and senior management positions. The company stated that by 2015, 30% of these positions will be filled by women. When the policy was launched 30% of Deutsche Telekom's staff was female, but only 13% of senior management was women.
- *Orange-France* justifies the advantages of establishing a 35% quota of female representation in all categories of managerial staff, in all departments. The company is changing its recruitment policies; for example, through partnerships with engineering schools and non-discriminatory management practices that respond to the diverse needs and work styles of both genders and consider pressures on their time and availability.
- *Girls4Tech* was created in 2014 by Mastercard to inspire girls to pursue STEM-based careers through a fun and engaging curriculum based on global standards of science and math. The programme incorporates Mastercard's deep expertise in payment technology and innovation, and includes topics such as coding, fraud detection, data analysis and digital convergence. So far, it has reached more than 400,000 girls in 25 countries.

ANNEX III. National strategies, policies and laws

In order to prepare Table 5 the following national strategies, policies and laws were analysed:

Argentina:

- Lineamientos para una Política en Investigación Fundamental
- Plan estratégico nacional de ciencia, tecnología e innovación “Bicentenario” (2006-2010)
- El Plan Nacional de Ciencia, Tecnología e Innovación Productiva Argentina Innovadora 2020 (AI2020)
- Ley 25.467 - Ciencia, Tecnología e Innovación (2001)
- Plan Nacional de Igualdad de Oportunidades y Derechos (2018-2020)
- Ley de Paridad de Género (Ley 27.412)
- Ley de Educación Nacional. Ley N° 26.206/2006
- Ley de Educación Superior. Ley N° 24.521/1995
- Ley de Educación Técnico Profesional. Ley N° 26.058/2005
- Ley de Financiamiento Educativo. Ley N° 26.075/2005
- Plan Nacional de Acción para la Prevención, Asistencia y Erradicación de la Violencia contra las mujeres

Bolivia

- Plan Nacional de Ciencia, Tecnología e Innovación (2013)
- Plan Nacional De Ciencia Tecnología e Innovación del Sistema de la Universidad Boliviana 2017-2026 (2017)
- Ley de Participación Popular (1994)
- Ley de Fomento de la Ciencia, Tecnología e Innovación
- Observatorio de Género de la Coordinadora de la Mujer
- Ley Contra el Acoso y Violencia Política hacia las Mujeres (2012)

- Ley de Reforma Educativa. Ley N° 1.565/1994
- Ley de Educación Avelino Siñani (2010)
- Ley N° 807 de identidad de género
- Plan Nacional de Desarrollo de Bolivia 2006-2010
- Plan Nacional de Desarrollo “Bolivia Digna, Soberana, Productiva y Democrática para Vivir Bien 2009- 2014
- *Plan de Desarrollo Económico y Social 2016-2020*

Brazil

- Estratégia Nacional de Ciência, Tecnologia e Inovação
- Emenda Constitucional N° 85, de 26 de fevereiro de 2015 06
- Lei N° 13. 243, de 11 de janeiro de 2016
- Plano de Ação em Ciência, Tecnologia e Inovação para o Desenvolvimento Nacional no período de 2007-2010
- I, II, III Plano de Políticas para as Mulheres
- Política Nacional de Alfabetização 2019
- Lei de Diretrizes e Bases da Educação. Lei N° 9394/1996
- Decreto N° 9.765 2019
- Ley de Igualdad y Oportunidades para la Mujer

Chile

- Política Institucional Equidad de Género en Ciencia y Tecnología Período 2017-2025
- Agenda de Innovación y Competitividad 2010-2020
- Estrategia Nacional de Innovación 2019
- Plan Marco “Educación para la Igualdad entre hombres y mujeres 2015-2018
- Plan de Igualdad entre Mujeres y Hombres 2010-2020

- Política de Equidad de Género Comisión Nacional de Investigación Científica y Tecnológica (CONICYT) 2013
- Ley N° 20.820
- Ley N° 20.609
- Ley Orgánica Constitucional de Enseñanza – LOCE. Ley N° 18.962/1990
- Política Nacional a Favor de la Infancia y la Adolescencia 2001-2010

Colombia

- Estrategia Nacional de Apropiación Social de la Ciencia, la Tecnología y la Innovación 2010
- Plan Nacional de Ciencia, Tecnología e Innovación 2017-2022 para el desarrollo del sector de las Tecnologías de la Información y las Comunicaciones TIC
- Plan Nacional de Desarrollo 2018–2022
- Política de Equidad de Género para las Mujeres 2012
- Plan de Igualdad de Oportunidades para la Mujeres 1999
- Ley N° 1.286 de 2009
- Ley N° 823 de 2003
- Lineamientos de la Política Pública Nacional de Equidad de Género para las Mujeres
- Ley General de Educación. Ley N° 115/1994
- Ley de Educación Superior. Ley N° 30/1992
- La Revolución Educativa: Plan Sectorial 2002–2006
- Lineamientos de política para la atención educativa a poblaciones vulnerables
- Política Pública por los Niños y Niñas, desde la Gestación hasta los 6 Años. Colombia por la Primera Infancia

Cuba

- Política Nacional de Ciencia e Innovación Tecnológica
- Estrategia Nacional de Ciencia, Tecnología e Innovación 2011–2015

- Ley de Nacionalización General y Gratuita de la Enseñanza de Cuba de 1961

Costa Rica

- Plan Nacional de Ciencia, Tecnología e Innovación 2015–2021
- Plan Nacional de Ciencia, Tecnología e Innovación 2011-2014
- Plan Nacional de Desarrollo (PND)
- Política Nacional para la igualdad entre mujeres y hombres en la formación, el empleo y el disfrute de los productos de la Ciencia, Tecnología, las Telecomunicaciones y la Innovación 2018-2027
- Programa Nacional de Ciencia y Tecnología 1990- 1994
- Plan Nacional de Desarrollo y de Inversión Pública del Bicentenario 2019-2022
- Ley N° 7.169: Programa Nacional de Ciencia y Tecnología
- Política Nacional para la Igualdad Efectiva entre Mujeres y Hombres en Costa Rica 2018-2030
- Ley Fundamental de Educación. Ley N° 2.160/1957
- Ley N° 7.600, Ley de Igualdad de Oportunidades
- Ley De Promoción de la Igualdad Social de la Mujer 1990
- Código de la Niñez y de la Adolescencia. Ley N° 7.739/1998
- Reglamento de Educación Superior Parauniversitaria. Reglamento N° 30.431/2002
- Plan de Acción de la Educación para Todos 2003-2015

Ecuador

- Plan nacional de CTI 2010
- Plan Nacional de Ciencia, Tecnología, Innovación y Saberes Ancestrales 2030 (forthcoming)
- Plan Estratégico 2009-2015
- Plan Nacional Buen Vivir 2013-2017
- Decreto Supremo N° 381
- Decreto Ejecutivo N°. 1603

- Decreto 1829
- Política para la Igualdad de Género 2018
- Ley Orgánica Integral para Prevenir y Erradicar la Violencia contra las Mujeres
- Secretaria Nacional de Ciencia y Tecnología (SENACYT)
- Fundación para la Ciencia y Tecnología (Fundacyt)
- Ley de Educación. Ley N°. 127/1983
- Código de la Niñez y Adolescencia. Ley N° 100/2003
- Ley de Educación Superior. Ley N° 16/2000
- Plan Decenal de Educación del Ecuador 2006-2015
- Plan Nacional Decenal de Protección Integral a la Niñez y Adolescencia
- Plan Nacional de Educación para Todos 2003-2015

El Salvador

- Política Nacional de Innovación, Ciencia y Tecnología (2014)
- Política Nacional de Innovación, Ciencia y Tecnología (2012)
- Estructura y la Estrategia de la Política Nacional de Ciencia, Tecnología e Innovación de El Salvador (1997)
- Ley de Desarrollo Científico y Tecnológico (2013)
- Plan Nacional de Educación 2021. “Metas y Políticas para Construir el País que Queremos”
- Plan El Salvador Educado. Por el derecho a una educación de calidad
- Ley General de Educación Decreto N° 917/1996 y Reforma año 2005
- Ley de Educación Superior. Decreto N° 468/2004
- Ley de la Carrera Docente. Decreto N° 665/1996 y Reforma año 2006
- Ley de Igualdad, Equidad y Erradicación de la Discriminación contra las Mujeres

Guatemala

- Política Nacional de Desarrollo Científico y Tecnológico 2015-2032 (2014)
- *Plan Nacional de Desarrollo K’atun, Nuestra Guatemala 2032*
- Política Nacional de Promoción y Desarrollo Integral de las Mujeres y Plan de Equidad de Oportunidades 2008-2023 (2009)
- Ley de Promoción del Desarrollo Científico y Tecnológico Nacional (1991)
- Ley de Educación Nacional. Decreto Legislativo N° 12/1991
- Ley de Colegiación Profesional Obligatoria. Decreto N° 72/2001
- Propuesta de Reforma de la Ley de Educación Nacional
- Plan de Educación 2004-2007
- Ley de Dignificación y Promoción Integral de la Mujer

Jamaica

- National Policy for Gender Equality
- Science and Technology for Socio-Economic Development a Policy for Jamaica 2005
- Strategic Plan 2005–2010
- National Science and Technology Policy (1990)
- Jamaica’s National Development Plan Vision
- National Policy on Science, Technology & Innovation (Npsti) 2013 - 2020
- The National Science, Technology and Innovation Policy Catalysing National Development 2019-2029
- Scientific Research Council Act
- Vision 2030 Jamaica National Development Plan
- Jamaica National Education Strategic Plan - 2011–2020
- Education Act

Mexico

- Programa Especial de Ciencia, Tecnología e Innovación 2014-2018
- Ley de Ciencia y Tecnología reformada en 2015
- Plan Nacional de Desarrollo 2013-2018 (PND)
- Plan Nacional de Desarrollo (PND) 2019-2024
- Política Nacional en Materia de Igualdad entre Mujeres y Hombres (2010) (balances y perspectivas)
- Política de Igualdad de Género 2013 –2018
- Norma Mexicana en Igualdad Laboral y no Discriminación (NMX-R-025-SCFI-2015)
- Ley General de Educación
- Ley de Fomento para la Lectura y el Libro
- Ley General de Bibliotecas
- Ley para la Coordinación de la Educación Superior
- Programa Nacional de Educación 2001-2006
- Ley de igualdad de trato y oportunidades entre mujeres y hombres del estado de México
- Ley General para la Igualdad entre Mujeres y Hombres

Nicaragua

- Plan Nacional de Ciencia, Tecnología e Innovación Nicaragua 2010-2013
- Plan Nacional de Educación
- Plan Estratégico de Educación 2011-2015
- Plan de Educación 2017 - 2021
- Plan Nacional de Desarrollo Humano 2012-2016
- Ley N° 582 2006
- Decreto ejecutivo N° 5-95
- Ley de Igualdad de Derechos y Oportunidades- Ley N° 648

Panama

- Política Nacional de Ciencia, Tecnología e Innovación de Panamá (2015)

- Ley 4 de igualdad de oportunidades para las mujeres (1999)
- Plan de Acción para la Igualdad de Oportunidades para las Mujeres, 2016-2019 (2016)
- Ley para el Desarrollo de la Ciencia, la Tecnología y la Innovación
- Ley Orgánica de Educación. Ley N° 47/1946
- Ley N° 34/1995 por la cual se deroga, modifican, adicionan y subrogan artículos de la Ley Orgánica de Educación 47/1946

Paraguay

- Política Nacional de Ciencia, Tecnología e Innovación 2017- 2030
- Libro Blanco de los Lineamientos de una Política de CTI en Paraguay
- Política Nacional de Ciencia, Tecnología e Innovación 2002
- Ley 2.279/03 “que modifica y amplía artículos de la Ley 1028/97 General de Ciencia y Tecnología”
- Ley 1028/97 General de Ciencia y Tecnología
- Ley General de Educación. Ley N° 1.264/1998
- Estatuto del Docente. Ley N° 1.725/2001
- Anteproyecto de Ley de Educación Superior
- Plan Educacional Ñandutí 2003-2015: “Por una Educación para Todos con Calidad y Equidad”
- II Plan Nacional de Igualdad de Oportunidades entre Hombres y Mujeres
- Igualdad de género y principales brechas en Paraguay
- Ley N° 34/1992

Peru

- Plan Nacional de CTI 2006-2021(2006)
- Ley N° 28.303, Ley Marco de Ciencia, Tecnología e Innovación Tecnológica
- Ley N° 28.613, Ley del Concytec
- Política Nacional de Igualdad de Género (2019)
- Plan Nacional de Educación Para Todos 2005-2015

- Agenda de Políticas Educativas Prioritarias 2006-2011
- Ley General de Educación. Ley N° 28.044/2003
- Ley de Democratización del Libro y de Fomento de la Lectura. Ley N° 28.086/2003
- Ley del Fondo Nacional de Desarrollo de la Educación Peruana (FONDEP). Ley N° 28.332/2004
- Ley del Profesorado. Ley N° 24.029/1984
- Ley que regula la participación de las asociaciones de padres de familia en las instituciones educativas públicas. Ley N° 28.628/2005
- Ley de igualdad de oportunidades entre mujeres y hombres - Ley N° 28.983

Dominican Republic

- Plan Estratégico de Ciencia, Tecnología e Innovación 2008-2018
- Plan Estratégico Nacional de Ciencia, Tecnología e Innovación (PECYT+I)
- Ley General de Educación. Ley N° 66/1997
- Ley de Estrategia Nacional de Desarrollo 2030
- Plan Estratégico de Desarrollo de la Educación Dominicana 2003-2012: "Construir un Futuro Solidario: Voluntad de la Nación"
- Ley 139-01 de Educación Superior, Ciencia y Tecnología República Dominicana
- Ley Orgánica Núm. 29-11
- Reglamento que regula la División de Igualdad de Género del Tribunal Superior Electoral

Uruguay

- Plan Estratégico Nacional de Ciencia Tecnología e Innovación 2010
- Hacia una Estrategia Nacional de Desarrollo Uruguay 2050
- Estrategia Nacional para la Igualdad de Género al 2030
- 3er. Plan de Igualdad de Género 2016-2020 (2017)
- Ley N° 18.084 Agencia Nacional de Investigación e Innovación

- Ley N° 18.104
- Igualdad de Derechos y Oportunidades entre Hombres y Mujeres en la República 2007
- Primer Plan Nacional de Igualdad de Oportunidades y Derechos 2007-2011
- Ley General de Educación. Ley N° 15.739/1.985
- Estatuto del Funcionario Docente. Ordenanza N° 45/1993
- Estatuto del Funcionario no Docente. Resolución N° 65/1990
- Ley de Educación Inicial. Ley N° 17015/1998
- Ley de Regulación de las Actividades de las Guarderías. Ley N° 16802/1996
- Decreto de Ordenamiento del Sistema de Enseñanza Terciaria Privada. Decreto N° 308/1995
- Decreto de Ordenamiento del Sistema de Enseñanza Terciaria Privada. Decreto N° 309/2002

Venezuela

- Plan Nacional de Ciencia y Tecnología 2005- 2030
- Ley Orgánica de Ciencia, Tecnología e Innovación (LOCTI, 2001) reformada en 2005
- Decreto 1.829
- Ley Orgánica de Educación 1.980
- Plan Educación Para Todos 2003
- Plan Estratégico de TICs 2002-2007
- Fondo Nacional de Ciencia, Tecnología e Innovación (FONACIT)
- Fundación para el desarrollo de la Ciencia y Tecnología
- Secretaría Nacional de Educación Superior, Ciencia y Tecnología (SENESCYT)
- Ministerio del Poder Popular para la Ciencia, Tecnología e Industrias Intermedias
- Observatorio Nacional de Ciencia, Tecnología e Innovación (ONCTI)
- Ley Orgánica de Educación. Ley N° 2.635/1980
- Reglamento General de la Ley Orgánica de Educación. Decreto N° 313/1.999

- Ley de Universidades
- La Educación Bolivariana. Políticas, Programas y Acciones: “Cumpliendo las Metas del Milenio”
- Plan de Educación Para Todos de Venezuela
- Plan Estratégico de la Tecnología de la Información y la Comunicación en el Sector Educativo Nacional 2002-2007
- Políticas, Programas y Estrategias de la Educación Venezolana
- Ley de igualdad de oportunidades para la mujer n° 5.398

Redes de mujeres científicas

- Red Argentina de Género, Ciencia y Tecnología (RAGCyT)- Argentina (1994)
- Organización Boliviana de Mujeres en Ciencia – OBMC (2000)
- Red de Investigadoras (RedI) – Chile (2012)
- Red Colombiana de Mujeres Científicas- Colombia (2015)
- 500 Científicas Costa Rica- Costa Rica (2016)
- Red Ecuatoriana de Mujeres Científicas – Ecuador (2016)
- Red Nacional Mujeres para la Ciencia, Tecnología e Innovación (RENMU-CTI)- Guatemala (2018)
- Red Mexicana de Ciencia y Tecnología (Red Mexciteg)- Mexico (2014)
- Grupos de Acción Peru and OWSD national chapter (2019)
- OWSD national Chapter Uruguay (2019)

ANNEX IV. List of people interviewed apart from UN Women regional staff (alphabetical order)

Name	Institution and role
Amorim-Borher, Beatriz	WIPO, Regional Office for Latin America and the Caribbean, Director
Anlló, Guillermo	UNESCO Regional Office for Latin America and the Caribbean/Regional STI specialist
Barrere, Rodolfo	OEI and RICYT/ Coordinator
Blowers, Tonya	OWSD/ Global Coordinator
Cabrera, Johana	OWSD Chile
Bugueño Zulantay, Cristina	CONACYT/ Department of Studies and Strategic Management of Chile
D'Onofrio, Guillermina	Ministry of Education, Culture, Science and Technology of Argentina / Coordinator in the Undersecretariat of Institutional Evaluation
Diego Fonseca, Carmen	AECID, Specialist
Florez Gómez, Mercedes	AECID
García Peñalvo, Francisco José	W STEM/ Coordinator
Gatica, Carolina	Adviser to the Cabinet Minister Ministry of Women and Gender Equality of Chile
Gómez, Natacha	SENACYT of Panama / Plans and Programs Coordinator
González, Silvia	Office of Planning and Budget (OPP) of Uruguay
Grazzi, Matteo	IaDB/ Competitiveness and Innovation Division Specialist
Hertz, Jana Rodríguez	OWSD/ Regional coordinator
Jorda, Oswald Girones	WIPO
Martínez García, Ana Vicenta	AECID
Monje, Andrea	IaDB, Gender Specialist
Montaldo, Mariana	Plan Ceibal of Uruguay/ Institutional Relations
Mougeot, Luc	IDRC/ Senior Program Specialist
Ortega, Marisa	Consultant Uruguay
Queijo von Heideken, Virginia	IaDB/ Lead Economist
Raffo, Julio	WIPO/ Economics and Statistics Division
Zambrana, Ana Inés	OWSD Uruguay

UN Women is the United Nations entity dedicated to gender equality and the empowerment of women. A global champion for women and girls, UN Women was established to accelerate progress on meeting their needs worldwide.

UN Women supports UN Member States as they set global standards for achieving gender equality, and works with governments and civil society to design laws, policies, programmes and services needed to ensure that the standards are effectively implemented and truly benefit women and girls worldwide. It works globally to make the vision of the Sustainable Development Goals a reality for women and girls and stands behind women's equal participation in all aspects of life, focusing on four strategic priorities:

- Women lead, participate in and benefit equally from governance systems
- Women have income security, decent work and economic autonomy
- All women and girls live a life free from all forms of violence
- Women and girls contribute to and have greater influence in building sustainable peace and resilience, and benefit equally from the prevention of natural disasters and conflicts and humanitarian action.

UN Women also coordinates and promotes the UN system's work in advancing gender equality, and in all deliberations and agreements linked to the 2030 Agenda. The entity works to position gender equality as fundamental to the Sustainable Development Goals, and a more inclusive world.

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Por un planeta 50-50 en 2030
Demos el paso por la igualdad de género