

HELPDESK RESPONSE 42

STEM Skills Initiatives for Adolescent Girls in the Latin America and the Caribbean Region

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About the EdTech Hub Helpdesk

The Helpdesk is the Hub's rapid response service, available to FCDO advisers and World Bank staff in 70 low- and lower-middle-income countries (LMICs) and UNICEF regional and country offices. It delivers just-in-time services to support education technology planning and decision-making. We respond to most requests in 1–15 business days. Given the rapid nature of requests, we aim to produce comprehensive and evidence-based quality outputs, while acknowledging that our work is by no means exhaustive. For more information, please visit <https://edtechhub.org/edtech-hub-helpdesk/>.

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Abbreviations and acronyms

ICT	Information and communications technology
IDB	Inter-American Development Bank
LAC	Latin American and Caribbean
MPL	Minimum proficiency levels
NGO	Non-governmental organisations
OECD	Organisation for Economic Co-operation and Development
PISA	Programme for International Student Assessment
SAGA	STEM and Gender Advancement
STEM	Science, technology, engineering, and mathematics

1. Purpose of the document

This document was produced in response to a request from the UNICEF country office of Argentina that was submitted to the EdTech Hub Helpdesk in November 2021. The UNICEF team requested a curated list of science, technology, engineering, and mathematics (STEM) skills initiatives for adolescent girls in the Latin American and Caribbean (LAC) region.

[Section 2](#) provides an introduction to gender equality and background on the participation of women in STEM fields in the LAC region and Argentina.

[Section 3](#) presents the mapping approach, with key components such as the inclusion criteria. [Section 4](#) presents key initiatives found through this mapping. Lastly, [Section 5](#) summarises cross-cutting recommendations based on the initiatives analysed.

This report does not aim to cover every leading and innovative STEM initiative with relevance to the LAC or Argentinian contexts. Rather, it presents a list of curated resources with relevant information on institutions involved, countries reached, number of participants, and indications of impact that can be used to inform the design of STEM initiatives for adolescent girls.

2. Gender equality in STEM

Figure 1. *Some notes on STEM and LAC*

Introducing STEM

The acronym ‘STEM’ refers to the fields of science, technology, engineering, and mathematics. Gender equality in STEM is used to describe the equal rights, responsibilities, and opportunities in STEM fields that individuals can access. It is based on education, opportunities, and qualifications that individuals acquire in STEM-related fields (↑UN Women, 2020; ↑UNESCO, 2017a).

Women and girls have been historically and consistently under-represented in STEM-related fields. Despite progress in certain fields and regions of the world, a global perspective on this issue shows that on average, 21% of people studying engineering are females, with only 19% for topics related to information and communications technology (ICT) (↑Wood, 2020; ↑Aauw, 2021).

Gender inequalities in STEM tend to emerge from structural inequalities that lead to greater barriers for girls and women to reach STEM opportunities than for their male counterparts (↑UNICEF & ITU, 2020). These structural inequalities are often visible in how gender norms, bias, and stereotypes impact the number of girls and women active in STEM as students or professionals (↑UNICEF, 2020). Some of these are exemplified in Table 1 below.

Table 1. *Example of gender-based structural inequalities in the LAC region.*

	Gender stereotypes A study evidenced that gender stereotypes significantly impact career choices, and also reported that around 70% of individuals in 34 countries associated STEM-related professions with being more suitable for men than for women (↑UNGEI, 2021; ↑University of Virginia, 2009).
	Gender bias in curriculums Perceptions and gender bias can play a role in children's professional aspirations and can influence their interests in given topics. Several studies have shown that children's textbooks disproportionately portray STEM characters as males. In the United Kingdom and China, on average, 87% of STEM characters are male, while in India this number reaches 94% (↑Perasso, 2017).



Gender bias in teacher expectations

Teachers' bias can impact the type and level of instruction and support that they provide to students. This can, in turn, impact students' motivation, skills, and learning outcomes. Evidence suggests that between 8% and 20% of Grade 6 maths teachers in Latin America believe that learning maths is easier for boys than for girls ([↑UNESCO, 2017b](#); [↑UNICEF, 2020](#)).



Lack of female secondary teachers

The role of teachers in influencing career choices and as role models often contributes to academic performance. In STEM, more gender parity in teaching staff can lead to more egalitarian performance for girls and boys in STEM subjects ([↑Alesina et al., 2018](#)). In Argentina, as in many other countries in the world, the majority of STEM teachers in schools are men ([↑Basco & Lavena, 2019](#); [↑UNICEF, 2020](#)).

Tackling gender inequalities in STEM is important, as it plays a crucial role in reducing global inequalities and improving sustainable development ([↑UN Women, 2020](#)). It could contribute to reducing gender pay gaps and creating egalitarian economic opportunities by both increasing women's employment and reducing occupational segregation ([↑Eige, 2021](#)). Ultimately, gender equality in STEM can foster economic growth, reduce levels of poverty, and improve global access to quality education. Ensuring that children and adolescents have access to egalitarian opportunities related to STEM is key to creating environments where diverse groups can flourish in schools, homes, businesses, hospitals, research facilities, and government agencies ([↑UN Women, 2020](#)).

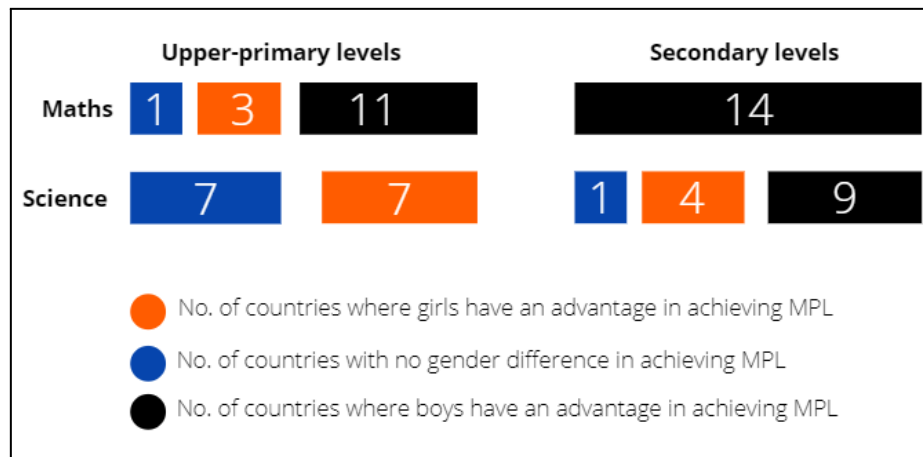
Efforts to support, enable, and prepare girls to access egalitarian STEM opportunities need to be accelerated. At the same time, system-level approaches, where different stakeholders work together towards a common goal, are often needed to dismantle the barriers that girls and women face in accessing such opportunities ([↑UNICEF & ITU, 2020](#)). As such, this brief serves to support different stakeholders to access, build on and / or adapt initiatives that have been implemented, and potentially scaled, to improve adolescent girls' STEM skills in the LAC region.

2.1. STEM in the Latin America and Caribbean region

Evidence illustrating and comparing gender gaps and inequalities in STEM in the LAC region has been emerging in recent years. The programmes and studies presented below offer insights related to gender gaps in STEM at school and high-school levels in the LAC region.

At a school level, data from a UNICEF study illustrated global gender disparities in STEM, with no exceptions in the LAC region ([UNICEF, 2020](#)). Figure 2 below illustrates that in upper-primary levels, the majority of LAC countries reported an advantage for boys in achieving minimum proficiency levels (MPL) in maths — and the same number of countries reported an advantage for girls or no gender disparities in other science-related topics. Gender disparities are amplified in secondary levels, with all LAC countries but one showing an advantage for boys and only one indicating no gender disparities in maths and other science-related topics. *Gender disparities, negatively affecting girls, are visible in most LAC countries in levels of performance in maths and other STEM-related topics at secondary levels of education* ([UNICEF, 2020](#)).

Figure 2. Number of LAC countries reporting gender disparities in minimum proficiency levels (MPL) in maths and other science-related topics. Source: [UNICEF \(2020\)](#).

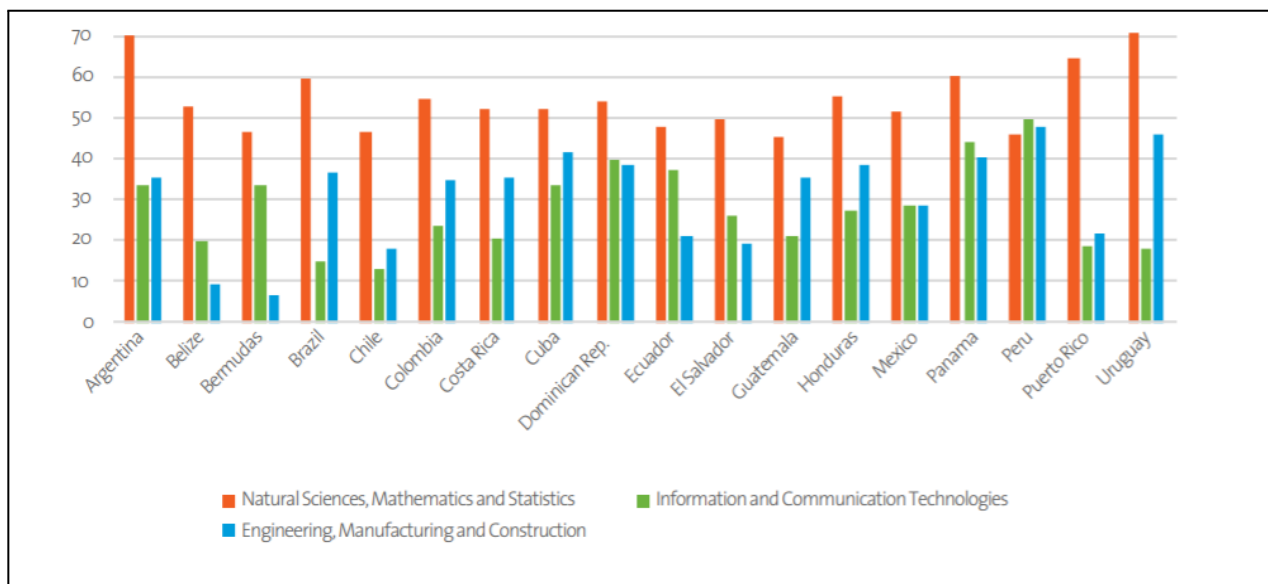


Importantly, this study further illustrated that socio-economic status is a key component in exploring, measuring, and tackling disparities in STEM. The study suggested that children from a lower socio-economic status in the LAC region are more likely to have lower results in STEM performance / grades than children from a higher socio-economic status when attending the same schools and using the same curriculum ([UNICEF, 2020](#)). This finding highlights the importance of adopting a wide, system-level, and inclusive perspective of gender equality, where different factors that influence equity are considered to measure and improve gaps in STEM-related fields. A key aspect to implement this in practice is to recognise and address intersectionality in gender gaps, by considering other intersectional, historical, and structural inequalities that can influence access to equitable and impactful opportunities.

At the level of higher education, an analysis capturing the percentage of female tertiary graduates by STEM-related fields revealed under-representation of women in STEM-related fields in LAC countries ([UN](#)

Women, 2020). This study illustrated that the most severe gender disparities are present in the fields of ICT and that in all LAC countries, females are also a minority in the fields of engineering, manufacturing, and construction. Figure 3 below presents these gaps by STEM-related topic and per LAC country.

Figure 3. *Percentage of female tertiary graduates by STEM fields in 2018 or latest year presented by ↑UN Women (2020, p.28).*



2.1.1. Argentina

At higher education and professional levels, a study looking at gender barriers to accessing STEM opportunities in Argentina found that in universities in Argentina (both public and private), only 33% of the students enrolled in a STEM-related degree are women (↑Basco & Lavena, 2019). It was shown that in Argentina, gender disparities also exist in access to technology, for example illustrating that 65% of men and 58% of women in Argentina have a laptop (↑Basco et al., 2017). One area where Argentina is doing better than other countries is in astronomy, where 40% of professional astronomers are women, which is one of the highest ratios globally (IAU, 2022; ↑Zhang, 2015).

At school and individual levels, PISA 2018¹ results showed that boys outperformed girls in mathematics by 15 score points in Argentina. As a comparative indication, across Organisation for Economic Co-operation and Development (OECD) countries, boys outperformed girls by five score points (↑PISA, 2018). In science, girls slightly outperformed boys on average by two score points across OECD countries; in Argentina, boys outperformed girls in science by 10 score points. In addition to these gaps in STEM-related performances and scores at school, this study also suggested that among

¹ PISA refers to 'Programme for International Student Assessment' and is a triennial survey of 15-year-old students that assesses the extent to which they have acquired the key knowledge and skills essential for full participation in society.

high-performing students in mathematics and science, about two in five boys in Argentina expect to work as an engineer or science professional at the age of 30, while about one in four girls expects to do so, mostly due to structural inequalities and gendered expectations ([PISA, 2018](#)).

3. Mapping overview

The inclusion criteria to gather the list of initiatives below were based on the following:

1. initiative's objective is to improve gender equality in STEM;
2. impact in one or multiple LAC countries;
3. target beneficiaries are adolescent girls (with inclusion of initiatives targeted at girls when relevant for this analysis);
4. particular attention given to initiatives that have been scaled; that include a partnership with governments; that explore teacher training and curriculum design to improve gender equality in STEM; that reach the most marginalised adolescent girls; and that intend to directly and intentionally improve STEM skills for adolescent girls.

The initiatives were first organised into two main categories, namely, global initiatives that included activities in LAC countries and local / regional initiatives. For each initiative we captured information related to the following elements:

- the **institution(s)** involved, which included the following categories: governments, private companies, startups, non-governmental organisations (NGOs) / foundations, UN agencies, education institutions, etc);
- a short **description** of the initiative's overall aims and activities;
- the initiative's main **objectives**, which were categorised into six potential objectives — as presented in [Table 2](#) below;
- the initiative's **geographical** reach with a list of the LAC countries involved;
- **date** of creation and potential end date;
- the number and key characteristics of **participants** involved;
- relevant **links** to access additional information / reference materials;
- If accessible online, information and data on scale, impact, and equity are included.

The categorisation of objectives of the initiatives builds on a study conducted by UN Women that illustrated six different types of objectives for gender equality STEM initiatives ([UN Women, 2020](#)). These objectives were adapted

to take into account inclusion criteria for this mapping and to reflect the objectives of the initiatives found throughout the selection process. The objectives are presented in Table 2 below.

Table 2. *Objectives used for categorising LAC initiatives*

Category	Description
1. Awareness actions and eradication of gender stereotypes	These initiatives are targeted at eliminating gender bias in STEM by raising awareness of gender equality in STEM and tackling gender stereotypes.
2. Attracting girls and adolescents girls into professional careers and STEM studies (i.e., as subjects to be studied at school, university, or during extra-curricular activities)	These initiatives aim to get adolescent girls interested in STEM-related topics as subjects to be studied (i.e., at school, at university and / or during extra-curricular activities) and consider STEM professional careers.
3. Improving STEM skills through training workshops, events, presentations, and/or lectures	These initiatives focus on generating inclusive spaces and opportunities to enable adolescent girls to directly gain STEM-related skills.
4. Supporting retention in STEM academic studies (at school, informal education, or university)	These initiatives aim to improve the retention of adolescent girls during STEM studies (at school, informal education, and university).
5. Specific ad hoc programmes and inter-institutional committees on gender and STEM	These initiatives intend to close the gender gap in STEM by creating inter-institutional teams, shaping initiatives, and designing policies to reduce the gender gap in STEM.
6. Improving gender equality in STEM through teacher training / development and curriculum design	These initiatives directly involve teachers and curriculum design to improve gender equality in STEM.

The list of initiatives presented in this mapping is not exhaustive. Rather, it aims to include the main initiatives involving adolescent girls and tackling gender issues in STEM that were implemented in the LAC region.

4. LAC initiatives

The long list of initiatives compiled for this report are listed in an external file that can be found [here](#). A total of 42 initiatives were found, with 15 Global and LAC-focused initiatives.

Below we present a subset of 12 initiatives that were determined to be most informative for the design of STEM initiatives for adolescent girls. These initiatives were chosen by considering their design, reach, approaches, impact, and available evaluations. For each initiative, information on objectives, participants and geography are presented. A short description, as well as details on impact and key takeaways, are also provided when such information could be found.

Some of the initiatives presented in the long list such as Ciencia es divertida, La voz de las chicas del Centro de América, Campamentos Tecnológicos, Hackatones femeninos, Clubes de programación, clubes de niñas y clubes de mamás are part of an umbrella programme called *TIC/AS* (an abbreviation that stands for 'Tecnologías de Información y Comunicación para chicas de centroamérica'). This programme intends to increase the number of girls and women in STEM-related fields in Central America. The approach used in most of the initiatives of this programme is based on addressing local barriers that are affecting inclusive participation in STEM-related programmes and activities. .

4.1. Global initiatives with LAC activities

The table below presents global and at-scale initiatives that included activities or sub-programmes in the LAC region.

Table 3. *Global initiatives with LAC reach*

Initiative	Overview
Girls4Tech² LAC country(ies): 15 countries across Latin America and the Caribbean Topic: STEM Modality: Non-formal Umbrella programme Objective(s): 3. Improving STEM skills through training workshops, events, presentations and/or lectures	Description <i>Girls4Tech</i> is a programme centred on an interactive STEM curriculum and the creation of a community of girls, parents, and teachers. This programme intends to enable students to discover a range of STEM courses, such as fraud detective, data scientist, and software engineer. These courses can be accessed by parents, teachers, or girls, on-screen or to print out, and are available in nine different languages.

² See <https://www.girls4tech.com/>

6. Improving gender equality in STEM through teacher trainings and curriculum design

Ages: 8–16

Focus on adolescent girls

Creation date: 2014

End date: ongoing

Technovation Girls³

LAC country(ies): All countries in the LAC region

Topic: Technology

Modality: Non-formal

Umbrella programme

Objective(s):

- 3. Improving STEM skills through training workshops, events, presentations and/or lectures*

Ages: 8–18

Focus on adolescent girls

Creation date: 2010

End date: ongoing

Description

Technovation Girls is a global tech education non-profit that intends to guide girls to become leaders, creators, and problem-solvers. This programme consists of groups of 12 girls (aged 8–18) and invites them to develop an application targeted at addressing real-world problems, with support from mentors and parents.

Impact

- Over the past nine years, about 32,000 girls have participated in developing mobile applications and launching start-ups to address diverse challenges, such as food waste, lack of nutrition and women's safety issues.
 - The programme trained 150,000 young women to be technology entrepreneurs and innovators, empowering them to solve problems in their communities using technology.
 - After participating in the programme, 78% of participants reported that they had become more interested in computer science; 70% more interested in entrepreneurship; and 67% were more interested in business leadership than when they started the programme.
-

Girl Power Codefest⁴

LAC country(ies): Chile, Peru, Colombia and Mexico

Topic: STEM

Modality: Non-formal

Part of an umbrella programme

Objective(s):

Description

Girl Power Codefest is an initiative funded by the British Council, which aims to increase STEM skills among teachers and to develop coding skills for girls. Girls are asked to solve problems and address challenges by using programming to develop a solution.

³ See <https://technovationchallenge.org>

⁴ See

<https://www.britishcouncil.org/partner/international-development/track-record/girl-power-codefest-americas>

- 3. Improving STEM skills through training workshops, events, presentations and/or lectures
- 6. Improving gender equality in STEM through teacher trainings and curriculum design

Ages: 11–13

Focus on adolescent girls

Creation date: 2018

End date: 2019

STEM and Gender

Advancement (SAGA)⁵

LAC country(ies): Argentina, Haiti, Jamaica, Uruguay and Canada.

Topic: STEM

Modality: Non-formal

Part of an umbrella programme

Objective(s):

- 5. Specific ad hoc programmes and inter-institutional committees on gender and STEM

Focus on policymakers

Creation date: 2016

End date: ongoing

Description

STEM and Gender Advancement is a global UNESCO programme aiming to strengthen UNESCO's work in support of gender equality in STEM and innovation.

SAGA's main objective is to offer governments and policymakers a variety of tools to contribute to reducing the current global gender gap in STEM in education and research.

Impact

In Argentina, this programme contributed to the inclusion of gender equality in the Third Open Government National Plan (2017–2019).

Mulheres na Ciência⁶

LAC country(ies): Brazil

Topic: STEM

Modality: Non-formal

Part of an umbrella programme

Objective(s):

- 1. Awareness actions and eradication of gender stereotypes
- 2. Attracting girls and adolescents girls into professional careers and STEM studies
- 3. Improving STEM skills through training workshops, events, presentations and/or lectures

Creation date: unknown

End date: ongoing

Description

Mulheres na Ciência (Women in Science) is a project that aims to support women and girls in the UK and Brazil to succeed in science as researchers, leaders, or entrepreneurs. This project facilitates university scholarships, training programmes, and educational webinars. The project seeks to bring about positive change at an individual and institutional level.

Impact

There is limited information currently available on impact. Three webinars have been organised to date. Additional results, data, and impact evaluations are currently being compiled by the programme implementers.

⁵ See <https://en.unesco.org/saga>

⁶ See <https://www.britishcouncil.org.br/en/programmes/schools/girls-school-women-science>
STEM Skills Initiatives for Adolescent Girls in the LAC Region

4.2. Local and regional initiatives

Table 4. *LAC initiatives*

Initiative	Overview
Niñas STEM pueden⁷ LAC country(ies): Mexico Topic: STEM Modality: Formal Umbrella programme Objective(s): 1. Awareness actions and eradication of gender stereotypes 2. Attracting girls and adolescents girls into professional careers and STEM studies 3. Improving STEM skills through training workshops, events, presentations and/or lectures Ages: 12–18 Focus on girls Creation date: 2017 End date: ongoing	Description <i>Niñas STEM pueden (STEM girls can)</i> is an initiative launched by the Mexican government and OECD that seeks to promote girls and adolescents' capacities to undertake successful careers in STEM. It intends to empower them to build, recognise, and use their knowledge and skills through various events such as workshops and seminars. Impact According to a 2017 survey taken after a pilot programme, 75% of the participants felt more motivated to pursue a STEM career after participating in a series of workshops. Key takeaway(s) This initiative highlights the importance of working with parents, as STEM is often an unknown topic for them. Raising awareness among them can help prevent falling into gender stereotypes at home.
STEM es para chicas⁸ LAC country(ies): Peru Topic: STEM Modality: Formal Part of an umbrella programme Objective(s): 1. Awareness actions and eradication of gender stereotypes	Description <i>STEM es para chicas (STEM is for girls)</i> is an initiative financed by the British embassy in Peru that consists of providing training opportunities on communication to scientists, engineers, and women working in other STEM-related fields. The women scientists trained are invited to share their experiences during events attended by girls and boys from secondary public schools that report low science and mathematics levels of proficiency.

⁷ See <http://ninastem.aprende.sep.gob.mx/>

⁸ See <https://enorbita.org/en-orbita/proyectos/stemesparachicas/>

2. Attracting girls and adolescents girls into professional careers and STEM studies

6. Improving gender equality in STEM through teacher trainings and curriculum design

Focus on female teachers

Creation date: 2018

End date: 2019

Impact

According to [Rodriguez et al. \(2019\)](#) the intervention had a significant effect related to challenging gender perceptions and stereotypes for male and female participants. The intervention had no significant effect on the likelihood of choosing a STEM career. However, positive and significant effects were found in increasing the likelihood that some groups would choose STEM careers after finishing secondary school, including:

- students in the fourth year of secondary school (Grade 10)
- students who had not previously received vocational information
- students who initially had a high level of self-esteem
- female students whose mothers work.

Key takeaway(s)

[Rodriguez et al. \(2019\)](#) highlight the following takeaways:

- It was considered preferable that such interventions be implemented a few years before the time of choosing a professional path and to provide information about STEM careers over an extended period of time.
- Such interventions should be combined with interventions focused on improving the self-esteem of all students, especially female students.
- This type of intervention is most useful in settings where information on STEM programmes and careers is more difficult to access.

Ciencia es divertida⁹

LAC country(ies): Costa Rica

Topic: Science and Technology

Modality: Formal

Part of an umbrella programme

Objective(s):

Description

Ciencia es divertida (science is fun) is one of the initiatives of the TIC/AS programme portfolio. It uses an arts-education methodology to invite children from rural settings to explore and discuss science and technology through workshops.

Impact

⁹ See <https://programatic-as.com/la-ciencia-es-divertida/>
STEM Skills Initiatives for Adolescent Girls in the LAC Region

1. Awareness actions and eradication of gender stereotypes

2. Attracting girls and adolescents girls into professional careers and STEM studies

Focus on girls and boys

Ages: 9–11

Creation date: Not specified

- Teachers and principals reported that one of the most important aspects of this process was that they became more aware of gender inequalities in teaching / learning STEM.
- This project offered insights on the potential of inviting mothers to learn about technology alongside their daughters.
- Twenty out of 166 girls who participated in the arts-education activities continued in camps and workshops developed by the same project. These 20 girls also decided to study a STEM field at university.

Key takeaway(s)

- Increasing teachers' awareness of gender disparities in STEM is one of the most important transformations that can be highlighted from this project.
- It was considered of crucial importance to work with both girls and boys to establish a methodology that promotes equity and the reduction of stereotypes.

Campamentos Tecnológicos¹⁰

LAC country(ies): Costa Rica

Topic: Technology

Modality: Non-formal

Part of an umbrella programme

Objective(s):

3. Improving STEM skills through training workshops, events, presentations, and/or lectures

Focus on adolescent girls

Ages: 15–18

Creation date: Not specified

Description

Campamentos Tecnológicos (Technology Camps) is one of the initiatives of the TIC/AS programme portfolio. The aim of the Campamentos Tecnológicos is to enable participants to acquire computing and coding skills through training sessions. These training sessions are organised over 5 days where girls can learn basic concepts to develop a project designed to solve real-life problems.

Key takeaway(s)

Before executing an initiative it is important to first understand levels of access to technology, including labs and laptops, among the initiative's target audience. This information can then be used to inform the development of the initiative's content.

¹⁰ See <https://programatic-as.com/campamentos-tecnologicos/>
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Hackatones Femeninos¹¹

LAC country(ies): Costa Rica

Topic: Technology

Modality: Non-formal

Part of an umbrella programme

Objective(s):

3. Improving STEM skills through training workshops, events, presentations and/or lectures

Focus on adolescent girls and women

Ages: 16–30

Creation date: 2014

End date: Not specified.

Last edition: 2018

Description

Hackatones Femeninos (Female Hackathon) is one of the initiatives of the TIC/AS programme portfolio. The main purpose of this initiative is to enable women to develop digital solutions that tackle a gender equality problem or an issue that they face in their lives. It has a duration of 3 months and is focused on digital technology such as green technology, satellite, and the Internet of Things, among others.

The programme relies on alumni of previous hackathons, who often work in the technology sector, to serve as mentors to hackathon participants.

Impact

The programme's impact is visible through its alumni, some of whom continue to follow careers in the technology sector and who engage with the programme as mentors.

Key takeaway(s)

The combination of technology with the sociocultural context enriches the gender approach to the process. This approach redefines the type of technology that is developed, how it is developed, why it is developed, and for whom it is developed.

¹¹ See <https://programatic-as.com/hackatones/>
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Laboratoria¹²

LAC country(ies): Peru, Colombia, Brasil, México, Chile.

Topic: Coding

Modality: Non-formal

Umbrella programme

Objective(s):

3. Improving STEM skills through training workshops, events, presentations and/or lectures

Focus on young women

Ages: over 18

Creation date: 2014

End date: ongoing

Description

Laboratoria is a training company that offers a programme lasting for 6 months. It consists of a full-time boot camp in which students develop key technical and life skills to work as front-end developers and user experience (UX) designers. Students pay nothing during the programme and, after getting a job, pay back a subsidised amount in monthly instalments. These payments enable other young women to participate in the programme.

Impact

As mentioned in [Laboratoria \(2020\)](#)

- 81% of students who graduated from Laboratoria were placed in tech-related jobs.
- 2.4x was the average wage increase post-boot camp for those students who were earning an income prior to studying at Laboratoria.
- Over 800 companies are partners with Laboratoria and committed to hiring graduate students from their boot camp

Key takeaway(s)

- Programmers / UX designers serve as 'coaches' in the programme and their role involves accompaniment and facilitation.
- The programme offers a space for self-knowledge and reflection, which will help students discover ways of learning that work best for them.
- No exams, only projects. The objective is not to memorise but to put into practice what each student discovers in the world of software.
- Learning by doing. Hackathons are held to solve real challenges of the participating companies.

¹² See <https://www.laboratoria.la/>

Chicas en tecnología (CET)¹³

LAC country(ies):
Argentina and 18 LAC countries

Topic: Technology

Modality: Non-formal

Umbrella programme

Objective(s):

3. Improving STEM skills through training workshops, events, presentations and/or lectures

Focus on adolescent girls and young women

Ages: 13–23

Creation date: 2015

End date: ongoing

Description

Chicas en tecnología (Girls in technology) is an Argentinean non-profit organisation that seeks to close the gender gap in the technological entrepreneurial environment, motivating, empowering, and increasing the knowledge of young women in these areas through different events and workshops. It offers five programmes such as Pumm, Clubes, Chicas líderes TEC, Comunidad and Protagonistas del futuro.

Impact

According to the 2021 CET report, 88.4% of the girls are interested in studying, working or researching in technological areas after participating in the CET programmes.

¹³ See <https://chicasentecnologia.org/sobre-cet/>
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5. Recommendations

The six recommendations below draw upon effective practices and examples from the 12 global and LAC initiatives profiled above, as well as from the [long list](#) of 42 initiatives. This section aims to provide practical suggestions to education decision-makers, policymakers, and programme implementers who seek to design and implement initiatives to improve girls' STEM skills and participation.

1. Consider including caregivers in the implementation of the initiative

Initiatives such as [Clubes de mamás](#), [Girls code](#), and [Chicas click](#) (featured in the long list)¹⁴ invite parents and / or caregivers to participate in STEM activities with their children. Providing opportunities for parents and caregivers to improve their STEM-related skills can enable them to directly support their children's learning. In addition, in the [Niñas STEM pueden](#)¹⁵ programme, analysing parents' level of familiarity with STEM-related topics was considered relevant as a first step to designing such opportunities. Parents and caregivers are also given support to understand how to best accelerate their children's learning and how to tackle gender norms at home. In these programmes, these practices were illustrated as effective to increase and sustain girls' interest in STEM-related topics. Involving parents is presented as an opportunity to allow them and their children to recognise the importance of acquiring STEM skills and the potential benefits of participating in STEM initiatives.

2. Link the teaching of STEM skills with the resolution of real problems

It was considered crucial to analyse the context where an initiative will be implemented, also taking into account the local realities and potential skills of participants — in addition to exploring and considering how STEM-related skills could be used in their everyday lives. This can be used to create impactful and contextualised initiatives, and to motivate participants to understand how acquiring STEM skills could be used in their everyday lives and create new opportunities for them. The [Clubes de mamás](#) is an illustration of this idea, as participating women learned to use digital tools to promote and sell products.

¹⁴ See <https://programatic-as.com/clubes-de-mamas/>
<http://www.girlscode.com.py/en/homee/>
<https://www.fundacionqt.org/iniciativas-fqt/>

¹⁵ See [http://ninastem.aprende.sep.gob.mx/en/demo/home_](http://ninastem.aprende.sep.gob.mx/en/demo/home_STEM_Skills_Initiatives_for_Adolescent_Girls_in_the_LAC_Region)
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This led them to increase their sales, and in turn to increase their motivation, interest and curiosity to further learn how to use digital tools.

[La Voz de las chicas del Centro de América](#)¹⁶ (part of [TIC/AS](#))¹⁷ is another initiative that followed a similar approach by inviting women to use technology to create digital content that illustrated and raised awareness of issues faced in their lives, such as violence, drug use, self-love, and teenage motherhood. In the case of [Laboratoria](#),¹⁸ an initiative that intends to enable young people to access tech-related professional opportunities, students were intended to learn by creating digital tools and solving technology-related issues. They were asked to solve problems often faced by technology companies, to enable them to acquire practical digital skills. The same happens with [Chicas en tecnología](#),¹⁹ which promotes the teaching of technology and digital literacy through projects that seek to solve problems participants face in their community.

3. Consider long-term initiatives rather than one-time events

Providing and considering continuity was considered a key element in the design of STEM initiatives aiming to improve gender equality. In the case of the [TIC/AS](#) programme, the greatest impact was observed when initiatives considered how participants would continue to attend activities, including with different roles (for example by transitioning from being participants to becoming mentors). This was determined to be a key component to creating impact in STEM, and to encouraging girls to take part in a STEM initiative.

The importance of long-term engagement is also visible in the [STEM es para chicas](#)²⁰ initiative, which notes the importance of avoiding one-time events and that longer initiatives are more likely to create sustainable impact and contribute to tackling issues related to gender inequalities in STEM.

As with other development interventions, it can be challenging to scale and sustain STEM initiatives. However, several factors can help increase the sustainability and scalability of such initiatives. For example, programme implementers could regularly engage with government partners, such as departments within a ministry of education responsible for STEM, in order to build opportunities to incorporate STEM practices into government policy and align uptake strategies with the national curriculum / priorities. Programme implementers and designers could also consider financial sustainability from the outset of an initiative, as well as implementing evaluative processes to

¹⁶ See

<https://programatic-as.com/la-voz-de-las-chicas-del-centro-de-america/><https://programatic-as.com/la-voz-de-las-chicas-del-centro-de-america/>

¹⁷ See <https://programatic-as.com/>

¹⁸ See <https://www.laboratoria.la/>

¹⁹ See <https://chicasentecnologia.org/sobre-cet/>

²⁰ See <https://enorbita.org/en-orbita/proyectos/stemesparachicas/>

improve the impact and uptake of an initiative over time. Finally, returning to the concept of intersectionality, it is important for programme designers and implementers to consider how STEM intersects with other inequalities, topics and initiatives, such as other modes of discrimination and socio-emotional learning. Initiatives that support girls to increase or realise their confidence, self-esteem, and agency can, in turn, enable them to take better advantage of STEM-related opportunities, challenge bias in their everyday lives, and develop growth mindsets.

4. Girls' and women's self-esteem should be strengthened prior to or alongside the acquisition of STEM skills

Several of the TIC/AS programme projects, [Girl Power Codefest](#)²¹ and [Laboratoria](#), have included in their methodologies objectives related to the strengthening of self-esteem and the development of soft skills. They included these objectives to help support girls' and women's performance in the world of technology, and therefore to progressively reduce gender stereotypes over time, by virtue of women's participation in this field. Along the same lines, [Rodriguez et al. \(2019\)](#) observed a positive and significant effect on girls and adolescents when they already had high self-esteem when participating in a STEM-related initiative. This finding suggests that programme implementers could explore the relevance of including activities intending to strengthen girls' and women's self-esteem as part of STEM programmes.

The initiative [La Voz de las chicas del Centro de América](#)²² reinforced girls' self-esteem by facilitating presentations about the safe use of technology; inviting girls to analyse videos and songs and reflect on female stereotypes; and by triggering discussions about how stereotypes might affect their daily lives. In more advanced modules, girls can also gain understanding and confidence of their skills and abilities to tackle problems that might affect them directly.

5. Programmes should consider how to reach girls with vulnerable backgrounds

Several LAC initiatives included in this mapping make a dedicated effort to include girls and women from rural areas, ethnic minorities, or in vulnerable situations in the teaching of STEM skills. Such initiatives include [Coderise](#), [TIC/AS](#), [Girls code](#), [Chicas click](#) and [Mujer, Ciencia y Equidad](#).²³ Future initiatives

²¹ See

<https://www.britishcouncil.org/partner/international-development/track-record/girl-power-codefest-americas>

²² See <https://programatic-as.com/la-voz-de-las-chicas-del-centro-de-america/>

²³ See <https://www.coderise.org/>

<http://www.girlscode.com.py/en/homee/>

<https://www.fundacionqt.org/iniciativas-fqt/>

<https://mujercienciaequidad.minciencias.gov.co/>

should consider additional dimensions related to equity and intersectionality to ensure that programmes intending to improve gender equality in STEM reach, support, and impact girls in an inclusive and egalitarian way, including by considering the participation of boys and men.

Many initiatives recognise the importance of including girls from vulnerable backgrounds and living in remote areas, however, only a few of them have practical information related to how to include them in practice. The initiative [Campamentos Tecnológicos](#)²⁴ presented practical measures and considerations to involve girls with marginalised backgrounds. These involved:

- Providing a safe and well-connected location for participants travelling by bus or train or other low-cost modes of transportation.
- Considering resources to cover public transport costs for young women who cannot afford them.
- Providing a waiting room for caregivers and a childcare room for teenage or young mothers.
- Having staff in charge of visiting schools that are close to the location where the activities will take place and inviting girls to participate in this initiative.

6. There is a gap in terms of information on impact, scalability, and level of ICT access

While there are many initiatives in Latin America focused on STEM skills for girls and adolescents, there are limited evaluative and rigorous studies available on the impact of these programmes. With limited evidence, it can be difficult to discern whether an initiative contributed to girls' participation in STEM fields. Since many of the initiatives mapped in this report are recent or of short duration, it may be too early to access such evaluations or studies.

Information on the scalability of initiatives to promote girls' involvement in STEM is also limited. Although the information on the number of participants, events, or the countries to which the initiative extends is usually known, there is very little information on strategies that programmes have used to scale up to reach greater numbers of participants, or to extend their impact in other ways — and especially to reach marginalised groups.

Even less data is available on the ICT levels of the target population of each initiative. However, in cases such as the [TIC/AS programme](#), many participants find their first contact with technology through the programme itself. This suggests that populations targeted by STEM skills initiatives may have limited

²⁴ See <https://programatic-as.com/campamentos-tecnologicos/>
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access to technology and that it could be relevant to include training on digital literacy as part of these programmes.

On the other hand, some initiatives such as [Mujer, Ciencia y Equidad](#)²⁵ require participants to have previous experience or studies in STEM fields in order to participate in the programme. While this strategy may be appropriate for some initiatives supporting the development of more advanced STEM skills, it is important that initiatives, especially those targeting younger girls, avoid preconditions or requirements that would further limit or deter girls' participation. In light of these gaps in information on impact, scalability, and the ICT levels of target populations in STEM initiatives, it will be important for ongoing and future initiatives to capture and report this information whenever possible.

²⁵ See <https://mujercienciaequidad.minciencias.gov.co/>
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Bibliography

This bibliography is available digitally in our evidence library at <https://docs.edtechhub.org/lib/I8GTEI7T>

Aauw. (2021). *The STEM Gap: Women and Girls in Science, Technology, Engineering and Mathematics*. AAUW : Empowering Women Since 1881. <https://www.aauw.org/resources/research/the-stem-gap/>. (details)

Alesina, A., Carlena, M., La Ferrara, E., & Pinotti, P. (2018). *Revealing Stereotypes: Evidence from Immigrants in Schools*. <https://www.iza.org/publications/dp/11981/revealing-stereotypes-evidence-from-immigrants-in-schools>. (details)

Basco, A. I., & Lavena, C. (2019). *Un potencial con barreras: La participación de las mujeres en el área de Ciencia y Tecnología en Argentina* / Publications. https://publications.iadb.org/publications/spanish/document/Un_potencia_l_con_barreras_la_participaci%C3%B3n_de_las_mujeres_en_el_%C3%A1rea_de_Ciencia_y_Tecnolog%C3%AD_a_en_Argentina_es_es.pdf. (details)

Basco, A. I., Carballo, M., Pernas, M., Alzualde, P., Codoni, S., Conte Grand, R., Wulff, A., Basco, A. I., & Carballo, M. (2017). *Compás Millennial: La generación Y en la era de la integración 4.0*. Inter-American Development Bank. <https://doi.org/10.18235/0000726>. Available from <https://publications.iadb.org/handle/11319/8347>. (details)

Eige. (2021). *How gender equality in STEM education leads to economic growth*. European Institute for Gender Equality. <https://eige.europa.eu/gender-mainstreaming/policy-areas/economic-and-financial-affairs/economic-benefits-gender-equality/stem>. (details)

Laboratoria. (2020). *Laboratoria: Reporte de Impacto 2020.pdf*. Available from https://f.hubspotusercontent20.net/hubfs/2994420/Laboratoria_Reporte%20de%20Impacto_2020.pdf?hsCtaTracking=c8ac5b5d-c512-4d2d-b2ed-9584e8eb40e9%7Ccc881523-57ea-49a2-ad62-f014a5dc22a5. (details)

PISA. (2018). *The Programme for International Student Assessment (PISA)*. https://www.oecd.org/pisa/publications/PISA2018_CN_ARG.pdf. (details)

Perasso, V. (2017, October 9). 100 Women: “We can’t teach girls of the future with books of the past.” *BBC News*. <https://www.bbc.com/news/world-41421406>. (details)

Rodriguez, L., Rivera, A., Orjeda Fernandez, G., Caillaux Icochea, M., & Quiroz Zafra, S. (2019). *Evaluación de Impacto. Proyecto: Rompiendo Estereotipos, STEM es para chicas*.

<http://enorbita.org/wp-content/uploads/2019/08/En-Orbita-Evaluacion-de-Impacto.pdf>. (details)

UN Women. (2020). *Women in Science, Technology, Engineering and Mathematics (STEM) in the Latin America and the Caribbean Region*. UN Women | Americas and the Caribbean.

<https://lac.unwomen.org//digiteca/publicaciones/2020/09/mujeres-en-cien-cia-tecnologia-ingenieria-y-matematicas-en-america-latina-y-el-caribe>. (details)

UNESCO. (2017a). *Cracking the code: girls' and women's education in science, technology, engineering and mathematics (STEM) - UNESCO Digital Library*. <https://unesdoc.unesco.org/ark:/48223/pf0000253479>. (details)

UNESCO. (2017b). *Measuring Gender Equality in Science and Engineering: The SAGA Toolkit*.

<https://repositorio.minedu.gob.pe/handle/20.500.12799/5727>. (details)

UNGEI. (2021, May 11). *STEM: breaking gender stereotypes*. UNGEI.

<https://www.ungei.org/blog-post/stem-breaking-gender-stereotypes>. (details)

UNICEF, & ITU. (2020). *Towards an equal future: Reimagining girls' education through STEM*.

<https://www.unicef.org/reports/reimagining-girls-education-through-stem-2020>. (details)

UNICEF. (2020). *Mapping gender equality in STEM from school to work | UNICEF Office of Global Insight & Policy*.

<https://www.unicef.org/globalinsight/stories/mapping-gender-equality-stem-school-work>. (details)

University of Virginia. (2009). *Citizens In 34 Countries Show Implicit Bias Linking Males More Than Females With Science*. ScienceDaily.

<https://www.sciencedaily.com/releases/2009/06/090622171410.htm>. (details)

Wood, J. (2020). *How many women work in STEM?* World Economic Forum.

<https://www.weforum.org/agenda/2020/02/stem-gender-inequality-researchers-bias/>. (details)

Zhang, S. (2015). *Argentina Has More Women in Science—But It Hasn't Fixed Sexism*. Wired.

<https://www.wired.com/2015/11/argentina-many-female-astronomers/>. (details)