Building Futures in STEM from Southern Chile: Experiences to Foster Vocations and Promote Gender Equity⋆

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Abstract

The persistent gender gap in STEM (Science, Technology, Engineering, and Mathematics) continues to be a critical challenge in Latin America, particularly during early educational stages. This article presents a systematization of two gender-oriented initiatives implemented in southern Chile that aim to promote equity in STEM from secondary education: the *Yo Quiero Ser Ingeniera* program, launched in 2018 by the Faculty of Engineering and Science at Universidad de La Frontera, and two editions of the *STEM CAMVIT Camp*, in Lican Ray in the 2023 and 2024 version. Both initiatives seek to foster early interest and vocations in STEM among girls and adolescents, strengthen inclusive learning communities, and provide female role models in engineering and science. Through a qualitative, experience-based approach, this study analyzes their main achievements, challenges, and lessons learned. The results highlight critical success factors for gender-responsive interventions in education and offer insights into their sustainability and adaptability in diverse territorial contexts. This article contributes to the development of inclusive pedagogical strategies that empower girls and adolescents to envision themselves as future leaders in science and technology.

Keywords

Gender Gap, STEM vocations, Equity, Female role, Secondary education, Women communities

1. Introduction

In recent decades, efforts to reduce gender gaps in STEM have gained institutional and academic momentum. Still, women remain underrepresented both in education and the workforce. Globally, fewer than 30% of science and technology researchers are women [1], and female enrollment in STEM fields, especially in engineering and IT, remains disproportionately low [2]. These disparities point not only to numerical gaps, but to deeper issues tied to stereotypes, the lack of female role models, and exclusionary institutional cultures.

Organizations like UNESCO and ECLAC stress the importance of incorporating a gender lens in STEM education, urging multidimensional strategies that go beyond access to include retention, recognition, and leadership [3, 1]. Education thus becomes a key space to challenge stereotypes and shape new imaginaries.

In Latin America, these inequalities are compounded by social and territorial disparities. Early vocational decisions are influenced by internalized gender biases that undermine confidence in fields

like math or computing [4, 5]. These dynamics demand early interventions that expand aspirations and provide relatable role models. Rural and semi rural areas face more acute challenges, requiring intersectional approaches that consider local, socioeconomic, and cultural conditions [1]. Programs that combine experiential STEM learning with mentoring and equity frameworks have shown positive outcomes for girls' motivation and persistence [6, 7, 8]. Yet, policy responses remain uneven and often fail to transform the cultural norms within STEM environments.

Community based and university driven initiatives offer promising alternatives. When STEM education aligns with local realities, it becomes a tool for transformation. This article explores two Chilean initiatives: *Yo Quiero Ser Ingeniera*, launched by Universidad de La Frontera in 2018, and the *STEM CAMVIT Camp*, held in Licán Ray in 2023 and 2024. Both provide immersive, gender sensitive STEM experiences rooted in territorial engagement.

Through a qualitative and reflective lens, we systematize these initiatives to highlight their design, methodologies, and contributions to inclusive STEM practices and the building of women's communities across Latin America.

2. Background

Early engagement in STEM is crucial for shaping girls' academic and professional paths. Career aspirations begin in childhood and adolescence and are deeply influenced by educational and sociocultural factors [9]. However, internalized gender stereotypes often weaken girls' self efficacy in areas like math and computing [4], [5], creating invisible barriers that limit their imagination of a future in STEM. Promoting inclusive pedagogies is therefore essential to foster sustained interest and equitable access.

Educational settings often reproduce gender bias. Studies show that girls are frequently exposed to messages from teachers, peers, media, or curriculum that frame STEM as male dominated [10], [7]. These signals shape their academic decisions and performance expectations. Gender responsive teaching must actively challenge these stereotypes and offer spaces where girls feel recognized and competent in STEM.

Support networks also play a key role. Formal and informal communities of women in STEM offer mentoring, shared experiences, and emotional support, especially in male dominated contexts [11], [8]. These communities promote belonging and persistence, particularly during critical transitions in education. Advancing equity requires structural change. As UNESCO and ECLAC note, true equity goes beyond enrollment, it includes visibility, recognition, and representation in decision making [1], [3]. Institutions must address systemic exclusion and reimagine who belongs in STEM and whose contributions are valued.

In this context, gender sensitive STEM education is a critical framework. It prioritizes inclusive curricula, participatory methods, and affirming students' identities, especially for those from marginalized groups [12]. Core strategies include teacher training and contextualized STEM learning that dismantle classroom bias.

Lastly, female role models have proven to boost girls' motivation and sense of belonging. Exposure to women in STEM through teaching, mentoring, or media enhances confidence and offers concrete proof that success is attainable and diverse [7], [13], particularly when those role models share the students' own backgrounds.

2.1. Gender and STEM in Chile: Policies, Gaps, and Initiatives

To understand girls' participation in STEM in a critical and situated way, it is important to consider the interplay of early vocational interests, gendered expectations, school based stereotypes, and access to inclusive pedagogies and mentorship. These factors shape how girls engage with science and technology, and their impact must be analyzed within a dynamic system of structural constraints and individual agency.

Despite growing awareness, women remain underrepresented in STEM in Chile. As of 2022, only 19% of first year university students in STEM fields were women, with even lower participation in

Table 1
Comparison of Gender and STEM Initiatives in Chile.

Initiative	Type of Organization	Target Population	Main Focus
Ingeniosas	NGO / Foundation	Girls aged 10–18	Hands on STEM workshops, mentoring, professional networks
Technovation Girls Chile	International NGO	Teenage girls	Mobile app development, teamwork, entrepreneurship
Chicas STEAM (Explora RM)	Public program	Primary and secondary students	Scientific camps, female role models, playful learning
Geek Girls LatAm	Regional community	Girls, youth and adult women	Digital education, leadership and tech empowerment
Girls in Tech Chile	Global NGO (local chapter)	Young women and professionals	Workshops, visibility, labor market inclusion
Yo Quiero Ser Ingeniera	Public university (UFRO)	Girls and adolescents from La Araucanía	Campus visits, technical workshops, leadership and mentoring
STEM CAMVIT Camp	Public university (UFRO)	High school girls and teachers	Immersive STEM learning, territorial and pedagogical approach

engineering and computing [14]. These gaps are tied to deep rooted barriers that emerge early in schooling and are reinforced by gender stereotypes, family expectations, limited exposure to STEM, and the lack of female role models particularly in rural and underserved areas [15].

In response, several public and civil society initiatives have emerged. The Ingeniosas program, supported by Fundación Girls in Tech Chile and UNESCO, provides STEM workshops and mentoring for girls from diverse backgrounds [16]. Technovation Girls Chile encourages digital innovation through app development projects led by teenage girls. At the policy level, the Ministry of Science launched the 2021 National Policy on Gender Equality in CTCI, which includes over 30 measures to promote equity in science and innovation [17], see Table 1.

In addition to public efforts, civil society and academia have fostered a dynamic landscape of programs aimed at promoting gender inclusion in STEM. Initiatives such as "Girls in Tech Chile", "Ingeniosas", "Chicas STEAM", "Geek Girls LatAm", and "Technovation Girls Chile" provide a range of experiential opportunities for girls and adolescents. These include coding workshops, mentoring networks, public awareness campaigns, hackathons, and mobile app development guided by social impact. Many of these programs are concentrated in urban areas and focus on digital empowerment or early innovation, supported by international organizations such as UNESCO and UN Women. Although they represent important strides toward equity, fewer initiatives are designed to reach rural school communities, promote intergenerational collaboration with teachers, or embed STEM training within territorially situated learning environments.

This context underscores the relevance of university led initiatives like *Yo Quiero Ser Ingeniera* and the *STEM CAMVIT Camp*, which adopt a gender and territory sensitive perspective. These programs not only respond to national policy goals but also fill critical gaps by building sustained, inclusive and place based engagement with STEM from early educational stages. In the following sections, we analyze their structure, methodologies, and contributions to the broader ecosystem of gender equity in Chilean science and technology.

2.2. Chile's southern region faces the STEM gap: La Araucanía

While Chilean national policies have begun addressing gender gaps in STEM, they often fail to account for the territorial inequalities that shape the educational landscape. Southern regions such as La Araucanía, Los Ríos, and Los Lagos face ongoing challenges in infrastructure, teacher development, and curricular innovation, especially in rural areas [18], [19]. These disparities limit meaningful access to science and technology for girls, both in schools and extracurricular settings.

Studies show that rural girls in Chile face dual exclusion: gendered expectations and limited access to STEM resources, such as labs, clubs, or female mentors [20]. The absence of local role models reinforces perceptions of STEM as distant from everyday life and identity.

Nonetheless, southern Chile has also become a space of educational innovation. Universities and NGOs have developed programs in collaboration with schools that include female scientists as mentors and facilitators. These initiatives offer bottom up responses to systemic exclusion by combining gender equity with territorial relevance. *Yo Quiero Ser Ingeniera* and the *STEM CAMVIT Camp*, both based in La Araucanía, embody this approach. They serve not only as early intervention strategies but also as platforms for reimagining science through identity, community, and local development.

The following section presents these two initiatives and their contributions to reducing gender gaps and motivating secondary students and educators in STEM.

3. *Yo Quiero Ser Ingeniera*: Early orientation and inclusion in Engineering and Sciences.

The program *Yo Quiero Ser Ingeniera* [21], was created in 2018 by the Dirección de Vinculación con el Medio de la Facultad de Ingeniería y Ciencias (FICA) of the Universidad de La Frontera (UFRO), as a concrete strategy to address the low representation of women in STEM careers, especially in engineering, technology and sciences. Unlike initiatives aimed solely at vocational promotion, this program aims to guide female high school students in their process of choosing and applying to university, offering early, relevant and meaningful experiences that contribute to informed and sustained decisions over time.

In its first editions, the program was aimed at 3rd and 4th year high school students, which allowed a gradual approach to university life. However, it is now focused mainly on 4th grade students, with some exceptions, in order to reinforce the decision making process at a critical stage of transition to higher education.

The program contemplates five fundamental axes: (1) vocational orientation to explore real interests in engineering and science, (2) practical and experiential experiences to learn about professional work, (3) detailed presentation of the different careers offered at FICA, (4) generation of a Special Admission pathway through the category "Participant in Early Linkage Activities", and (5) subsequent institutional support for students who enroll in the Faculty. The current call offers 40 places per edition, and the activities are carried out in person and free of charge, between the months of May and August, with sessions on Fridays from 15:00 to 17:00 hours. The program includes thematic workshops, vocational orientation, visits to laboratories, extra classroom contests and mentoring spaces, all designed with a practical, collaborative and inclusive approach.

The activities are led by academics, professionals and university students from FICA, who guarantee access to all the necessary materials and promote direct dialogue with the university community.

The computer and informatics area has played a leading role through workshops on logical thinking, programming and technological challenges, allowing students to approach technical knowledge and challenge gender stereotypes in an active learning environment.

In addition, the intergenerational component of the program, which involves female academics, graduates and student mentors, allows the establishment of meaningful links and offers real references for those who come from contexts with low female representation in science and technology.

With seven editions carried out, *Yo Quiero Ser Ingeniera* has been consolidated as an institutional strategy of early linkage with a gender focus, which articulates teaching, extension and inclusion
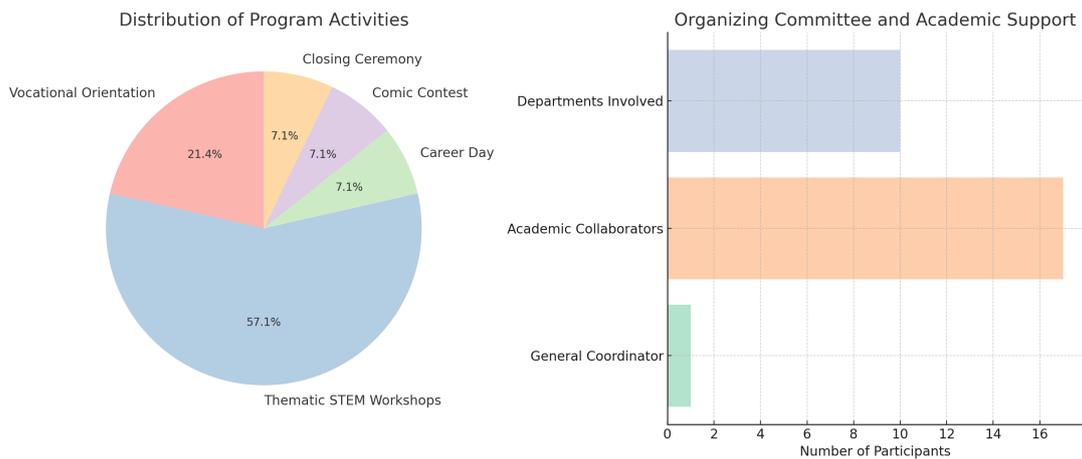
Figure 1: Organizing Committee And Academic Support 2024.

policies. Its evolution reflects FICA's sustained commitment to building a more equitable, territorially relevant and culturally transformative training ecosystem.

One of the outstanding and highly valued benefits of the program is the possibility of applying to careers in the Faculty of Engineering and Sciences through Special Admission, through the category "Participant in Early Linkage Activities". This path is specifically designed to recognize the formative trajectory of students who have actively participated in the program, and allows them to enter the university through a modality other than regular admission, as long as they have at least 85% attendance to the programmed activities.

This mechanism not only broadens access opportunities for talented young women interested in engineering and science, but also gives institutional visibility to their effort, commitment and early motivation to join a challenging academic environment. In addition, it reinforces the transformative nature of the program, reconfiguring the link between secondary and higher education based on formative criteria and not exclusively standardized, as is the case with the university entrance exam. From a gender perspective, this admission policy also represents an advance towards equity in the admission to careers underrepresented by women, and allows consolidating the sustained work of the Faculty in terms of inclusion, permanence and educational justice.

Regarding program evolution, participation and intake impact, the *Yo Quiero Ser Ingeniera* program has shown remarkable continuity and institutional relevance since its launch in 2018. Over seven editions, it has engaged hundreds of high school students through immersive STEM activities with a gender equity lens. The program not only provides mentoring and academic experiences, but also serves as a gateway to engineering education through a special admissions pathway, see Figure 1.

The top graph shows the number of students who participated in each edition of the program, which peaked in 2021 with 215 participants, and has since moved to a more female focused model for high school seniors, with a smaller format. The graph below shows the number of participants who were admitted to the Faculty of Engineering and Science (FICA) at Universidad de La Frontera the year following their participation, see Figure 2. Admission rates have remained constant, with an annual average of 18 to 24 students entering FICA through this route, even though overall participation has varied. In recent years, despite a deliberate reduction in cohort size (e.g., 40 students in 2023 and 2024), the conversion rate between participation and admission has remained strong, underscoring the program's effectiveness as a strategic tool for early outreach and sustained inclusion (2025 also already selected 40 participants).

Based on Table 2, it is evident that Civil Industrial Engineering[1] consistently stands out as the most

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[1] In the Chilean context, the term "Civil Engineering" in a degree title does not necessarily refer to the field of infrastructure or structural engineering. Rather, it denotes a professional degree of approximately six years in duration, which grants a licenciatura and formally qualifies graduates to practice as engineers. Degrees such as Civil Industrial Engineering or Civil
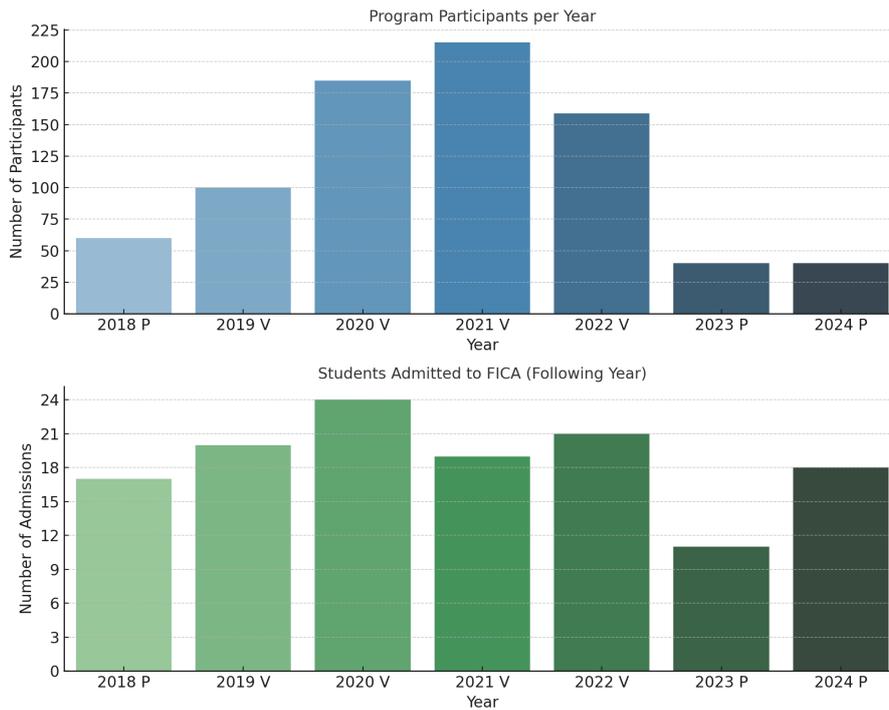
Figure 2: Students Admitted To FICA (Following Year).
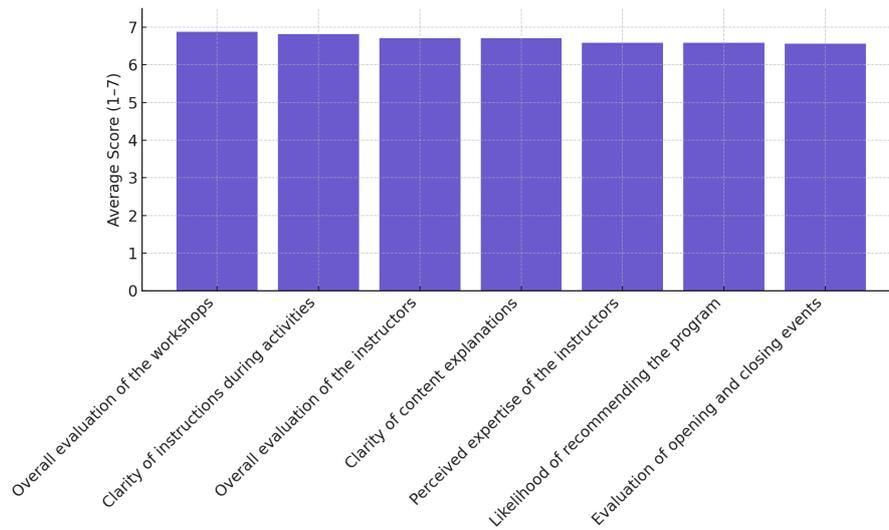
Figure 3: Evaluation results for the *Yo Quiero Ser Ingeniera* 2024).

selected program over the years. This trend may reflect both the cross disciplinary character commonly attributed to the field and the influence of early exposure provided by the initiatives described. Other programs that show sustained interest include Civil Engineering, Civil Chemical Engineering, and the Common Plan in Civil Engineering. In contrast, computing related areas such as Civil Computer Engineering and Informatics Engineering show lower and more variable participation, suggesting ongoing challenges in attracting young women to these fields. These results highlight the importance of maintaining targeted efforts to strengthen girls' and adolescents' engagement with computing and digital technologies. The evaluation results for the 2024 edition of the *Yo Quiero Ser Ingeniera* program show consistently high levels of participant satisfaction across all evaluated areas, see Figure 3. The

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Computer Engineering are independent disciplines, not subfields of traditional civil engineering.

Table 2

Admissions to FICA by Program and Year (includes income cohort 2025).

Program	2019	2020	2021	2022	2023	2024	2025	Total
Biochemistry	1	1	0	1	1	0	1	5
Civil Engineering	5	2	4	3	2	2	1	19
Civil Environmental Engineering	1	1	1	0	0	0	0	3
Civil Electrical Engineering	0	0	2	0	1	0	1	4
Civil Industrial Engineering	3	5	6	6	3	5	6	34
Civil Computer Engineering	1	0	1	3	2	0	3	10
Civil Mathematical Engineering	0	0	1	1	1	1	0	4
Civil Chemical Engineering	0	2	3	2	4	1	2	14
Civil Telematics Engineering	0	0	0	0	1	0	0	1
Construction Engineering	1	2	1	1	1	2	1	9
Informatics Engineering	1	3	1	0	1	0	1	7
Civil Biotechnology Engineering	1	0	0	1	0	0	0	2
Civil Mechanical Engineering	1	0	0	0	1	0	0	2
Common Plan in Civil Engineering	2	4	4	1	3	0	2	16

perceived expertise of instructors received the highest average score (6.88), followed by the overall quality of instruction and clarity of content delivery. The workshops and logistical aspects such as instructions and event organization were also highly rated, indicating a well structured and meaningful experience. Notably, the strong score for willingness to recommend the program (6.61) reflects a deep sense of appreciation and value among participants. These findings highlight the 2024 version's success in fostering a positive and empowering STEM learning environment for young women. The program will be renewed for the year 2025 with a new implementation format. The proposal contemplates working with focused groups of 20 students per cycle, developing a cohort during the first semester of the year and another during the summer season. The program will continue to focus on fourth grade students, but does not exclude the participation of third grade students who demonstrate motivation and interest in the program. Although there is not yet sufficient data to establish trends, a key indicator is the number of participants entering STEM careers. It is hoped that a longitudinal follow-up will be implemented in the future to assess their effective engagement with these areas.

4. *CAMVIT STEM Camp*: building scientific identity and sense of belonging from the territory.

Over the course of two editions held in January and December 2024, the *CAMVIT STEM Camp* [22] has become a distinctive and innovative educational experience aimed at reducing gender gaps in science and technology through experiential learning, early university engagement, and the strengthening of school communities. Organized by the Center for Mathematical Support and Early Engagement (CAMVIT) of the Universidad de La Frontera (UFRO), the camp is designed for high school girls and their science or mathematics teachers from various communes in southern Chile. The initiative places particular emphasis on working with rural and underrepresented areas in the Region of La Araucanía and its surroundings, where structural educational inequalities and the absence of female role models have a direct impact on the vocational aspirations of adolescent girls.

The first edition of the camp brought together 36 students and 10 teachers from 10 different municipalities in the region, while the second involved 40 students and 10 teachers from 6 municipalities in Araucanía and 2 in neighboring regions. Both editions featured the active participation of faculty from five academic departments at UFRO, as well as university students from gender focused STEM groups such as NUMIC, WIE, and MIngTech, who acted as peer mentors and facilitators.

The camp was designed with a strong mathematical component by academics from the Department of Mathematics and Statistics, integrating a playful and collaborative approach. Students and professors

Workshop Topics – January 2024
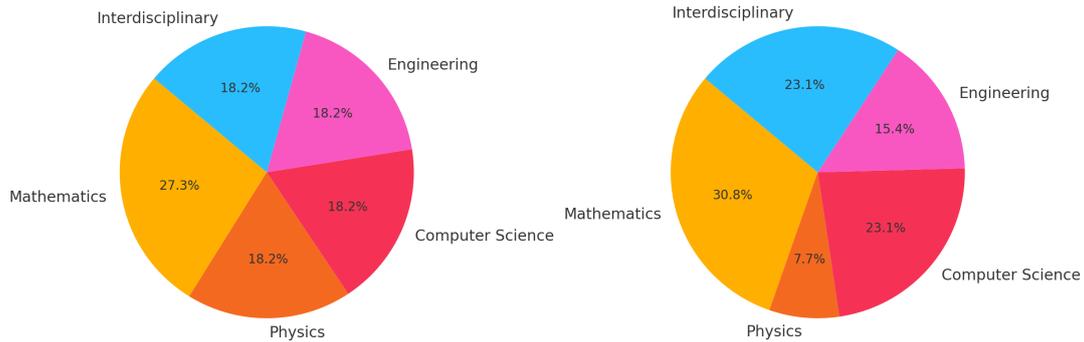
Workshop Topics – December 2024

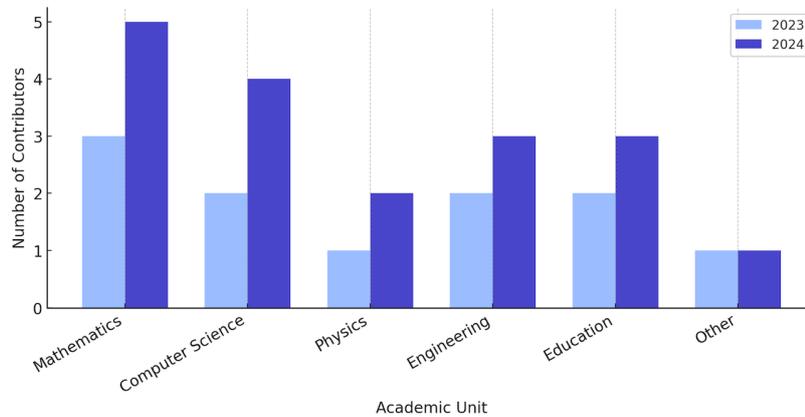**Figure 4:** Workshop Topics – December 2024 and January 2023.

Figure 5: Academic participation by UFRO unit in the *STEM CAMVIT camps* of 2023 and 2024.

participated in hands-on activities on geometry, logical reasoning, probability, graph theory and problem solving. These experiences, regularly promoted by CAMVIT, seek to reduce gender gaps in mathematical learning, detectable as early as elementary school, and to foster confidence in girls and adolescents to face scientific challenges.

The intensive three-day camp offers an interdisciplinary program with workshops in mathematics, 3D design, robot programming, optics, probability, applied physics and emerging technologies (see Figure 4). The sessions are led by academics and instructors from careers such as Common Plan Engineering, Computer Science, Physics and Mathematics (see Figure 5), promoting active learning and teamwork. The Department of Education also offers spaces for accompanying teachers, focused on innovative methodologies and inter-municipal pedagogical networks (see Figure 6). The Math Fair stands out as one of the most valued activities, with exploration stations where students face practical challenges and re-signify school knowledge from a participatory and close experience.

Notably, the initiative is sustained entirely through the voluntary commitment of faculty members, students, and collaborating departments. Funding is obtained through internal efforts led by CAMVIT to cover food, lodging, and basic supplies, while all teaching, material preparation, and logistical coordination are carried out without monetary compensation. This model reflects a concrete institutional commitment to gender equity and meaningful community engagement.

Beyond its educational impact, the camp has functioned as a space for institutional articulation and strengthening of the university–school relationship, which is especially relevant in contexts marked
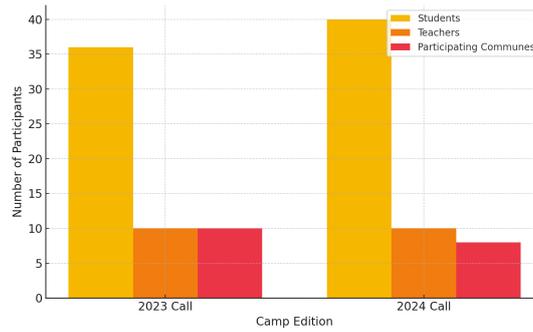
**Figure 6:** Participation in *STEM CAMVIT Camp*, December and January.
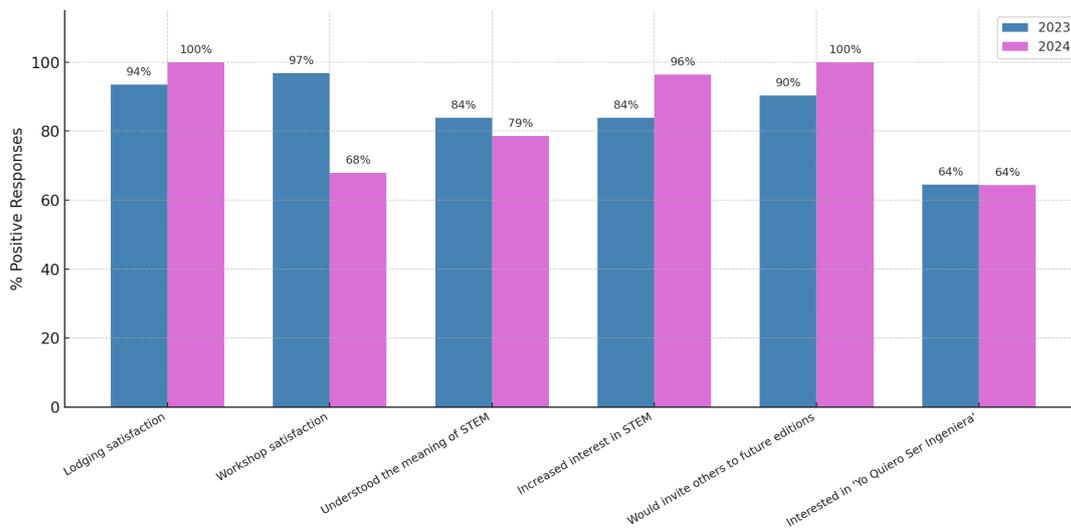
Figure 7: Comparison Of STEM Camp Survey Results (2023 Vs 2024).

by geographic dispersion. Collaboration with municipal and subsidized high schools from various municipalities has made it possible to identify concrete educational needs, build trust among educational actors, and move toward a shared construction of knowledge, see Figure 8. In this sense, the sustained participation of high school teachers not only as companions but also as active learners in their own right has been one of the distinguishing features of the CAMVIT model.

Furthermore, the integration of university student groups with a gender perspective has enriched the experience through an intergenerational component that fosters identification, empathy, and community building. Peer mentors not only share technical knowledge but also life stories, strategies of resistance, and valuable lessons that enable adolescent girls to envision themselves in traditionally male dominated careers. This collaboration between faculty, students, and teachers forms a support network that extends beyond the event itself and lays the groundwork for ongoing mentoring.

The camp's educational approach also deserves special mention. Unlike programs focused solely on promoting or showcasing careers, CAMVIT offers an immersive experience that combines mathematical reasoning, experimentation, creativity, and the resolution of real world problems. Activities are designed to challenge gender stereotypes associated with logic, abstraction, or technology, and foster active learning where error, collaboration, and curiosity are central. This experiential pedagogy with a gender perspective is key to cultivating informed and sustainable STEM vocations.

The integration of informatics and computer science is a relevant component of the *CAMVIT STEM Camp*, offering high school students an educational experience in these areas. Considering the gender gap that persists in technological disciplines, the camp includes hands on workshops that allow participants to explore basic notions of programming, robotics, algorithmic thinking and 3D modeling.
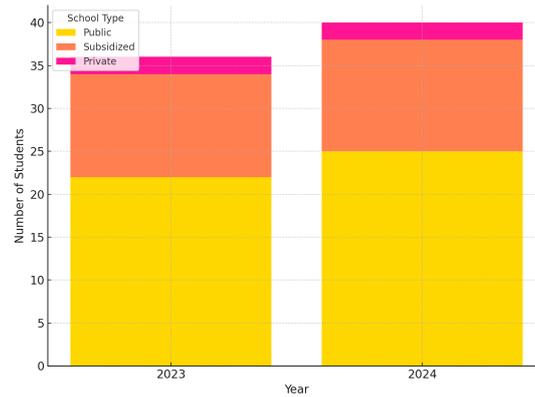
Figure 8: Evolution of student participation according to type of establishment (public, subsidized, private).

These sessions are led by academics from the Computer Engineering area of Universidad de La Frontera, who provide not only technical knowledge, but also pedagogical strategies aimed at inclusive learning, showing the importance and role of women in STEM Technology. Together with them, university students members of groups with a gender focus in computing such as MIngTech and WIE act as peer mentors, sharing with the teenagers their academic trajectories, personal experiences and challenges experienced in their training process as women specifically in computer science careers.

This component of the camp challenges traditional stereotypes that associate computer science with masculine logic or solitary work. On the contrary, it promotes a collaborative, creative and socially meaningful vision of the use of technology. Female students are encouraged to see computing and informatics not only as a set of technical skills, but as a tool for expression, innovation and empowerment.

Furthermore, by placing technologies in an interdisciplinary and gender sensitive context, *Camp CAMVIT* demonstrates how early and positive exposure can strengthen a sense of belonging and agency in girls who might not otherwise consider this area as a possible option. This approach aligns with international recommendations that promote female participation in computing through contextualized, community based interventions.

The comparative bar chart reveals a consistently high level of positive responses across both editions of the STEM Camp, particularly regarding lodging satisfaction and willingness to recommend the experience to others, see Figure 7. Notably, the 2024 cohort showed a significant increase in understanding the concept of STEM and reported greater interest in pursuing STEM areas after the camp. However, satisfaction with the workshops decreased compared to 2023, which may point to differing expectations, content delivery, or thematic alignment. Despite this, the upward trend in motivation and program continuity interest suggests a strong perceived impact among participants. In future versions, systematic monitoring is planned to measure sustained interest in STEM. As an initial approach, indicators such as stated interest at the end of the program and participation in similar activities (quotes from students) are being considered. Finally, testimonies from participants collected through interviews, journals, and audiovisual records reflect significant transformations. For many, it was their first time visiting a university or using scientific equipment under equitable conditions. These experiences not only open personal and academic horizons but also reaffirm the potential of initiatives like this one to generate long term impact. The information collected was systematized based on workshop records, feedback forms, and standardized field notes.

5. Conclusions

Gender gaps in science, technology, engineering, and mathematics are not a matter of ability but of conditions: of trajectories limited by stereotypes, of educational spaces that exclude, and of policies that do not always reach the territories where they are most urgently needed. This article has shown that it is possible to confront these inequalities from the South, from the community, and from the public

university, with initiatives that not only awaken vocations but also build new ways of belonging to the scientific world.

The experiences systematized in this work, *Yo Quiero Ser Ingeniera* and the *STEM CAMVIT Camp*, are not isolated efforts but part of a broader movement that challenges historical structures and expands the horizons of girls, adolescents, and teachers in rural and underrepresented contexts. By articulating inclusive pedagogical approaches, intergenerational collaboration, and territorial engagement, these actions allow us to imagine a future in which science is not neutral, but diverse, situated, and deeply human. Although both initiatives seek to encourage female participation in STEM, they differ in their target audience and methodologies. The *STEM CAMVIT Camp* focuses on sparking scientific vocations in teenagers through immersive experiences and fun activities, while *Yo Quiero Ser Ingeniera* aims to retain and empower female university students through mentoring, workshops, and ongoing support. This diversity of approaches allows for a complementary approach to addressing gender gaps at different stages of the educational cycle. The students speak out: "I never imagined myself in a laboratory, and now I don't want to leave it" (Student, 16 years old, Camp 2024), "After meeting the engineers from UFRO, I feel that I can be one too" (Student, YQSI 2023 talk).

Faced with an ecosystem of interventions that remains fragmented [1], these experiences highlight the power of relational, collective, and transformative strategies. Promoting gender equity in STEM is not merely an educational or political objective; it is an ethical and urgent task that challenges every level of the system. From this perspective, the article provides not only evidence but also inspiration to continue opening new paths, because the data clearly show that targeted, context-aware initiatives can have a meaningful impact on vocational choices and self perception. However, both experiences show potential for scalability if they are maintained as permanent programs with core funding. Their sustainability requires political will and clear governance structures within the university. Both experiences present elements that can be replicated in other territories, but their long-term sustainability requires political will, clear governance structures within the university, continuous team training, and secure core funding. Only within this framework could they be maintained as permanent programs with real potential for scalability.

Acknowledgments

Declaration on Generative AI and CEC

AI is used to translate texts and reformulate sentences and improve clarity. This article has been approved by the UFRO Scientific Ethics Committee, resolution ACTA 106 21 of project folio 104/21.

References

[1] UNESCO, Cracking the Code: Girls' and Women's Education in STEM, UNESCO Publishing, 2017. URL: https://unesdoc.unesco.org/ark:/48223/pf0000253479.

[2] OECD, The missing entrepreneurs 2021: Policies for inclusive entrepreneurship, 2021. URL: https://doi.org/10.1787/71b7a9bb-en.

[3] ECLAC, Women's autonomy in changing economic scenarios, 2020. URL: https://www.cepal.org/en/publications/46405-womens-autonomy-changing-economic-scenarios.

[4] L. Bian, S.-J. Leslie, A. Cimpian, Gender stereotypes about intellectual ability emerge early and influence children's interests, Science 355 (2017) 389–391. doi:10.1126/science.aah6524.

[5] A. Master, A. N. Meltzoff, Gender stereotypes about stem abilities start early and have consequences, Proceedings of the National Academy of Sciences 118 (2021). doi:10.1073/pnas.2115529118.

[6] A. B. Diekman, E. R. Brown, A. M. Johnston, E. K. Clark, Malleability in communal goals and beliefs influences attraction to stem careers: Evidence for a goal congruity perspective, Journal of Personality and Social Psychology 101 (2011) 902–918. doi:10.1037/a0025199.

[7] N. Dasgupta, Ingroup experts and peers as social vaccines who inoculate the self-concept: The stereotype inoculation model, Psychological Inquiry 22 (2011) 231–246. doi:10.1080/1047840X.2011.607313.

[8] H. Etzkowitz, C. Kemelgor, B. Uzzi, Athena Unbound: The Advancement of Women in Science and Technology, Cambridge University Press, 2000.

[9] M.-T. Wang, J. L. Degol, Gender differences in stem career interest: The role of goal congruity, Educational Psychologist 52 (2017) 109–127. doi:10.1080/00461520.2017.1288576.

[10] S. Cheryan, S. A. Ziegler, A. K. Montoya, L. Jiang, Why are some stem fields more gender balanced than others?, Psychological Bulletin 143 (2017) 1–35. doi:10.1037/bul0000052.

[11] American Society for Microbiology, The importance of mentorship and community for women in stem, 2024. URL: https://asm.org/articles/2024/october/women-stem-importance-mentorship-community.

[12] M. Manchenko, et al., Gender-sensitive pedagogy for stem disciplines, 2022. URL: https://www.researchgate.net/publication/362094648.

[13] T. C. Dennehy, N. Dasgupta, Female peer mentors early in college increase women's positive academic experiences and retention in engineering, Proceedings of the National Academy of Sciences 114 (2017) 5964–5969. doi:10.1073/pnas.1613117114.

[14] Ministerio de Educación de Chile, Gobierno lanza política para reducir brechas de género en carreras stem, 2023. URL: https://www.mineduc.cl/gobierno-lanza-politica-para-reducir-brechas-de-genero-en-carreras-stem/.

[15] F. Beroíza-Valenzuela, N. Salas-Guzmán, Stem and gender gap: a systematic review in wos, scopus, and eric databases (2012–2022), Frontiers in Education 9 (2024). doi:10.3389/feduc.2024.1378640.

[16] UNESCO, Girls, women and stem: How the ingeniosas foundation helps discover vocations in science and technology in chile, https://www.unesco.org/en/articles/girls-women-and-stem-how-ingeniosas-foundation-helps-discover-vocations-science-and/-technology-chile, 2022.

[17] Ministry of Science, Technology, Knowledge, and Innovation, National policy on gender equality in science, technology, knowledge, and innovation, 2021. URL: https://www.gob.cl/en/news/government-launches-gender-equality-policy-science-technology-knowledge-and-innovation/-well-regional-alliance-digitalization-women-latin-america/.

[18] C. Bellei, V. Orellana, Educational inequality and territorial fragmentation in chile: Evidence and policy challenges, Revista Brasileira de Educação 27 (2022) e270044. doi:10.1590/S1413-24782022270044.

[19] Organisation for Economic Co-operation and Development, Education in chile: Reviews of national policies for education, 2017. URL: https://www.oecd.org/education/education-in-chile-9789264284425-en.htm.

[20] P. Rojas, C. Arriagada, M. Fuentes, Girls and stem in rural chile: Barriers, perceptions and agency, Revista Latinoamericana de Estudios Educativos 50 (2020) 67–89.

[21] Facultad de Ingeniería y Ciencias, Universidad de La Frontera, Yo quiero ser ingeniera - facultad de ingeniería y ciencias ufro, https://fica.ufro.cl/yo-quiero-ser-ingeniera/, 2024. Accessed: 2025-05-08.

[22] Departamento de Matemática y Estadística, Universidad de La Frontera, Ufro reunió a mujeres estudiantes y profesoras de enseñanza media de la región y país en segunda versión de campamento stem, https://dme.ufro.cl/noticias/ufro-reunio-a-mujeres-estudiantes-y-profesoras-de-ensenanza-media-de-la-region-y-pais-en-/segunda-version-de-campamento-stem.html, 2024. Accessed: 2025-05-08.