Overcoming Obstacles: Challenges of Gender Inequality in Undergraduate ICT Programs Extended Abstract – CTDGSI 2025

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Abstract. *Gender inequality in Information and Communication Technology (ICT) programs is a persistent issue, particularly in Brazil, where women represent less than 18% of ICT students. This study explores the perceptions of 402 women enrolled in ICT undergraduate programs across 18 Brazilian states. Using a mixed-method approach, we identify key challenges such as discriminatory practices, gender stereotypes, and lack of representation, which undermine women's confidence and participation. Findings reveal that women face interruptions, isolation, and mistrust in academic settings, often leading to course discontinuation. Strategies to improve women's confidence and retention include increasing representation, fostering supportive environments, and raising awareness about gender biases.*

1. Introduction

The global interest in Information and Communication Technology (ICT) programs has grown significantly in recent years, driven by the increasing demand for skilled professionals in the tech industry. In Brazil, the number of students enrolled in ICT courses rose by 57.25% from 2020 to 2021, with a total of 464,269 students in 2021 [Zweben and Bizot 2019]. However, despite this growth, women remain severely underrepresented, comprising only 16.3% of ICT students in Brazil. This underrepresentation is not unique to Brazil; in the United States, for example, women earned only about 20% of bachelor's degrees in computer science in 2018 [Foundation 2021].

Gender inequality in ICT is a multifaceted issue influenced by sociocultural factors, stereotypes, and institutional barriers. Previous studies have highlighted several challenges that women face in ICT programs, including a lack of role models, male-dominated environments, and societal stereotypes that discourage women from pursuing careers in technology [Cheryan et al. 2017, Barrett et al. 2024]. For instance, [Lamolla and González Ramos 2020] identified the perception of ICT as a male-dominated field as a significant barrier to women's participation. Additionally, [Cheryan et al. 2017] proposed an analogy comparing the barriers faced by women to the reluctance to enter a cold pool, emphasizing the need to create more inclusive environments that encourage women's participation.

This study aims to contribute to the existing literature by exploring the perceptions of women undergraduate students in ICT programs, focusing on their experiences, challenges, and strategies to overcome gender inequality [Souza et al. 2025]. By conducting a

mixed-method survey of 402 women from 18 Brazilian states, we seek to provide actionable insights into how educational institutions can create more inclusive and supportive environments for women in ICT.

2. Study Settings

Our study aims to analyze the perceptions of women in Brazilian undergraduate ICT programs, focusing on factors that influence their participation and performance. We conducted a survey that included 38 questions, covering topics such as classroom interactions, challenges faced, impostor syndrome, underrepresentation, and strategies to enhance women's confidence. The survey was distributed through social media platforms and remained open for 33 days. [1] We employed snowball sampling to expand the participant network. Data analysis involved open and axial coding to identify key themes and patterns in the responses.

3. Results

Participant Characterization. The majority of participants were between 18 and 24 years old (57.2%), with 30.9% aged 25 to 34. In terms of race, 49.75% identified as white, 34.08% as brown, and 14.18% as black. The most common courses were Computer Science (19.4%), Information Systems (19.4%), and Computer Engineering (14.9%). Most participants attended public universities (55.7%), with 44% enrolled in private institutions.

Impact of Classroom Interactions. More than 80% of participants reported hearing insinuations that ICT courses are more suitable for men. This stereotype contributes to a significant barrier for women, manifesting in various forms of gender bias and discrimination within academic environments. For instance, 60.19% of women reported being interrupted while expressing their opinions or asking questions in the classroom, with 51.24% of interruptions coming from male peers and 27.36% from professors. These interruptions often led to feelings of insignificance and self-doubt, with some women choosing to remain silent during discussions. For instance, 41.05% of participants chose not to express their opinions in discussions, even when confident in their correctness, and 35.6% revealed discomfort when articulating their opinions during classes. One participant shared, "I need to spend much more energy than my male colleagues to be heard; I have to provide many more arguments for my opinion to be considered" (#R358).

Challenges Faced by Women. Participants identified several challenges, including sexism, gender discrimination, and feelings of inferiority. Many women reported experiencing stereotypes that undermined their capabilities, such as being told that ICT is a male-dominated field or being encouraged to pursue less technical roles. For example, one participant mentioned, "A professor once asked me how many liters of detergent it takes to wash ten dishes, implying that my perspective was valuable only in domestic contexts" (#R345). Additionally, 20.14% of participants reported instances of sexual harassment by professors or peers, which created a hostile learning environment. Social and family pressures, such as domestic responsibilities, also hindered women's academic performance. One participant noted, "It's hard to perform well when I manage every-

[1] Further details are on our replication package: https://doi.org/10.5281/zenodo.11053838

thing alone—cooking, cleaning, working to support myself—while my colleague enjoys financial stability and a supportive home environment" (#R220).

Strategies to Improve Confidence. Participants suggested several strategies to improve women's confidence in ICT, including increasing the number of women professors and role models, creating support groups, and raising awareness about gender biases. In addition, strategies to promote a more inclusive environment were identified. Students suggested several approaches, with gender diversity being the main concern, with an emphasis on attracting more women (students and teachers), giving women visibility and placing them in leadership positions. Support programs were widely recommended, including support groups, mentoring programs, lectures and outreach programs, specific projects for women and targeted internships. Many women emphasized the importance of having female role models in leadership positions, as this would help them feel more represented and capable. One participant stated, "If more women professors were leading classrooms and projects, it would bring me more confidence [...] feeling I'm capable too" (#R103). Participants also recommended that professors and peers receive training on how to avoid stereotypes and discriminatory behaviors in the classroom.

4. Conclusions and Future Work

This study highlights the pervasive challenges faced by women in ICT programs, including discrimination, stereotypes, and lack of representation. To overcome these obstacles, institutions must implement strategies to boost women's confidence and create inclusive environments. Future work will explore the role of gender stereotypes in shaping perceptions of competence and conduct a global replication of this study.

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