Beyond Access: Hidden Barriers Shaping Gender and Ethnic Disparities in STEM Higher Education

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Abstract

STEM education plays a pivotal role in fostering innovation, economic growth, and broader societal advancement. Yet, despite the increasing global demand for STEM expertise and skills shortages, persistent inequalities continue to limit the participation and representation of women and other underrepresented groups within the STEM workforce. Focusing on Mexico, this study investigates barriers to access and progression in STEM through qualitative perspectives gathered from students, graduates and academics at leading institutions. Our findings show that, although policies supporting equity, diversity, and inclusion (EDI) are present, their impact is diminished by uneven implementation and insufficient integration across curricula, institutional practices, and support systems. As a result, inclusivity remains inconsistent, shaped by structural, cultural, and pedagogical factors that influence both educational experiences and career pathways. The study highlights the need for a comprehensive, institution-wide approach that fully embeds EDI across all aspects of higher education, ensuring that inclusion is not only a policy target but a sustained and lived experience. While centred on Mexico, these insights may resonate with similar contexts and offer an additional perspective on improving inclusive participation and progression in STEM degrees in higher education more broadly.

Keywords:

Gender equity, Higher education, Mexico, STEM

1. Introduction

Innovation is the fundamental force that drives development, better living standards, and social welfare; for that reason, it is acknowledged that the promotion of education in Science, Technology, Engineering and Mathematics (STEM) is crucial to sustain economic growth, with wider benefits to countries and individuals. STEM education fosters critical thinking, problem-solving, rigour, analysis, creativity, innovation, collaboration, communication, and ethical awareness. Such skills help learners to acquire knowledge, abilities and attitudes that are essential for solving not only complex global challenges (i.e., climate change, net-zero and water, food, and energy security), but help achieving pressing global targets like UN's Sustainable Development Goals (SDGs).

New generation of STEM specialists require access to training aimed to deliver sustainable clean technologies in an era of increased uncertainty; they need to develop deep climate resilient expertise and gain confidence and capability to transcend their own disciplines and adapt to future sector challenges. Individuals in the STEM workforce make important contributions to improving a nation's living standards, economic growth, and global competitiveness fuelling innovative capacity through their work in research and development (R&D). It is estimated that a global shortage of over 85 million skilled workers will be reached by 2030, with the largest gap in the STEM workforce (World Economic Forum, 2025). This shortage could result in a potential loss of US$8.5 trillion in global GDP over the next decade. With an annual average of 20% percent of graduates from STEM courses in industrialised countries (excluding Germany with 37%), emerging economies like India, China, Malaysia, South Korea, etc. are driving the training in STEM subjects (30-43% of graduates from STEM subjects), but limitations in the global supply and demand for STEM jobs stresses workforce shortfalls (i.e., right skills in the wrong place) (World Economic Forum, 2025). In the UK, it is predicted that an additional 1.8 million STEM specialists are needed to meet the workforce demand by 2030, particularly in the engineering and technology sectors. STEM skills shortage cost UK employers £1.5 billion a year in additional training costs, recruitment, temporary staffing and inflated salaries (Banerjee et al., 2024).

Along with shortages in the STEM workforce, there is evidence to suggest that women, certain ethnic minorities, people with disabilities and those from disadvantaged socioeconomic backgrounds are underrepresented in education, training and employment related to STEM. This detrimentally impacts productivity as innovation needs diversity; people with different ideas and diverse backgrounds are needed to create the kind of environment where transformative solutions are forged. For instance, although more girls are in school today than ever before, they do not always have the same opportunities as boys to complete and benefit from an education of their choice. Numerous girls and women are held back by biases, social norms and expectations influencing the quality of the education they receive and the subjects they study. Globally, women still only account for around 28% of engineering graduates, 35% of science graduates and 40% of computer science/IT graduates, but their contribution to the STEM workforce is much lower – i.e., 14% in cloud computing; 20% in engineering; 32% in Data and Artificial Intelligence (World Economic Forum, 2025).

Mexico's STEM specialists have been growing at a fast pace in the past decade, as every year about 21% of all tertiary-level students are awarded degrees in the natural sciences, mathematics or statistics, engineering, manufacturing, and construction – i.e., over 110,000

engineers annually graduate from Mexican universities, which is more than what the STEM work market can absorb. In addition, the unbalance representation of women and ethnically minoritised groups in Mexican Universities is drastically accentuated in STEM subjects, with a clear knock-on effect on STEM workforce diversity as female representation is the lowest in comparison with other fields – i.e., women comprise less than 20% of employed professionals in engineering jobs.

There is a clear need to accelerate changes in STEM education to bring quality standards of academic programmes, gender equity and diversity, and technical and transferable skills of graduates, to meet the expectation of a global demand in STEM workforce. International collaboration can help to develop a new generation of global STEM graduates able to contribute to the solution of global challenges. In this work, we are seeking to untap the enormous potential that Mexico possesses to help covering the global demand of STEM specialists and services. We conducted a qualitative study with STEM undergraduates, graduates and academics of two leading Mexican Universities from the private and public sector, Tecnologico de Monterrey (TEC) and Universidad Autonoma de Yucatan (UADY), to firstly identify the current barriers preventing women and ethnically minoritised groups to enrol and successfully complete STEM academic programmes in Mexico, and secondly to evaluate embedded equity, diversity and inclusion (EDI) values in the curriculum.

2. Methodology

A survey research study based on questionaries, unstructured interviews and focus groups was conducted with participants from TEC and UADY (Ethics approval reference No1654, Research Ethics Committee, Faculty of Engineering and Physical Sciences, University of Leeds). Students and academics from STEM programs were openly and widely invited to take part in the surveys and share their opinions on women's and ethnically minoritised group participation in STEM and their perceptions on EDI principles in the academic environment. With the participants consent, we anonymously surveyed a population of 149 participants (i.e., 118 undergraduate students, 11 graduates, and 20 academic staff) from various STEM programmes (i.e., biotechnology, chemical engineering, civil engineering, applied chemistry and food chemical engineering). Student participants were between 20 and 40 years old from different ethnicities (i.e., Mayan, Hispanic and mixed background), 54% female and 46% male from the areas of Yucatan, Tabasco, Guadalajara with 9% of student delegates reporting a disability. The graduate population consisted of 11 people from diverse backgrounds representing ages between 20 and 60 years old. The academic population was widely diverse consisting of participants with ages between 30 and 60 years old, 40% female and 60% male, from different ethnicities including Mayan, Hispanic, mixed background and European, mostly born on the geographic areas of Yucatan and Guadalajara.

The survey approach was designed to evaluate the awareness of EDI values and gender equality in the higher education communities and to collect information about perceptions of inclusivity in STEM programmes and student recruitment. Three anonymous surveys were developed, one for each target group: students (42 questions), graduates (34 questions), and academics (25 questions). Each survey comprised a combination of Likert-scale items and open-ended questions. The surveys were conducted over a month targeting to engage a population from different programmes. At a later stage in our study, focus groups were organised to discuss and expand the information collected with the surveys. Focus groups

were recorded, fully transcribed and analysed using NVivo software using thematic analysis within the areas of study (student recruitment inclusivity, awareness of gender equality and EDI values, perceptions of EDI in curriculum, and the link between inclusivity and employability) and interpretation-focus coding (Adu, 2026).

Table 1. Survey demographics

Demographics	Students	Graduates	Academics
Participants No.	118	11	20
Female	54%	46%	40%
Male	46%	55%	60%
Age (years)	20-30 (98%) 30-40 (1%) 1% undefined	20-30 (9%) 30-40 (9%) 40-50 (64%) 50-60 (9%) 9% undefined	30-40 (35%) 40-50 (35%) 50-60 (30%)
Ethnicity	Maya, Hispanic, Mixed background	Maya, Hispanic, Mixed background, Black	Mayan, Hispanic, Mixed background, European

Participation in the focus groups included participants from both Mexican institutions with 30 students (40% female, 60% male) and 11 academics (55% female, 45% male). For both, surveys and focus groups, ethics clearance was obtained to allow the collection of information, data analysis, and storage.

3. Results

3.1 Student recruitment and programme inclusivity

Approximately 63% of academic staff reported their involvement in organizing inclusive student recruitment activities, although their responses indicate a significant variation depending on gender. Among female respondents, 50% indicated their participation in inclusive recruitment practices, compared to only 21% of male respondents suggesting that female staff disproportionally conduct EDI related activities which might contribute to unequal workload imbalance (Figure 1). Furthermore, while 37% of academics conduct outreach activities aimed at promoting inclusive engagement, perceptions of inclusivity in recruitment differ as only 40% of female respondents perceive the recruitment culture as inclusive while 67% of male respondents believe that recruitment is inclusive (Figure 1) indicating a disconnection on the perception of inclusivity, male staff perceive it as sufficient while female staff are aware of limitations, highlighting the need of a transparent recruitment process and understanding of what inclusive recruitment actually entails.

On the other hand, significant discrepancies of views from academics were perceived by the students with 72% reporting being unaware of initiatives at their institutions (Figure 2a). Nearly half of the student population (~48%) surveyed indicated that they had never received any form of EDI training, 19% reported receiving training once per year, and two different groups, each representing around 8% of the total student population, stated that they received EDI training either twice or more than three times annually (Figure 2b). These contradictory responses indicate that EDI programs are not reaching all students with further 8% of them

not attempting to respond this question suggesting poor embedding into the curriculum and induction processes.

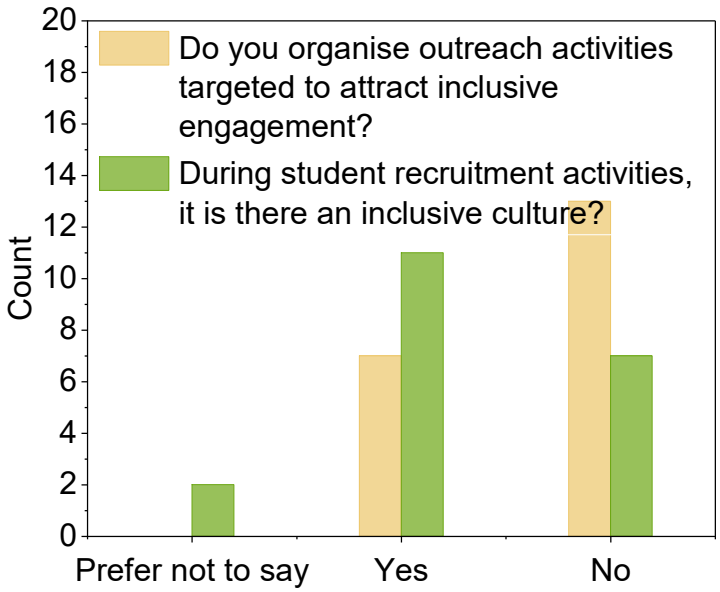

Figure 1. Survey responses by academics on organising inclusive recruitment events and perception of inclusive culture in recruitment.

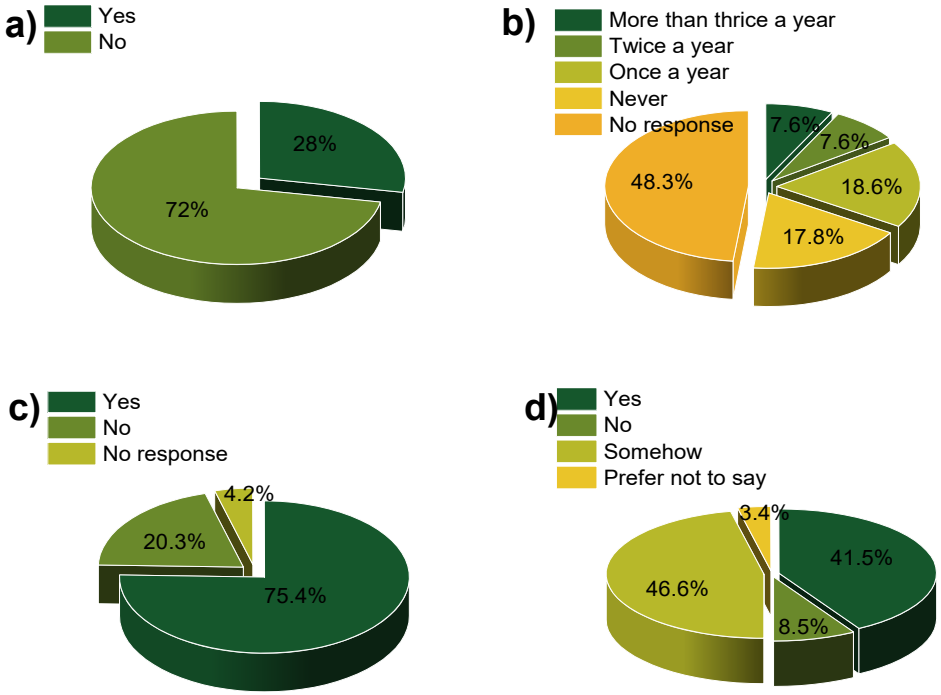

Figure 2. Student EDI general perceptions from the institution; **a)** responses to awareness of an EDI programme at the institutions, **b)** receiving training on EDI at the institutions, **c)** inclusivity at events organised at the institutions, **d)** responses on feeling supported at the institutions.

These findings highlight the imperative need for broader dissemination and promotion of formal EDI training among students, as well as the integration of fundamental inclusivity principles in academic life. Interestingly, when asked whether institutional events were inclusive, 75% of students responded affirmatively, suggesting proactive efforts by institutions to foster inclusive environments (Figure 2c). In contrast, when students were asked about their perception of support given by the institution to achieve their academic potential, responses were mixed: 42% responded positively, 47% felt moderately supported and approximately 9% felt unsupported (Figure 2d). This ambiguity in the responses suggests inconsistent or uneven implementation of EDI principles within the curriculum, despite the existence of institutional EDI policies leaving students not experiencing inclusive academic environments.

A clear discrepancy also emerges in students' perceptions of inclusivity. When asked about their overall experience on inclusivity, responses were divided, 50% expressed to experience an inclusive culture, but 9% of students reported a negative experience. The rest of the population felt unsure (37%) or preferred not to respond to this question (3%) (Figure 3a). Conversely, 8% of the student population felt in disadvantage due to gender or ethnicity (Figure 3b). These mixed responses suggest that while institutions may be making strides in promoting inclusive environments, still there is a need for more consistent and transparent implementation of EDI principles indicating lack of clarity and visibility of EDI practices, particularly in areas that directly affect students' academic experiences and sense of belonging.

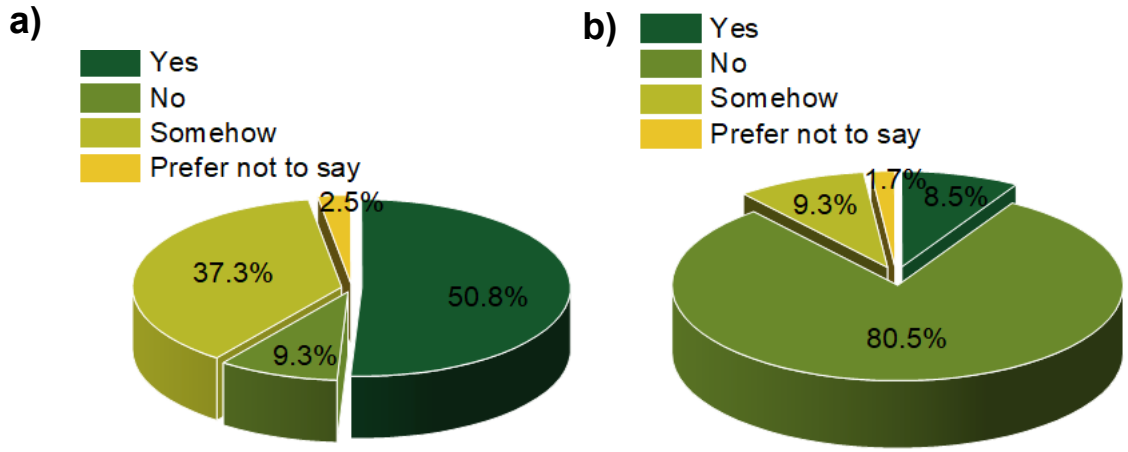

Figure 3. a) Student perception on the provision of a positive student experience by the institutions and sense of belonging, and **b)** disadvantage and missing educational opportunities feeling by students due to gender, ethnicity, sexual orientation, age, or disability.

Information collected from focus groups reveal that inclusivity in student recruitment and programme implementation is partially established but unevenly experienced, reflecting a fragmentation between institutional provision and student realities (Table A-1 and Figure A-1, Supplemental Information). A major finding concerns inequalities linked to mobility and

accommodation. Students report significant challenges related to commuting, including long travel times, unreliable transport systems, and lack of local accommodation. These barriers disproportionately affect students from rural areas or those without financial resources, indicating that access to education is strongly mediated by location and socioeconomic status. Although the institution offers mobility programmes, scholarships, and academic opportunities, access to these is unevenly distributed. Students frequently highlight limited awareness due to poor dissemination, as well as financial constraints that restrict participation. This creates a situation where opportunities exist but are not equitably accessible, reinforcing hidden inequalities.

Students identify weak communication systems as a central barrier. Key information such as accreditation, research opportunities, or support programmes is often poorly disseminated, relying on informal networks or individual initiative. This results in informational inequality, which significantly undermines inclusivity.

Both academics and students acknowledge the presence of inclusive infrastructure, such as ramps, accessible classrooms, and some support for students with disabilities. However, these provisions remain partial and primarily focused on mobility impairments, with limited support for sensory or non-visible disabilities. Academics emphasise ongoing institutional efforts, including training and awareness initiatives, while students highlight the limited visibility of diverse disabilities, suggesting that inclusion is not fully embedded in everyday academic life.

English proficiency emerges as a complex factor in access and participation. While it is no longer mandatory in some programmes at these institutions, students perceive it as essential for employability and academic progression. The inconsistent quality of language provision creates differential advantages, benefiting students with prior access to language training acting as a hidden barrier to inclusion.

Inclusivity in special circumstances like student pregnancy is recognised in principle in Mexican contexts, with students emphasising the right to continue education. However, institutional support systems are unclear and insufficiently communicated, resulting in uncertainty about available resources. Inclusion in this context is perceived as both an institutional responsibility and a shared social obligation among students.

3.2 Awareness of gender equality and EDI values among students and academic staff

Responses from academic staff revealed insights into the current state of EDI within institutions. Approximately 35% of academics confirmed the existence of a formal EDI structure within their institution. This suggests that while these institutions have taken steps toward institutionalising EDI, a considerable proportion may still lack a formal framework and dissemination of those initiatives to support the students and academic communities (**Fig. 4**). A moderated level of institutional commitment to acknowledge contributions in the field of EDI and gender balance was identified as 55% of academics reported that their institutions recognize, and reward efforts related to this matter; however, the same group indicated that recruitment targets (e.g., minority groups or women) do not apply to their institutional environment indicating the lack of efforts to achieve gender and minority imbalances among the academic communities of these two institutions. This indicates that EDI recognition exists but fails to transfer into the implementation of mechanisms to promote structure change.

Inclusivity was also explored in the acceptance sense with only 45% of participants stating that they feel accepted by their colleagues; however, one of the academics from a minority group indicated that gaining acceptance required considerable personal effort due to their minority status, highlighting ongoing challenges in fostering inclusive environments revealing unequal inclusion experiences and the existence of hidden cultural barriers.

Various other aspects linked to EDI were also explored within the student community, for example, student representation by the societies in their institutions and active engagement to student societies. Unfortunately, responses indicated that student do not feel represented by societies, and this agrees with their response to 54% neutral, 27% disagree and strongly disagree. We perceive here a missing opportunity to promote inclusivity in societies and representative bodies in these institutions.

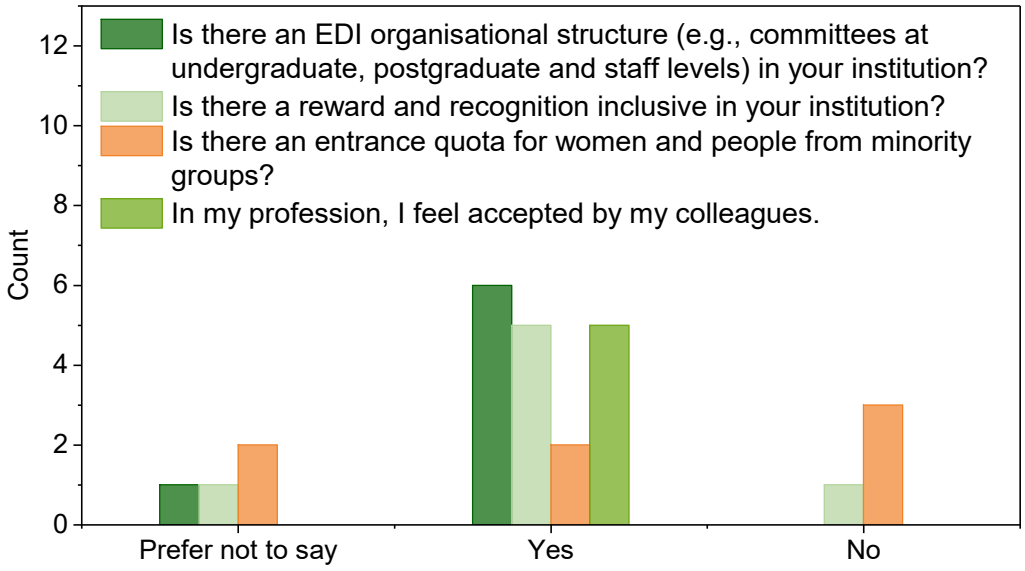

Figure 4. Academic responses on EDI practice at the Mexican institutions studied.

Our investigations from focus groups indicate that awareness of EDI values is developing but inconsistently internalised across the academic community (Table A-1 and Figure A-1). Participants report a noticeable increase in women's participation in engineering and other traditionally male-dominated fields. However, gender imbalances persist, particularly among teaching staff, and instances of subtle bias or discriminatory language remain. This reflects a transitional phase, where progress in representation coexists with residual cultural norms. Academics emphasise institutional initiatives, such as gender equity programmes and support for minority groups. However, students question the effectiveness and visibility of these efforts, particularly in terms of measurable outcomes. Data collection on diversity exists, but its application remains unclear, limiting its impact on policy and practice. Students rarely report direct personal disadvantage but acknowledge that others experience privilege and inequality. This awareness suggests a developing understanding of systemic inequities, even where individual experiences of discrimination are limited.

Students demonstrate awareness of formal mechanisms, such as gender violence protocols, which are perceived as functional but slow. However, uncertainty regarding access pathways suggests that awareness is partial and operational clarity is lacking. A key finding is the

variation in EDI awareness between individuals and groups. Students often perceive themselves and their peers as more open and inclusive, while some academics, particularly those described as more traditional, are seen as less adaptable. This highlights a generational and cultural gap in EDI understanding and potential risks associated with it as presented in literature (Corrie et al., 2022).

3.3 Perception of how the academic community understand EDI implementation in the curriculum

As mentioned above, EDI initiatives were identified at each institution, but they are not reaching the entire academic community indicating the importance of institutional policy to disseminate within the academic and student population. It was identified that the meaning of EDI implementation within the curriculum was not clear among the academic community, neither by staff nor by students. For example, we have asked nine questions aiming to identify the perceptions from students about the implementation of EDI elements in the curricula, but almost half of the population surveyed, neutrally replied to all nine questions. We interpret this neutrality as lack of information, rather than undecidedness or indifference, given the reduced dissemination of EDI initiatives reflecting that EDI is not explicitly embedded or disseminated in teaching (Figure 5).

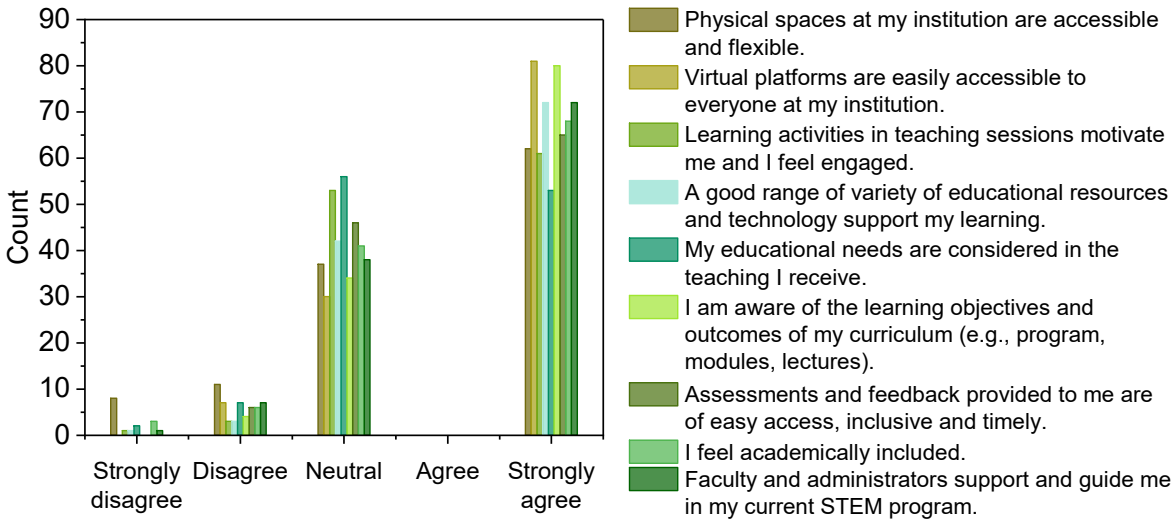

Figure 5. Perspectives of EDI implementation in the curriculum by academic staff.

Although, it is expected that all students are aware about learning objectives and outcomes of their curriculum, not all student population responded awareness to this question, just 64% of them. Moreover, 49% of the students agreed on received inclusive and timely feedback on assessments from academics. And only 47% of the students feel academically included and 55% reported to feel supported and guided by administrators. This indicates wider curriculum communication issues that impact student engagement and inclusive teaching practices.

When asked about accessibility and flexibility of physical spaces in the classrooms, only 47% of the population agree with the existence of accessible and flexible spaces in the classroom. Regarding a good range of various educational resources and technology, 55% of students

agree with their existence of support for student learning, and 63% of the students agree to the statement that the virtual platforms available are accessible to everyone.

Less than half (47%) of the student population surveyed agree with the existence of learning activities that motivate them and make them feel engaged but only 41% of students feel that their educational needs are considered in the teaching received indicating that teaching is not fully responsive to diverse needs.

The findings presented above highlight a critical gap between institutional EDI intentions and students lived experiences, reinforcing the argument that an inclusive curriculum is not achieved through policy statements alone but through meaningful translation into practice. While institutions have formal EDI initiatives, the prominent levels of neutral responses and limited awareness among students suggest that these efforts are not being effectively embedded or communicated within the academic environment. This aligns with previous findings that EDI often fails to permeate the curriculum when its meaning is unclear to both staff and students, leading to fragmented and inconsistent implementation (Bryan 2017; Brooks et al., 2022). The low levels of perceived inclusion, engagement, feedback quality, and accessibility further indicate that key elements of an inclusive curriculum (e.g., responsive teaching, equitable assessment, accessible learning spaces, and recognition of diverse student needs) are not yet systematically integrated. Instead, inclusion appears to depend on isolated practices rather than coordinated design. Collectively, this suggests that achieving an inclusive curriculum requires not only clear institutional communication and shared understanding of EDI, but also deliberate alignment between policy, curriculum design, pedagogy, and student experience to ensure that inclusion is visible, consistent, and meaningful across the entire learning journey. These findings are consistent with previous research showing that top-down EDI initiatives often fail to translate into consistent curriculum practices, due to unclear definitions of EDI, weak dissemination across institutional levels, and reliance on individual academics rather than systematic curriculum design (Fox et al., 2023).

Furthermore, through focus groups, we identified several signs that the integration of EDI principles into the curriculum and teaching practices is perceived as limited, inconsistent, and dependent on individual actors (Table A-1 and Figure A-1, Supplemental Information). EDI topics are marginal within the curriculum, often confined to specific modules or introduced late in programmes. This restricts their impact on students' overall educational experience and suggests a lack of systematic embedding of inclusivity within programme design. Students report highly variable experiences depending on individual teachers. While some adopt inclusive and supportive approaches, others focus narrowly on content delivery. This lack of standardisation indicates that inclusion is not institutionally embedded but relies on personal commitment.

Support services for mental health and wellbeing exist but are widely perceived as insufficient, inaccessible, or bureaucratic. Limited capacity, short-term interventions, and delayed processes reduce their effectiveness, particularly for students experiencing acute needs. Academics acknowledge a lack of training to address these issues, reinforcing the gap between provision and capability. For example, there is increasing recognition of neurodiversity and minority identities; however, institutional responses remain underdeveloped. Students' needs are often identified informally, and teachers feel

underprepared to provide appropriate support, highlighting systemic shortcomings. Students report mixed experiences of belonging. While some identify with the institution and benefit from student-led initiatives, others perceive a lack of institutional support for community building. Engagement often depends on student initiative rather than structured opportunities, limiting broader inclusivity.

3.4 Inclusivity and Employability

We attempted to investigate inclusivity in the employment process including the application and career progression. From the responses received, none of the graduates have felt in disadvantage neither by gender nor by ethnicity during the application process and as one of the respondents have commented "*there are no spaces in the work culture where discrimination is encouraged*"; however, about 55% of the participants indicated that there is a fair career progress in terms of gender, ethnicity, age and disability in their workplace (Fig. 6); the remaining population (45%) did not expressed that strong satisfaction. In agreement to this, only 45% indicated to have received any kind of professional advice or support from the institution where they obtained their university degree indicating a weak link between university support and graduate outcomes. Overall, 55% of the academic population surveyed feel they had a fair recruitment application reflecting the positive perception of entry-level equality, but also reveals the potential hidden inequalities beyond entry level.

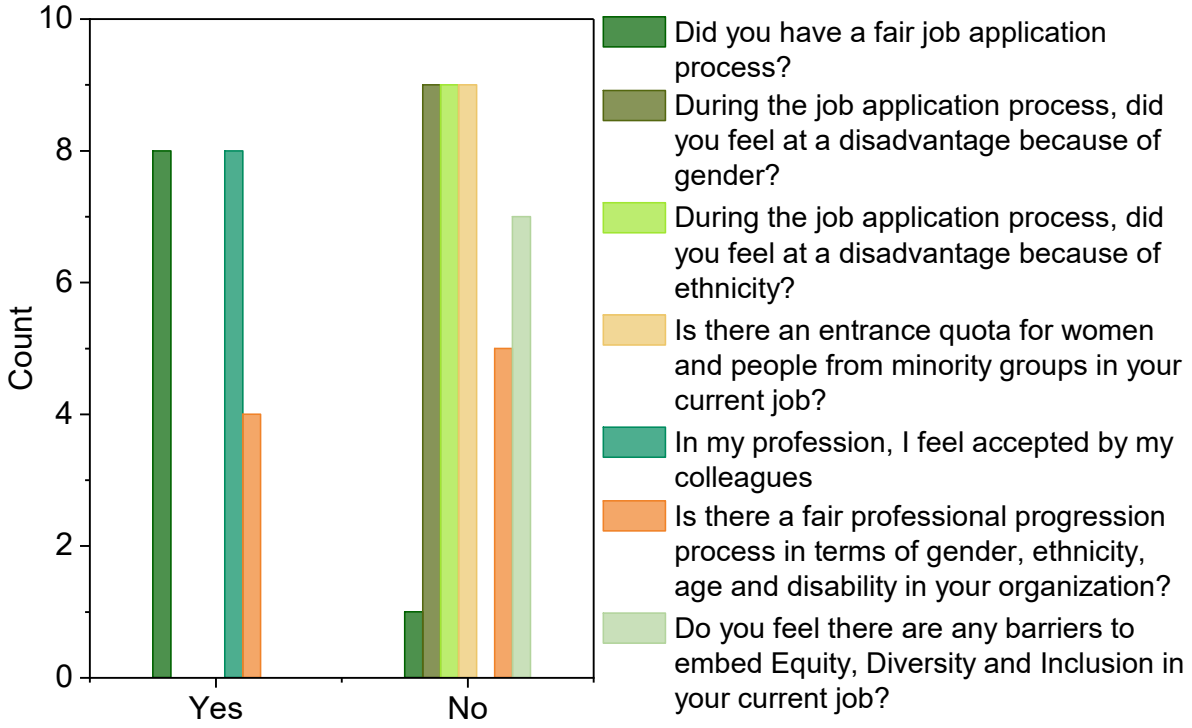

Figure 6. Responses on inclusivity within the employment process including job application and career progression.

In general, graduates feel there are no limitations to integrating EDI in their current job position; one of them indicated "*The requirements focus on formal academic training and the achievements obtained during the performance*"; however, this perception is not a communal agreement as another academic commented "*in managerial and executive ranks, selection is much more inclined towards men, and if they have a family, they are usually perceived as*

more stable and therefore more suitable for the position, rather than women, even if they are single or childless". This highlights contradictory workplace perceptions on merit-based systems and gender bias in leadership selection.

Focus groups revealed that inclusivity in employability reflects a combination of strong institutional frameworks and uneven student outcomes. It was revealed that accreditation processes, particularly those aligned with CACEI, are well established at an institutional level. Academics emphasise structured approaches to curriculum design, while students report increasing awareness through coursework and participation. However, dissemination of accreditation information remains limited, reducing its perceived relevance for students. Students highlight a lack of systematic dissemination of career-related information, including research opportunities and professional pathways. This reduces engagement and limits students' ability to make informed decisions, particularly at the initial stages of their education

A consistent finding is the disconnect between theoretical knowledge and practical application. While opportunities for firsthand learning exist (e.g., projects, internships, software training), these are often introduced late or unevenly implemented, limiting their impact on employability. The institution offers numerous opportunities for skill development, including optional courses, workshops, and student organisations. However, access and quality vary, resulting in uneven development of professional competencies. Students from different educational backgrounds experience unequal entry conditions, particularly where prior knowledge is assumed. Although remedial programmes exist, they are perceived as insufficient and poorly integrated, leading to persistent disparities in academic performance.

4. Discussion

Inclusivity should provide equal opportunities for all participants from the academic community to succeed, and it is a long-term journey. Inclusive teaching requires continuous reflection and ongoing development. Sustainable inclusive teaching in STEM requires a systemic transformation of pedagogy, rooted in understanding social context, developing cultural competence, and embedding inclusion across all stages of academic training.

This study examined inclusivity across recruitment, institutional practices, curriculum, and employability, revealing a consistent pattern of "fragmented inclusivity" where institutional intentions and structures do not fully translate into equitable student experiences. The discussion below interprets these findings across four topics 1) student recruitment and programme inclusivity, 2) gender equality awareness and EDI values, 3) EDI in the curriculum and 4) inclusivity and employability, highlighting key tensions and implications.

4.1 Student recruitment and programme inclusivity

Our findings reveal a complex picture of student recruitment and programme delivery. Most academic staff (63%) report involvement in inclusive recruitment activities, we found that female staff are significantly more engaged than male counterparts suggesting that EDI efforts are unevenly distributed potentially placing an uneven burden on female staff. Differential perceptions of inclusivity between male and female staff reflect different awareness of the systemic barriers. Student responses further complicate this picture as a substantial majority (72%) report being unaware of EDI initiatives and half have not received any formal training. The evident disconnection between staff activity and student perception

clearly evidences that communication needs to be improved leaving them with an uneven inclusion experience. Inclusion practices may exist, but they require more systematic implementation and dissemination.

The findings demonstrate a clear distinction between institutional provision and student experience. While universities have introduced infrastructure adaptations, mobility schemes, and support mechanisms, students continue to encounter significant barriers linked to location, socioeconomic status, and access to information. This aligns with broader higher education literature that identifies inclusivity not merely as the presence of resources, but as the ability to access and benefit from them equitably. Despite the existence of opportunities (e.g., mobility programmes, accreditation benefits, support services), limited dissemination restricts participation. This suggests that inclusivity is undermined not only by resource scarcity but by limited communication, resulting in a "hidden exclusion" (Burgos-Lopez et al 2025; Emmerich, M. 2021).

Similarly, language requirements (e.g., English proficiency) emerge as a structural inequity embedded within the system. Although not always formally mandatory, language competence remains essential for academic and professional advancement, disproportionately benefiting students with prior access to language education. These findings reinforce the idea that institutional policies can function as implicit filters, shaping inclusion in less visible ways (Franquiz et al., 2021).

4.2 Gender equality awareness and EDI values

The data on awareness and institutional commitment to EDI reveal a moderate but uneven level of engagement. Only a minority of academic staff (35%) confirm the existence of formal EDI structures, which suggests either limited institutional development or insufficient communication of these frameworks. Although over half of surveyed staff report that their institutions recognise and reward EDI-related contributions, the absence of measurable mechanisms such as recruitment targets indicates a gap between symbolic recognition and structural action. Additionally, less than half of academics feel accepted by their colleagues, and experiences reported by minority staff highlight ongoing challenges in achieving genuine inclusivity within academic cultures. From the student perspective, the lack of perceived representation through student societies further reinforces this issue, with many students expressing neutrality or dissatisfaction. This suggests that both formal structures and informal community mechanisms are not effectively supporting inclusivity, pointing to the need for stronger institutional strategies that address both representation and a sense of belonging (Lv et al 2026; Stewart, 2022).

The findings reveal that awareness on EDI values are present but unevenly internalised across the academic community. Formal policies, such as gender equality frameworks and reporting mechanisms, are recognised by both academics and students; however, their visibility, accessibility, and perceived effectiveness vary significantly. Students' accounts suggest that EDI is often experienced through interpersonal interactions rather than institutional systems, leading to inconsistent outcomes. While many report respectful and diverse environments, instances of bias and discriminatory language persist, particularly among more traditional academic staff. This highlights a generational and cultural gap in EDI consciousness, where institutional expectations are not fully aligned with individual practices. Importantly, students demonstrate awareness of systemic inequalities, even when not personally affected,

indicating a growing recognition of privilege and structural inequity. However, this awareness does not always translate into collective or institutional change, pointing to the need for more active engagement strategies.

4.3 EDI in the curriculum

The findings clearly demonstrate a lack of shared understanding of how EDI is implemented within the curriculum. The high proportion of neutral responses across multiple questions suggests that students are either unaware of EDI-related practices or unable to recognise them within their learning experience. This is further supported by the fact that a notable portion of students are not fully aware of their learning objectives, indicating broader issues with curriculum transparency. Levels of agreement regarding inclusive feedback, academic inclusion, and support services remain moderate, suggesting that inclusive teaching practices are applied inconsistently. Similarly, perceptions of accessibility (both in physical learning spaces and in teaching resources) are mixed, with digital accessibility rated higher than physical infrastructure. The low levels of student engagement and perceived consideration of individual educational needs further indicate that teaching practices are not yet fully responsive to diverse learners. Overall, these findings highlight a significant gap between institutional EDI intentions and their practical realisation in the curriculum, suggesting that inclusive education is currently fragmented and reliant on individual efforts rather than being systematically embedded in programme design.

The curriculum emerges as a critical but underdeveloped site for EDI implementation. The findings indicate that inclusivity is not systematically embedded within curriculum design but rather appears sporadically in isolated modules or through individual teaching practices. This fragmentation results in high variability in student experiences, where inclusion depends on the commitment and awareness of individual educators. While some teachers adopt holistic and inclusive approaches, others focus narrowly on content delivery, reinforcing a model of education that prioritises disciplinary knowledge over social responsibility. Although, the data presented in this study is derived from two Mexican institutions, they might be relevant to institutions in Latin American countries in which training of academic staff plays a key role for the implementation of EDI initiatives (Sanchez-Gomez et al., 2024).

Mental health and pastoral support further illustrate this inconsistency. Although services exist, they are perceived as under-resourced and difficult to access, particularly in situations of acute need. The administrative nature of support systems may discourage engagement, especially among vulnerable students, thereby limiting their effectiveness. Additionally, the findings highlight gaps in addressing neurodiversity and invisible conditions, reflecting a broader lack of institutional preparedness. Both academics and students recognise the need for training, adapted pedagogies, and better data integration to support diverse learning needs.

The concept of belonging is also unevenly realised; while some students develop strong identities within the institution, often through peer networks or extracurricular activities, others report weak connections due to limited institutional support for community-building. This suggests that belonging is not structurally fostered but emerges through individual or collective student initiatives.

4.4 Inclusivity and employability

The results present a positive but varied perspective as none of the surveyed graduates reported experiencing discrimination during the recruitment process, perceptions of fairness in career progression are less consistent, with only just over half expressing confidence in equitable advancement opportunities. This suggests that while entry into the workforce may appear equitable, structural inequalities may persist at more advanced career stages. The low proportion of graduates receiving professional guidance or career support from their institutions further indicates a gap in institutional responsibility for employability. Additionally, contrasting views regarding workplace equality (ranging from perceptions of merit-based systems to concerns about gender bias in leadership roles) highlight variability across organisational contexts and suggest that inclusivity is not uniformly realised in professional environments. These findings underscore the importance of extending EDI considerations beyond higher education into career development and progression, as well as strengthening institutional support for graduate employability (Baron et al., 2024; Hammershøj, L.G. 2019).

This study identifies a tension between strong institutional frameworks and unequal student outcomes. Accreditation processes are well established and aligned with international standards, yet their relevance to students is diminished by limited awareness and dissemination. A key issue is the disconnect between theoretical knowledge and practical application. While opportunities for experiential learning exist, they are often introduced late in programmes or inconsistently implemented. This delays the development of professional competencies and places greater responsibility on students to seek out opportunities independently (Uziak, et al., 2017; Hakimet al., 2018).

Moreover, differences in educational backgrounds create unequal starting points, particularly in technical subjects such as mathematics and programming. Although level up courses are available, their limited scope and integration reduce their effectiveness, perpetuating disparities throughout students' academic trajectories. The findings also highlight the importance of informal and extracurricular learning environments, such as peer support and optional courses, in developing employability skills. However, these opportunities are not uniformly accessed, reinforcing patterns of inequality. The lack of systematic career information dissemination limits students' ability to navigate professional pathways, particularly in initial stages of their education. This reflects a broader issue of institutional communication gaps, which impact both inclusivity and employability.

We identified invisible barriers for women in STEM education and professional careers facing various interrelated and implicit barriers that originate from structural, cultural, and operational inequalities.

The unbalance EDI-related work placed on female academics is often undervalued and may hinder career progression. At the same time, differential gender inequality awareness contributes to inconsistent recognition of systemic barriers, limiting effective institutional responses. Although policies promoting inclusivity exist, their implementation remains partial, with weak accountability mechanisms and limited integration into curricula and institutional practices. Women also encounter cultural challenges, including implicit bias, lack of representation, and a diminished sense of belonging, particularly in male-dominated STEM environments. These issues are compounded by uneven access to opportunities,

insufficient career guidance, and reliance on informal networks that may exclude women. While entry into the workforce appears relatively equitable, persistent concerns around career progression and leadership opportunities point to ongoing invisible barrier. Our findings suggest that inclusivity efforts remain figurative rather than transformative, requiring a more systemic and embedded approach to effectively address gender-based inequalities.

Conclusions

Our findings demonstrate that achieving meaningful inclusion requires more than the presence of policies or isolated initiatives. It demands a coherent, institution-wide approach that aligns strategy, curriculum design, staff practices, and student experience. Greater emphasis is needed on clear communication, shared understanding of EDI principles, and systematic integration across all aspects of academic life. Only through such alignment can institutions move from aspirational commitments to sustained and measurable inclusive practice.

The curriculum plays a critical but underdeveloped role in advancing inclusivity. EDI principles are only partially integrated, often depending on individual educators rather than systemic design. Similarly, support structures for student wellbeing and diverse learning needs exist but are limited in consistency and capacity. This suggests that inclusivity within teaching and learning is emergent rather than institutionalised. Inclusivity in employability is constrained by disparities in skill development, uneven access to practical learning opportunities, and limited dissemination of career-related information. Although accreditation frameworks and professional preparation mechanisms are in place, their benefits are not equally for all students.

Barriers faced by women in education and professional careers are implicit in institutional structures, everyday practices, and cultural norms. Despite the presence of inclusivity policies and initiatives, their inconsistent implementation limits the intentions in addressing gender inequalities. Women continue to encounter disproportionate expectations, limited recognition, and systemic obstacles that affect their sense of belonging, access to opportunities, and career progression. The persistence of implicit biases, weak accountability mechanisms, and reliance on informal support systems further reinforces these disparities. Therefore, achieving genuine gender equality requires a shift from policy-level commitments to fully integrated, systemic change, where inclusivity is consistently embedded across recruitment, curriculum, institutional culture, and career development pathways.

From the student perspective, a shift from policy-driven inclusion toward systemic inclusivity in needed. Achieving this requires not only expanding resources but also improving communication, coordination, accountability, and pedagogical practices. This study underscores that inclusivity in higher education is not a fixed outcome but a continuous and relational process, requiring sustained engagement across institutional, academic, and student levels. Addressing both visible and hidden barriers will be essential to ensuring that inclusion is not only articulated but meaningfully experienced by all members of the academic community.

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