Gender Equity in Higher-Education Institutions: An Analysis of Student Perceptions in an Engineering School in Chile

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Abstract

The commitment to gender equity in a higher education institution is justified from an ethical and human rights perspective. Fostering gender equity within professional education enriches the diversity of perspectives and experiences on campus, enhancing academic life and promoting a more inclusive and tolerant environment. In the case of engineering education, which remains highly male-dominated, institutional commitment becomes a priority, enabling the generation of initiatives promoting this inclusive and gender-bias-free environment. All these actions will enhance the quality of learning by fostering critical discussion and a diversity of thought. Therefore, it can be stated that the incorporation of gender equity in professional education contributes to having a positive impact on society. This study analyzes the students' perception of institutional commitment to incorporating gender perspectives in a School of Engineering in Chile. The sample consists of 407 students from various engineering programs within this school, which has the largest enrollment at the national level. To address these objectives, a self-administered questionnaire was employed, adapted, and validated for the context of engineering students in Chile. The questionnaire covers the perception of incorporating gender perspectives in a higher education institution across three dimensions: (1) Institutional sensitivity to gender perspectives, (2) Integration of gender perspectives into the curriculum, and (3) Awareness of gender inequalities in the classroom. The results allow for the characterization of the sample's perception regarding incorporating gender perspectives into their engineering education programs. Furthermore, it is worth noting that statistically significant differences exist between the perceptions of men and women concerning the analyzed dimensions. These findings highlight the importance and the necessity of implementing actions that promote high-quality education free from gender biases.

Keywords: gender equity, engineering education, HEI

Introduction

According to UNESCO, gender equality contributes to economic, social, cultural, and political development [1]. Currently, there are areas in which women are underrepresented, necessitating specific actions to reduce gender gaps. The STEM fields, Science, Technology, Engineering, and Mathematics, are most affected by these gaps. For instance, IT (Information Technology) companies seek to hire women, but there remains a significant gap in their participation in these careers [2], making the hiring process more challenging. Furthermore, if women do not participate in engineering across various fields, their perspectives on design solutions are absent [3]. This is significant, considering that a diverse team can better understand and represent end-users' needs in problem-solving [1].

Differences in gender socialization, linked to environmental factors such as family values, social expectations, and representation in traditional and digital media, among others, are identified as one of the reasons for gender biases among individuals. Therefore, family and education are crucial in career choice [2]. Efforts from academia and industry are essential to promote a change in the volume of female participation in these fields [1]. This challenge should be viewed as a societal one involving various stakeholders, not only women. When all the pressure to be a role model falls exclusively on STEM women, diversification can be seen as a uniquely female issue [4].

Various studies recommend different characteristics that contribute to the commitment to gender equality within engineering programs. For example, in [5], the authors suggest that to make computer science curricula more accessible, attention must be paid to the quality of student experiences, and support structures for underrepresented students should be established.

This study examines how students perceive gender equity in their study programs, comparing perceptions between men and women. The research was carried out in a School of Engineering that established a Gender Equality Committee two years ago. The School declares itself committed to gender equality. For this research, gender equity refers to the actions taken to support the historically disadvantaged group. Gender equality, on the other hand, will be discussed as the ultimate goal of such actions. The study aims to gauge students' perceptions through a quantitative study in three dimensions: (1) Gender in the curriculum, (2) Awareness of gender inequality in the classroom, and (3) Institutional awareness. The research question guiding this study is: Is there a difference between men's and women's perceptions regarding incorporating gender equity in their engineering education? This information will be helpful for the school and the Gender Equality Committee in identifying actions that are relevant to the students' perceptions of gender equity.

Bibliographic Review

According to UNESCO, gender equality exists when women and men enjoy the same status and have equal conditions, treatment, and opportunities to reach their full potential [1]. The UN acknowledges this across its sustainable development goals (SDGs), specifically in SDG 5. Various global studies highlight the importance of gender equality, especially in the field of engineering [3], due to the low entry of women into STEM careers and low retention, particularly in engineering [6]. Women are underrepresented in STEM fields, both in the professional world and professional education institutions, among students and academics [1]. This directly impacts society's development and growth, as engineering and technology are key development aspects [3]. The number of women in technology (recruitment) will only increase with specific actions to encourage this growth [2]. In other words, actions for gender equity are necessary. Additionally, retaining those who join is essential [4] [3].

For women to have equal opportunities in the STEM fields, there needs to be more significant support and awareness about gender equity. Educational institutions play a crucial role in creating an inclusive culture that facilitates access and retention of women in STEM [3]. The importance of gender equity in areas such as engineering is emphasized in [7]. It is not enough to eliminate obstacles; educational institutions must also adopt and evaluate practices promoting

gender equity. In other words, higher education entities offering STEM careers have a fundamental role in reducing gender gaps.

Various studies point out different aspects that an educational institution in STEM fields should consider to promote gender equity in the area. In [8], significant importance is given to the role of teachers and their gender sensitivity or awareness in the initial stages of engineering education. This is also mentioned in [6], where it is indicated that teachers can induce a gender gap through unconscious biases. On the other hand, in [5], explicitly discussing computer science students, it is noted that special attention should be paid to the students' experience, eliminating stereotypes not only of gender but also of the field, and recommends training teachers and assistants. In [3], the importance of having an inclusive classroom without gender stereotypes, considering the challenges of intersectionality, and understanding that each person has multiple dimensions is mentioned. In [6], they emphasize that the classroom experience is a fundamental part of student well-being, affecting student retention; therefore, an inclusive and unbiased environment can promote the retention of women in STEM disciplines. This complements the idea that first-year courses, and hence, STEM teachers who teach initial courses, are considered identity builders and have a greater responsibility in the commitment to gender equity [8]. In [1], concrete actions are mentioned to promote women's participation in the workplace, specifically in software development, and it suggests support groups for women and formally establishing policies against harassment.

It has been identified that ineffective or insufficient gender policies, as well as entrenched practices that favor male dominance, are factors that hinder the integration of a gender perspective in universities. This situation translates into both structural and cultural challenges, including gender imbalances, wage differences, and segregation in academic areas. Furthermore, a lack of gender approaches in teaching and research, as well as the presence of biases and discrimination on university campuses, has been observed [9], [10], [11]. Resistance to these changes can be both institutional and individual, explicit or implicit, manifesting in various ways, from denial to minimizing the importance of gender equality policies [12]. It is important to differentiate between gender equality, which implies equality of resources and opportunities, and gender parity, which focuses on numerical representation. Experts warn that in unequal contexts, treating everyone equally can perpetuate inequalities rather than reduce them [10]. The importance of taking action towards gender equity cannot be overstated.

Studying the problems of underrepresentation is relevant to defining concrete actions [2]. Initiatives must be generated from understanding women's experiences and their most significant barriers [3]. These issues may be related to cultural factors, educational resources, school environment, characteristics of the field of information technology, relationships between teachers and students, role models, pre-university experience, exposure to information technology, parental guidance, and media [2].

In a study conducted by [6], the authors conducted research where they detected a higher likelihood of a woman participating orally in a class when another female classmate has already experienced or when the teacher is a woman. Classroom behavior directly influences how a female student develops, potentially affecting her retention in the field. This is particularly true in fields where women are underrepresented, such as STEM. It should be noted that class

participation serves as an assessment, by both teachers and peers, of the academic ability of the participant.

Specifically in Chile, authors [13] observed a similarly neutral attitude toward gender equality in education. They found that students emphasize the need for gender-related training for teachers to better manage gender-related situations in classrooms. Additionally, they highlight significant differences in the perception of gender inequalities among students, with women perceiving more significant inequalities.

It is also relevant to understand that today, men occupy leadership positions mainly; therefore, they must be allies in the fight against gender inequity [14]. Gender inequity should be considered a societal problem [4] involving everyone, regardless of sex. For example, [14] indicates that there is evidence suggesting that men's participation in gender equity practices is a mechanism that contributes to the required cultural change.

In this regard, the work of [15] points out a lack of perception of gender inequalities in education, which can affect students' ability to recognize and act against discriminatory situations in their future professional lives. These authors found indifference or low institutional sensitivity towards the gender perspective associated with weak gender policies and a lack of commitment from institutions and teachers.

Incorporating initiatives for advancement in gender equality must include indicators that allow monitoring of their implementation [7]. Creating and strengthening an equitable, diverse, and inclusive culture goes hand in hand with formalizing processes, enabling structuring and measuring efforts. All stakeholders must be involved in this formalization, which will also allow it to be extrapolated when there is more than one campus [16]. Indicators alone do not contribute to achieving gender equality, and the disposition of academic leaders within educational institutions will be vital to advancing and improving commitment to SDG 5.

Methodology

Survey

The methodological tool used in this research is a modification of the Sensitive Assessment Scale for Training in Gender Equality [15]. Its designers proposed and validated said questionnaire to measure the uptake of a gender approach in teacher training. Building on that study, this work aims to complete the validation of an instrument adapted to the local context of engineering education, initiated by [13], to measure the state of gender perspective incorporation in engineering programs. The proposed dimensions are:

- Dimension 1: Inclusion of gender in the curriculum. An example of an item is: "Training in gender issues within engineering is a necessary condition for developing equality in the profession."
- Dimension 2: Awareness of gender inequalities in the classroom. An example is: "Teachers tend to have higher and more demanding expectations from male students than from female students."

- Dimension 3: Institutional sensitivity to the application of gender perspectives in teaching. An example of an item is, “My study curriculum includes the development of competencies in gender equality.”

As presented in Table 1, the instrument's scale is a 5-level Likert type, where 1 represents “Strongly disagree” and 5 means “Strongly agree.” The instrument used, with the item adaptations relevant to the context of this research, is presented in Table 3 below.

Table 1. Survey dimensions - Cronbach's Alpha reliability analysis

	Dimensions	*Number of items*	*Scale*
Sensitive Assessment Scale in Gender Equality	*Dimension 1: Gender in the curriculum*	6	1. Strongly disagree 2. Disagree 3. Neither agree nor disagree 4. Agree 5. Strongly agree
	Dimension 2: Awareness of gender inequality in the classroom	4	
	Dimension 3: Institutional awareness	5	

Descriptive statistics were used in sample characterization for data analysis. Likewise, as there was no normal distribution, non-parametric tests were carried out; chi-square, Kruskal-Wallis test, and Spearman's correlations were conducted using the SPSS statistical software.

Participants

A survey was conducted on undergraduate students from the School of Engineering using a convenience sampling method. The questionnaire was made available online, and out of a total of 8,700 students, 407 voluntary responses were considered valid for the analysis. With a confidence level of 95%, the margin of error in the sample is 4.74%.

Of the 407 responses, 30.50% came from female students, 66.30% from male students, 1.20% from non-binary students, and 2% preferred not to disclose their gender. In terms of the age range, 22.36% of the students were between 18 and 20 years old, 22.36% were between 21 and 23 years old, 15.237% were between 24 and 26 years old, 8.84% were between 27 and 29 years old, and 31.20% were older than 30 years old. Regarding the study programs, the sample is divided according to Table 2.

Table 2. Distribution of the sample by study programs

Study programs	*N*	*%*
Earth Sciences	20	4,90%
Industries	283	69,50%
Computer Science	70	17,20%
Construction	19	4,70%
Merchant Navy	15	3,70%

Results

During the survey validation process, a Cronbach's Alpha of 0.898 was attained for the “Gender in the Curriculum” dimension, 0.866 for the “Awareness of Gender Inequality in the Classroom” dimension, and 0.855 for the “Institutional Awareness” dimension.

Table 3. Descriptive analysis results per dimension.

Dimension	*Item*	*Min.*	*Max.*	*Mean*	*Std. Dev.*
Gender in the curriculum	3. Training in gender issues within engineering is a necessary condition to develop equality in the profession.	1	5	3.59	1.425
	4. Including the gender perspective in engineering training is essential to dealing with sexism.	1	5	3.63	1.464
	5. The diversity of sexual identities should receive more attention in the study curriculum.	1	5	3.05	1.449
	8. Gender should be integrated into engineering training on a mandatory basis.	1	5	2.9	1.439
	9. All subjects in the curriculum should be taught with a gender perspective.	1	5	2.87	1.477
	10. There should be at least one compulsory subject on gender equality in the curriculum.	1	5	2.79	1.452
Awareness of gender inequality in the classroom	12. Teachers tend to have higher and more demanding expectations from male students than female students.	1	5	2.48	1.337
	13. Male students receive more attention from faculty teachers than female students.	1	5	2.19	1.262
	14. Female student achievements are often minimized.	1	5	2.2	1.289
	15. Female student achievements are attributed more to their efforts than their ability.	1	5	2.69	1.383
Institutional awareness	1. The School of Engineering has taken a proactive approach towards gender equality.	1	5	3.55	1.044
	2. The school applies current regulations on equality.	1	5	3.7	0.984
	6. My study curriculum includes the development of competencies in gender equality.	1	5	3.02	1.258
	7. Gender perspective receives sufficient attention in the subjects studied.	1	5	3.13	1.148
	11. The teaching staff is sufficiently aware of gender issues.	1	5	3.28	1.192

Regarding the data collection conducted with the validated instrument, the report will begin with an analysis of various dimensions, followed by a study of gender differences, and lastly, an examination of the correlations between the variables of interest. Firstly, Table 3 presents the descriptive results for each of the items that make up the three dimensions of the instrument,

namely "Gender in the Curriculum" (M=3.14, SD=1.23), "Awareness of Gender Inequality in the Classroom" (M=2.39, SD=1.13), and "Institutional Awareness" (M=3.34, SD=0.89).

Our goal was to examine gender sensitivity differences between men and women. Therefore, we excluded responses identified as "non-binary" or "prefer not to say." We found statistically significant differences in the dimensions "Gender in the Curriculum" (Mw=3.67, Mm=2.95; U=10754, p<0.001) and "Awareness of Gender Inequality in the Classroom" (Mw=2.75, Mm=2.26; U=12380.5, p<0.001), but no significant differences were found for the dimension "Institutional Awareness."

Figure 1 displays the average per-item scores for men and women. According to Table 4, the Mann-Whitney U test reveals significant gender differences in most of the items of the instrument, as expected: “3. Training in gender issues within engineering is a necessary condition to develop in equality in the profession” (Mw=3.97, Mm=3.48, U=13218, p<0.001); “4. Including the gender perspective in engineering training is essential to dealing with sexism” (Mw=4.18, Mm=3.44, U=11652.5, p<0.001); “5. The diversity of sexual identities should receive more attention in the study curriculum” (Mw=3.56, Mm=2.86, U=12115.5, p<0.001); “8. Gender should be integrated into engineering training on a mandatory basis” (Mw=3.57, Mm=2.66, U=10660.5, p<0.001); “9. All subjects in the curriculum should be taught with a gender perspective” (Mw=3.42, Mm=2.68, U=11953, p<0.001); “10. There should be at least one compulsory subject on gender equality in the curriculum” (Mw=3.32, Mm=2.6, U=12034, p<0.001); “12. Teachers tend to have higher and more demanding expectations from male students than to female students” (Mw=2.8, Mm=2.35, U=13549.5, p=0.002); “13. Male students receive more attention from faculty teachers than do female students” (Mw=2.55, Mm=2.06, U=12970, p<0.001); “14. Female student achievements are often minimized” (Mw=2.62, Mm=2.05, U=12546, p<0.001); “15. Female student achievements are attributed more to their efforts than to their ability” (Mw=3.04, Mm=2.57, U=13508, p=0.002).

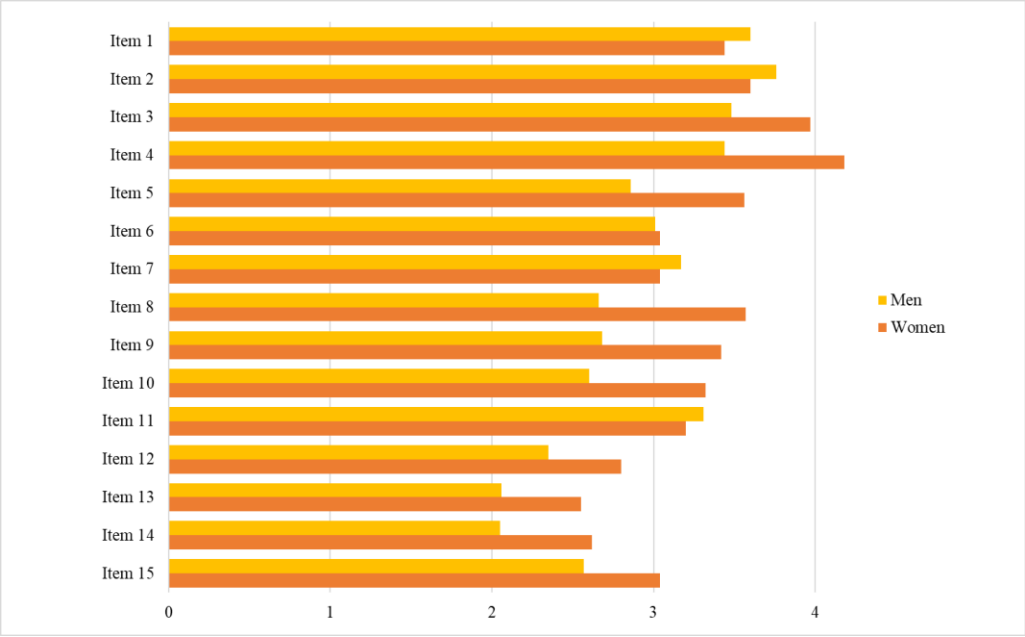

Figure 1. Mean per item for women and men.

Table 4. Mann-Whitney U Test.

	Mann-Whitney U	*Wilcoxon W*	*Z*	*Asymp. Sig. (2-tailed)*
1. The School of Engineering has taken a proactive approach towards gender equality.	15663	23413	-1.073	0.283
2. The school applies current regulations on equality.	15759	23509	-0.985	0.325
3. Training in gender issues within engineering is a necessary condition to develop equality in the profession.	13218	49803	-3.486	<.001
4. Including the gender perspective in engineering training is essential to dealing with sexism.	11652.5	48237.5	-5.077	<.001
5. The diversity of sexual identities should receive more attention in the study curriculum.	12115.5	48700.5	-4.507	<.001
6. My study curriculum includes the development of competencies in gender equality.	16457	53042	-0.28	0.78
7. Gender perspective receives sufficient attention in the subjects studied.	15669	23419	-1.069	0.285
8. Gender should be integrated into engineering training on a mandatory basis.	10660.5	47245.5	-5.939	<.001
9. All subjects in the curriculum should be taught with a gender perspective.	11953	48538	-4.676	<.001
10. There should be at least one compulsory subject on gender equality in the curriculum.	12034	48619	-4.598	<.001
11. The teaching staff is sufficiently aware of gender issues.	15912	23662	-0.816	0.414
12. Teachers tend to have higher and more demanding expectations from male students than female students.	13549.5	50134.5	-3.161	0.002
13. Male students receive more attention from faculty teachers than female students.	12970	49555	-3.792	<.001
14. Female student achievements are often minimized.	12546	49131	-4.199	<.001
15. Female student achievements are attributed more to their efforts than their ability.	13508	50093	-3.172	0.002

Concerning the study program, as shown in Table 5, the Kruskal-Wallis H test showed no significant differences in dimensions between the study programs. However, the test indicated statistically significant differences were observed for items “3. Training in gender issues within engineering is a necessary condition to develop equality in the profession” and “4. Including the gender perspective in engineering training is essential to dealing with sexism”. Going deeper into these differences for item 3, Mann-Whitney U test indicated statistically significant differences

are present between “Industries” and “Merchant Navy” (Mi=3.65, Mmn=2.53, U=1218.5, p=0.004); also between “Computer Science” and “Merchant Navy” (Mcs=3.56, Mmn=2.53, U=321.5, p=0.016), and finally between “Construction” and “Merchant Navy” (Mc=4.05, Mmn=2.53, U=59, p=0.03). In the case of item 4, statistically significant differences result between “Industries” and “Merchant Navy” (Mi=3.71, Mmn=2.23, U=998, p<.001); also, between “Computer Science” and “Merchant Navy” (Mcs=3.6, Mmn=2.33, U=266, p=0.002), and finally between “Construction” and “Merchant Navy” (Mc=3.89, Mmn=2.33, U=58.5, p=0.03).

After analyzing the data, the Kruskal-Wallis H test showed no significant variable differences between age groups. This suggests that the distribution of variables is similar across all age categories.

Table 5. Kruskal-Wallis Test. Grouping variable: Study Program

Dimension	*Kruskal-Wallis H*	*df*	*Asymp. Sig.*
Dimension 1: Gender in the curriculum	9.007	4	0.061
Dimension 2: Awareness of gender inequality in the classroom	4.018	4	0.404
Dimension 3: Institutional awareness	4,92	4	0.296
Item			
3. Training in gender issues within engineering is a necessary condition to develop equality in the profession.	11.227	4	0.024
4. Including the gender perspective in engineering training is essential to dealing with sexism.	14.139	4	0.007

We performed a Spearman correlation to analyze the relationships between the dimensions of interest in order to gain a deeper understanding. The study results indicated that there was a moderate and statistically significant positive correlation ($\rho = 0.507$, $p < 0.001$) between "Gender in the Curriculum" and "Awareness of Gender Inequality in the Classroom." Furthermore, a weak but statistically significant positive correlation ($\rho = 0.251$, $p < 0.001$) was discovered between "Gender in the Curriculum" and "Institutional Awareness."

Discussion

This study delves into the intricacies of gender perceptions in the university's educational environment, specifically within an Engineering School. The focus is on understanding how these perceptions differ between men and women and how they are reflected in various aspects of academic life. The study thoroughly analyzes the relationship between the inclusion of a gender perspective in the curriculum and the level of awareness of gender inequality, both in the classroom and at the institutional level. The research also explores gender sensitivity and how it varies across student groups, depending on their gender and the study program they are enrolled in.

The results reveal interesting student response patterns, highlighting significant differences and neutral trends in the perception of gender-related issues. These findings lead to a deeper

discussion about the impact of the gender perspective in education and its relevance for achieving greater equality in different educational contexts. Overall, gender sensitivity showed significant differences between men and women, with women's groups presenting a higher average in two dimensions of the instrument. This is consistent with what is mentioned in the literature, where the group of people who have been historically disadvantaged are those who have greater sensitivity to the existing inequalities, in this case, regarding gender [15].

It should be noted that many respondents tended to select the neutral option ("Neither agree nor disagree") on the scale when responding to the survey questions. This trend was observed among both men and women. This could make it challenging to understand the student group's perception of the items being evaluated, as they may prefer to provide a vague answer. When choosing between even or odd Likert scales, it is important to consider the research objectives, knowledge about respondents, and data collection methods. Even scales do not have a midpoint, while odd scales include it, which different respondents could interpret differently. Some respondents may feel uncomfortable with even scales, especially when it comes to sensitive topics, which may affect completion rates and responses. However, in this case, with a high percentage of neutral or undefined responses, it is important to investigate why many respondents chose this option. A similar finding is presented in the study of [15], where the results also tend towards a neutral or indifferent perception regarding gender sensitivity in education.

For the first dimension, "Gender in the Curriculum," women agree more strongly that gender issues in engineering education are relevant for achieving equality in the profession (item 3), with an average of 3.97. They also consider it important to include a gender perspective in their education to address sexism (item 4), with an average of 4.18, and to integrate it mandatorily into the programs (item 8), with an average of 3.57. On the other hand, men have a neutral perception of this dimension, with an average of 2.95, compared to women's average of 3.67. This means that women recognize the influential power that engineering schools have not only to avoid gender biases in the classroom but also to cultivate a profession with gender equality [3]. Actions such as incorporating a UN Women's gender certification for first-year students in the School of Engineering, as is currently applied, would be in total alignment with the above.

Incorporating a gender perspective in academic programs goes beyond just having students take a course on the subject. As evidenced in the literature review, educators are significant in committing to gender equity actions within the classroom [8], [6]. In the results for the second dimension, "Awareness of Gender Inequality in the Classroom," although there is a significant difference in perception between men and women, this dimension has the lowest average, at 2.39. When analyzing the items that make up this dimension, students most frequently responded with a neutral perception, tending towards disagreement. This means that the women in the sample do not perceive gender biases in the classroom related to the items inquired about or manage to respond neutrally to the items. This could be related to a denial or minimization of the importance of gender equity policies [12] or to a lack of recognition of the need to create inclusive classrooms [3].

There were no significant differences between the results of men and women in the third dimension, "Institutional Awareness." However, this dimension had the highest average score of

3.34, indicating a neutral perception of the surveyed items related to institutional actions contributing to gender equality. In [15], it is mentioned that results like these may be due to a lack of awareness or knowledge about gender inequalities. Among the items that make up this dimension, it was observed that men recognize the application of regulations on equality (item 2) and the proactive approach of the School of Engineering towards gender equality (item 1) to a greater extent than women. These results suggest that although students perceive that actions are being taken to promote gender equality, women in the sample do not feel that these actions are sufficient or fully implemented.

Significant variations were found with the merchant marine program regarding the differences observed between study programs. Specifically, this program presented the lowest averages, tending to a range between 2 and 3, for the items "3. Training in gender issues within engineering is a necessary condition to develop equality in the profession" and "4. Including the gender perspective in engineering training is essential to dealing with sexism." This indicates that the students in the sample have a neutral perception and tend to disagree on the evaluated items. On the other hand, the area of industries and construction shows the highest averages in the items, with average values between 3 and 4, meaning they have a neutral perception with a tendency towards agreement on the evaluated items. This difference between programs may be due to the proportion of women in the programs and a cultural aspect, where the merchant marine area has a lower presence of women and is currently more male-dominated than other areas.

Concerning the theoretical dimensions of the instrument, we observed a moderate and statistically significant positive correlation ($\rho = 0.507$, $p < 0.001$) between "Gender in the Curriculum" and "Awareness of Gender Inequality in the Classroom." This result suggests that, as the students in the sample agree more with the inclusion of a gender perspective in the curriculum, they also have a higher perception of the presence of certain gender inequalities in the classroom. The magnitude of this correlation indicates a significant association but not a determining one, implying that other factors might also influence the relationship between awareness of gender inequality in the classroom and the inclusion of gender in the curriculum. It is important to recognize that if we believe that incorporating a gender perspective into curricular training is valuable, then it is equally crucial for educators to teach this curriculum with a gender perspective in mind within their classrooms [3].

On the other hand, we found a weak but statistically significant positive correlation ($\rho = 0.251$, $p < 0.001$) between "Gender in the Curriculum" and "Institutional Awareness". This finding indicates that although there is a positive relationship between the perception of the inclusion of gender issues in the curriculum and the perception of institutional awareness of these issues, this relationship is relatively weak. This could suggest that the perception of institutional awareness of gender inequality is related to other factors besides the mere inclusion of gender content in the curriculum [3], [6]. These results are important because they underline the complexity of the relationships between the educational curriculum and gender perceptions at different levels of the academic environment. While the inclusion of gender in the curriculum seems to have a moderate impact on awareness of gender inequality in the classroom, its relation to awareness at the institutional level is less pronounced. This could be due to the diversity of factors influencing institutional awareness, including policies, organizational culture, and external factors [3], [12].

In summary, the study highlights the significance of incorporating a gender perspective into higher education, as found in [15]. It was found that there exist notable differences in how men and women perceive gender. Therefore, it is crucial to tackle gender inequality both in the curriculum and at an institutional level to promote a more inclusive and fair education. This approach is essential for achieving greater gender equality in the academic sphere.

Conclusions and Future Directions

This study examined how students perceive gender equality in their engineering study programs. The analysis was conducted across three dimensions: 1) Gender in the Curriculum, 2) Awareness of Gender Inequality in the Classroom, and 3) Institutional Awareness. The study found a statistically significant difference in responses between men and women in dimensions 1 and 2, indicating that women are more aware of gender issues, consistent with the literature reviewed. The study also found no significant differences among age groups, but there were differences between study programs for two specific items that belonged to different dimensions. These differences were significant for the merchant marine program compared to others.

Another critical aspect to highlight is that, despite the significant difference in perceptions between women and men, both groups tend to choose a neutral response for the evaluated items. This could be attributed to the sensitivity of gender topics within STEM areas. In light of this, it would be pertinent to complement this with a qualitative study that allows a deeper exploration into the perceptions of the student body and identifies the reasons behind their responses in each dimension and the tendency towards a neutral response. In addition, based on the findings in the qualitative study, the necessity of changing the evaluation scale to exclude the neutral response option, that is, an even-numbered scale, could be assessed. With this, respondents could be guided toward providing an answer with a definite stance.

According to student perceptions, gender-related training is important for students and educators in their educational curriculum. Since these educators are responsible for professional training, and in cases where gender aspects are included in the curriculum, they will be responsible for conveying them to their students. Notably, in line with existing literature, we want to emphasize the importance of the educator's role, especially in the first year of STEM education. They are tasked with creating a classroom environment free from gender biases. This opens the door to new research on gender perspectives among first-year students and their teachers.

The implications of this study extend beyond academia, calling for significant changes in the educational structure and culture across STEM fields. Institutions must implement gender equality training programs for students and educators to promote an inclusive classroom environment and better prepare future STEM professionals to address gender inequalities. Incorporating gender equality into the STEM curriculum from the early years of education can have a lasting impact, promoting a more equitable and diverse professional culture. These collective efforts can reduce the gender gap in STEM professions, contributing to a more representative society.

At the School of Engineering level analyzed in this study, the results obtained will allow for the generation of actions that align with what the students would expect regarding gender equity within their engineering education. This would complement the actions already initiated by the School through its Gender Equality Committee, which considers gender equity a commitment adopted institutionally. The continuation of this study is envisioned by incorporating qualitative tools that allow for the complementation and deepening of the results obtained in the survey, providing greater detail to the School.

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