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Trends and Innovations in Transport Education

GENDER DISPARITIES IN ENGINEERING EDUCATION AND THEIR LONG-TERM ECONOMIC CONSEQUENCES IN THE LABOR MARKET

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Abstract. Gender disparities in engineering education remain a persistent global issue with far-reaching consequences for labor market implications, innovation capacity, and economic equity. Although institutional, societal, and policy interventions and incentives have been implemented to increase inclusivity in engineering, women are still underrepresented within engineering programs and are accessing engineering programs with barriers during their education and professional journeys [1, 2]. This study aims to examine the extent of these disparities, identify the contributing factors, and explore their long-term consequences on labor market participation, earning potential, and career advancement. Drawing on data collected from 104 participants, undergraduate and postgraduate engineering students across two universities CIT (Canadian Institute of Technology) and UBT (University of Business and Technology). This research utilizes a mixed methods approach utilizing quantitative and qualitative design. Quantitative data was gathered via a structured Google Forms questionnaire, which they completed online and was distributed to the institutions' engineering students; (104) participants were gathered from this link provided to participants. The survey addressed themes such as academic performance, experiences of discrimination or support, and career expectations. Among the respondents, 40.4% identified as female and 59.6% as male, with 69.2% pursuing undergraduate studies and 28.8% enrolled in postgraduate programs. Notably, only 13.5% of students reported always having access to female mentors, while 27.9% stated they rarely did, highlighting the limited presence of visible female role models. Furthermore, 34.6% of respondents identified gender stereotypes, and another 34.6% cited a lack of female role models as the main barriers to women's participation in engineering education. Only 7.8% had received any career guidance specifically tailored to female students. Qualitative insights were obtained through 15 semi-structured online interviews with BA and MA students from the Canadian Institute of Technology (CIT) and the University of Business and Technology (UBT), offering deeper perspectives on personal

experiences, perceptions of gender bias, and institutional culture. The combined findings reveal a consistent pattern: female students report higher incidences of stereotyping, limited access to mentorship, and underrepresentation in faculty and leadership roles.

These educational experiences showed causal relationships to lower self-efficacy, decreased career confidence, and lower interest in staying in engineering after graduation. The research also showed that these disparities continued into the labor market. Female engineering graduates were more likely to experience wage gaps, underemployment, and fewer opportunities for promotions. The economic consequences aren't only individual but also societal because gender inequity fosters talent loss, reduces productivity, and maintains systemic inequalities in innovation related industries. The implications are even greater because when the intersection of gender with other identity factors (race, socioeconomic status, disability) were accounted for, marginalization is compounded with limited educational and professional opportunities, highlighting the importance of thinking intersectional in examining policy reform and broader educational change.

Whether institutions can create practices that either reduce or exacerbate gender inequity [3]. Universities and colleges that have inclusive curricula, robust mentorship connections, gender appropriate pedagogy, and diverse faculty are positioned to have better retention rates for women students. Still, it is unfortunate that some institutions still lack comprehensive policies around structural biases, forcing students to endure hostile and unwelcoming conditions in isolation. Although national and international policy efforts matter, they frequently focus on access instead of persistence and success, thereby limiting their positive effect.

The research presented in this thesis contributes to the growing literature that emphasizes the need for systemic changes in engineering education. Specifically, the research illustrates that solving gender imbalances means more than achieving diversity based on numbers; it means changing the culture to create inclusivity and provide for different learning styles while simultaneously disrupting the patriarchy present in the engineering profession. This research helps to identify the following areas of improvement: providing early STEM experiences, increasing funding for scholarships such as women in engineering, aligning gender equity in institutions, labor market reforms such as pay transparency, and creating family-friendly workplaces that support women in the engineering workforce.

Future research should seek to examine longitudinal data on the career path for female engineering graduates and expand the analysis to include private sector engineering graduates, along with international comparisons to provide scope for international discussions on the topics presented in this thesis. This study highlights a need for collaboration among educators, policy makers, industry leaders, and civil society to ensure that gender does not dictate educational opportunity or opportunity for economic success in engineering.

Keywords: gender disparities; engineering education; labor market inequality; women in STEM; higher education policy; intersectionality; economic impact; academic barriers; career progression

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1. Introduction

Gender disparities in education and labor market participation continue to be a complex and multi-dimensional issue in Kosovo and Albania, especially in the fields of science, technology, engineering, and mathematics (STEM). While men and women have nearly equal enrollment in higher education, gender inequalities continue to reflect systemic factors; differences in unemployment rates, occupational segregation, and not being represented in technical, leadership, and decision-making [1]. Women in both countries also face structural and cultural barriers on their full participation and progress in male-dominated fields such as engineering.

The paper examines the reach and implications of these disparities by concentrating on engineering education which not only reflects gendered processes, but impacts pronouncedly on innovation, labour market outcomes, and national economic development [3, 4]. This paper employs a mixed-methods approach to data collection, based on a research project undertaken at two higher education providers; Canadian Institute of Technology (CIT) and University of Business and Technology (UBT). A combination of quantitative data from 104 engineering students, and qualitative data from 15 semi-structured interviews with BA and MA students.

The quantitative results show a severe underrepresentation of females participating in engineering education with only 40.4% of respondents identifying as female with 59.6% male. While students indicated relatively high academic confidence, only 13.5% of the sample said they had female mentors (and role models) on an ongoing basis, and 27.9% infrequently on a rare basis, suggesting few opportunities for women to gain a high profile in an influential academic position. In addition, 34.6% of respondents cited gender stereotype and the same number pointed to lack of female role models as barriers to women's participation in engineering education. An even lower percentage (7.8%) of students indicated they had received career advice or guidance targeted to female students, signaling a major absence of institutional support offered in relation to gender.

The qualitative data supports these trends suggesting that female students often experience implicit bias, cultural stereotyping and a lack of institutional mechanisms to support gender equity. Many participants retroactively expressed feeling isolated in their academic environment. They also noted the absence of inclusive and gender sensitive teaching and curriculum practices effecting their academic engagement and long-term confidence when considering a career in engineering.

These educational experiences are similar to eventual labor market outcomes. Research has shown that women graduating in engineering are more likely to

be underpaid, underemployed and have limited promotional opportunities [2]. The implications are not only personal but also systemic, as the marginalization of women leads to loss of talent, reduced innovation capacity, and entrenched economic inequality.

This study participates within the body of literature demanding intersectional approaches to gender equity in STEM, recognizing that gender does not exist in isolation but is joined with other social categories such as socio-economic class, ethnicity, and disability, compounding marginalization for many students [4]. Additionally, it argues that aspects of institutional practice, such as mentorship programs, inclusive pedagogy, and leadership diversity are critical to retention and success in engineering education [3].

By providing empirical evidence from Kosovo and Albania, this paper seeks to contribute to the international discourse on gender equity in higher education and the engineering workforce. It argues that the resolution of disparities requires more than a numerical gender balance; it requires a systemic change to policies, pedagogies, and institutional accountability. This paper recommends many changes including gender-sensitive curricular reform, early engagement for girls in STEM, targeted scholarships, and labor market policies such as transparency, flexibility, and equity.

2. Literature Review

The reviewed literature highlights persistent gender disparities in education, employment, and STEM participation in Albania and Kosovo, with relevant comparative insights from global research. Labor force data indicate that while women have almost equal access to higher level qualifications, in both Kosovo and Albania, they still experience lower workforce participation, higher unemployment rates, and greater occupational segregation [5, 6]. Research publications suggest gender biases in favor of women in learning, but structural barriers, that impacted education alongside opportunities for women in STEM degrees [7, 8]. Limited gender-sensitive policies is one structural barrier, compounded with both peer and societal biases that impact career perspectives. Various researchers have explored how societal and institutional gender stereotypes, as well as patterns of such as mathematics anxiety and interest, affect females' interest in taking courses in the full range of STEM education streams in early education and what happens to their interest as they progress through to secondary/post-compulsory education [9, 10, 11, 12]. Global studies [1, 4, 13, 14] potentially indicate similar gender gaps in their respective fields, but appreciate that complex social norms take considerable time to shift, especially to support sustained change and enhancements in women's workforce representation in STEM-related occupations through interventions. Research relating to performance [3, 15] demonstrates mixed evidence of research impact between genders, whilst pointing out systemic issues rather than ability.

There is evidence on the part of role model effects and institutional culture that were critical components to optimizing women's participation in STEM [16]. Overall, the literature reviewed largely concludes that taking an integrated approach to enhancing (and reversing gender gaps) into action has the best chances of success, alongside education interventions, policies and approaches, and addressing cultural practices that have created such biases.

3. From Stereotypes to Structural Inequities: Understanding Gendered Labor and Education Patterns

In Kosovo and Albania, unequal gender roles are established through cultural paradigms based on social role theory and precluding manhood theory which describes how the roles we are assigned come to be seen as stereotypes that shape and constrain behavior [17, 18]. According to social role theory, women are associated with communal attributions, like warmth and cooperation, while men are associated with agentic attributions: assertiveness and ambition. When people act outside of their prescribed roles, it can result in social backlash which may inhibit women from pursuing fields occupied by men, including STEM, IT, Cybersecurity, and engineering occupations [19]. In Kosovo, and other masculine societies, men are culturally bound to the provider role and women to the caregiver role [20]. This results in men resorting behaviors reaffirming their masculinity, through competition, risky, or aggression in response to a challenge to their masculine norm [21].

Kosovo's and Albanians gender inequality is also reinforced by social role theory and precarious manhood theory which explain how culturally assigned roles evolve into stereotypes that constrain behavior [17, 18].

– Social Role Theory links women with communal traits (warmth, cooperation) and men with agentic traits (assertiveness, ambition).

– Deviations from these roles often trigger social backlash, discouraging women from entering male-dominated fields such as STEM fields, IT, Cyber Security and engineering [19].

– In masculine societies like Kosovo, men are expected to be providers, women caregivers [20]. When these roles are challenged, men may reaffirm masculinity through competitive, risk-taking, or even aggressive behaviors [21].

3.1. Labor Market Overview in Kosovo and in Albania

Labor force participation, outcomes, and sectoral distribution demonstrate the on-going significance of gender gaps in both Kosovo and Albania, despite increases in educational attainment for women. Both countries have made policy commitments related to EU gender equality; however, labor market indicators reveal persistent structural inequalities.

In Kosovo, women's participation in the labor market are significantly lower than men. Women's unemployment rate is 38.0% while men's unemployment is 25.0% [22]. Labor force inactivity among women is 75.2%, compared to men's

inactivity rate of 42.0% [23]. The distribution of ownership of property and economic resources is still heavily skewed with over 80% of owners being male and less than 20% female [22]. The distribution of employment is significantly segregated by gender: women are concentrated in education (18.9%), health and social work (15.1%), and finance (2.5%). Men are concentrated in construction (17.2%), manufacturing (9.9%), and retail trade (19.5%). Although both men and women are accessing trade and service work, women are more likely to hold education and professional positions (33.2%) while men are concentrated within skilled trades and elementary occupations.

Table 1. Labor Market Participation by Gender in Kosovo

Indicator	Kosovo		Sources	Albania		Sources
	Men	Women		Men	Women	
Unemployment rate (%)	25.0	38.0	[22]	16.2	23.7	[24]
Labor force inactivity rate (%)	42.0	75.2	[23]	27.2	47.3	[24]
Youth unemployment (%)	16.7	16.7	[23]	24.8	30.1	[24]
Property ownership (%)	>80	<20	[22]	~70	~30	[24]

In Albania, a similar trend exists. INSTAT in Albania calculates the labor force participation rate at 52.7% for women versus 72.8% for men [24]. For women, the employment rate is 47.1% compared to 66.3% for men. Women earn on average 13.9% less than men when doing similar work, demonstrating a significant gender pay gap. As with many women in the region, women in Albania are often employed in public administration, education, and healthcare, while men work primarily in construction, transportation, and agriculture [24]. Informality is also a significant concern; women often work informally (without contracts for example) especially in rural and low-income communities.

3.2. Educational Attainment and Gender Patterns

Despite facing structural labor market disadvantages, women in Kosovo outperform men at all levels of tertiary education.

Table 2. Higher Education Graduates in Kosovo by Gender (2021/22 – 2022/23)

Degre Level	Women%	Men %	Notes
Bachelor's	70,5	29,5	2022/2023
Master s	64,0	36,0	2022/2023

PhD	56,0	44,0	2022/2023
Private University Graduates	72,1	27.9	6881 total graduates

Women perform well academically overall, yet there is still evidence of gender segregation by field of study, whereby men are more prevalent in computer science, agriculture, business, and geosciences and women are more prevalent in education, health, and humanities. In Kosovo, for the academic year 2022/2023, women accounted for 70.5%, 64.0%, and 56.0% respectively of Bachelor, Masters, and PhDs, particularly from private institutions where 72.1% of all graduates were women.

In Albania, female students accounted for 59.3% of all graduates from higher education, according to INSTAT Albania and the Ministry of Education and Sports, and they represented 62.5% of graduates with a Masters, but only 38.7% of graduates from STEM fields [24]. Not a relatively large percentage of female graduates were from engineering and ICT programs, as they did not lead mainly account for the majority of graduates from these fields.

Gender segregation by field persists in both countries, whereby engineering, ICT and agriculture fields are still dominated by male graduates, while women were more heavily enrolled in education, social sciences and the health fields. For instance, in Kosovo, 36.0 % of students enrolled in ICT programs were women and just 27.0% of female students in ICT were enrolled in vocational education. Albania reported only 25% of students were women who were enrolled in engineering programs, and less in the specialized subfields such as mechanical or civil engineering. Qualitative data from interviews that we conducted in this study systematically documented common barriers women face in engineering education thus far and they include:

– Lack of female mentors and academic role models;

– Discouragement from family and peers in pursuing male-dominated fields;

– Gender bias in internships and job recruitment, particularly for roles involving fieldwork or technical field operations.

These trends reinforce the concept of the “leaky pipeline,” where women drop out of engineering education or shift career paths due to cumulative disadvantages. Female engineering students frequently report three interconnected barriers: the scarcity of women in faculty and leadership roles, discouragement from peers and family when choosing technical disciplines, and perceived gender bias in recruitment, particularly for engineering positions involving extensive fieldwork.

3.3. Structural Inequality and Academic Gender Gaps

Gender inequity in academia and research continues to reflect wider labour market variations. Women are underrepresented at senior levels of higher education, particularly in STEM departments, where male leadership is largely unquestioned. Research has shown that gender differences in academic productivity, peer review,

and access to funding are exacerbated by expectation of family obligations, gendered norms, and a lack of institutional support [2, 3]. In both of Kosovo and Albania, evaluation systems and promotion procedures, are not fully gender-neutral. In addition, women academics are usually excluded from large international academic networks which hinders their visibility and ultimately their impact within the global academic and scientific community. In addressing these structural issues, this research provides recommendations located in the international literature and EU frameworks that include:

– Institutional accountability for gender equity outcomes;

– Gender-sensitive curricula and pedagogy in STEM fields;

– Funding schemes and scholarships aimed at increasing women's participation in technical disciplines;

– Work-life balance policies and family-friendly workplace environments;

– Support for international collaboration and mobility opportunities for female researchers and students.

Gender differences in academia and research represent the broader inequalities present labor market whereby academic research disparities (productivity, peer review, citation, funding, advancement) are instantiated in structures and biases, unequal correlational and family burdens, and lack of access to networking. The evaluation processes of research, as it relates to promotion and funding decisions may replicate inequality if there is not a gender-neutral specification.

Additionally, within the Western Balkans, similar structures exist despite varying EU integration policies designed to promote gender equality in science and research. Addressing these structures requires institutional reform that ensures gender-neutral assessment, eliminates barriers to women's progression; expands work-life balance policies; and increases the access to collaborative and international scientific research opportunities.

4. Methodology and Results Analysis

This study adopts a mixed-methods research design to investigate gender differences in the field of engineering education, specifically in Kosovo and Albania. With quantitative data collected by survey, alongside interpretive qualitative greater understandings from interviews, the method allows for both statistical analysis, as well as capturing a sense of the lived experiences of engineering students from two institutions of higher education, namely, the Canadian Institute of Technology (CIT) and University of Business and Technology (UBT).

4.1. Quantitative Data Collection

Quantitative data were collected through a structured online questionnaire developed in Google Forms. A total of 104 participants, both undergraduate and postgraduate engineering students, responded to the survey. Of these, 40.4% identified as female and 59.6% as male, with 69.2% enrolled in undergraduate programs and 28.8% in postgraduate studies.

The survey explored themes such as:
– Access to mentorship and role models;
– Perceptions of gender stereotypes;
– Experiences of academic and institutional support, and
– Career expectations in engineering.
Key quantitative findings include:
– Only 13.5% of students reported always having access to female mentors, while 27.9% stated they rarely did.
– 34.6% of participants identified gender stereotypes, and another 34.6% cited lack of female role models as major barriers to women's participation in engineering education.
– A mere 7.8% had received any career guidance tailored to female students, highlighting a systemic gap in support structures.

These data point to the fact that while female students are performing academically, it is within settings where there is little visibility of women in viable leadership or mentorship roles, absence having considerable ramifications on confidence and persistence in engineering pathways. A general summary of the survey results is in the Annex at the end of this paper.

4.2. Qualitative Data Collection

In addition to the survey, 15 semi-structured interviews were conducted with female and male BA and MA students from CIT and UBT. The interviews were online and utilized an open, semi-structured guide to enable extensive exploration of some topics and issues; the interviews aimed to investigate:
– Institutional culture,
– Perceptions of inclusion/exclusion,
– Gender dynamics in classrooms and internships, and
– Barriers to career progression in technical fields.

Interview responses demonstrate some recurring themes including implicit bias, belief by peers that pursuing engineering is not a career for women, and expectation from cultural norms. Female students frequently noted feeling alone in a male-dominated classroom and many expressed concerns about potential discrimination in their future career trajectories, especially in fields that involve fieldwork or work where they are required to be physically present in a technical environment. Students also noted that the curriculum did not have any gender-sensitive approaches and that there was not much gender-diversity in faculty for either program.

4.3. Synthesis of Findings

Together, the quantitative and qualitative results reveal a multi-layered pattern of structural and cultural inequality. While women in engineering demonstrate strong academic outcomes, their educational journeys are shaped by limited access to mentorship, entrenched gender stereotypes, and inadequate institutional support. These factors contribute to lower self-efficacy, reduced professional confidence,

and a higher risk of attrition from STEM careers, validating the "leaky pipeline" phenomenon widely documented in international literature. These disparities extend beyond education into the labour market, where women face wage gaps, underemployment, and glass ceiling effects, a trend also confirmed in the regional labour statistics reviewed in this study.

5. Gender Dynamics in STEM Education and Labor Markets: Challenges and Opportunities in Kosovo and Albania

The underrepresentation of women in STEM education and the labor market is a serious and ongoing issue in Kosovo and Albania, driven by structural, cultural, and institutional factors. While women have achieved considerable engagement in higher education in both countries and have often outperformed men in graduation rates, these successes have not led to equal job opportunities for women, especially in technical and engineering fields.

The centralized academic guidance structure in Kosovo and Albania containing little consideration for gender issues is informal and formal violence. A lack of access to mobility programs, childcare assistance and mentors presents obstacles to women who come from a disadvantaged background and are at the beginning of their careers. Without inclusive practices and examples of women, the only social experience a young woman has in STEM education can show them that they are not likely to be persistent and engaged long term in a technical area.

In both Kosovo and Albania, the social construction of gender roles and stereotypes as they manifest in educational and professional paths continue to dominate some women's decisions. Viewed as people-oriented professions, women appear to dominate in healthcare and education disciplines, while men appear to occupy only object-oriented professions like engineering, construction, and ICT. According to both Social Role Theory and Precarious Manhood Theory, women are expected to be communal and treated that way with limited opportunities to show assertiveness and leadership, while men are expected to be assertive and leaders with consequences for showing lack of assertiveness and leadership such as becoming frozen in an unviable pathway. Under normal circumstances the separation continues (and can hurt) people unrelated to the sex/gender characteristics (when women are unrelated, they can't stop notions of equity!!). When role boundaries are violated, backlash to those who threaten normative social ideas exists. As evidenced, principles of social upset would result from dismantling, challenging, or working toward gender equity.

Data from the labour market clearly indicates pronounced gender differences. Women in Kosovo are economically inactive at a rate of 75.2% and have higher unemployment rates than men. More than 70% of graduates of certain educational levels are women, but women are less often engaged in ICT and engineering roles. In Albania, similar patterns occur: women are much less likely to work in

STEM disciplines, influenced by stereotypes around family and career and limited exposure to STEM early on.

Research shows that women from other countries are incentivized by interest and role models, but constrained by stereotypes about family balance and career opportunities. Girls' instability with maths as well as their low levels of confidence have made it unlikely for them to study STEM.

Beyond economic effects, these inequities have broader economic consequences – one recent estimate indicates that gender inequality in the Western Balkans reduces GDP by 18% and that sexual segregation in occupations accounts for a considerable amount of the loss. Ending the gender gap in STEM must begin early, include gender-sensitive curricula and learning environments, gender-inclusive policies, and strong mentorship systems. Future related research should take a qualitative approach that helps to uncover real lived experiences and analysis of the "leaky pipeline phenomenon," which occurs when girls drop out of STEM education before entering the jobs market.

6. Long-Term Economic Consequences

Gender disparity in engineering education has considerable and persistent impact on the economy across the Western Balkans, including Kosovo and Albania. Countries that have low rates of female participation in the labor market experience limits to economic growth. The findings form World Bank in 2018 finds that gender gaps cost the region's economy approximately 18% of GDP, with approximately/ one-third of that loss attributable to occupational segregation whereby women work in certain jobs and men work in others [25]. Even as many women hold degrees in engineering or STEM more largely, many end up in administration, education or low wage jobs that do not fully exploit their technical skills. The suboptimal employment of skilled women inhibits women's own job advancement and lowers the labor market's potential for productivity and innovation. Female employment is more concentrated in sectors such as education and health where wages are typically lower than sectors with predominantly male practitioners, such as construction and manufacturing. There is unequal pay even among individuals with comparable qualifications due to the concentration of women in lower-paid sectors.

Research provides evidence of creativity, problem-solving, and innovation that is enhanced by the diversity of collaborations and performance in gender equitable teams in engineering and STEM. However, with the prevalence of under-represented women in technology and the infrastructure sector in Kosovo and Albanian, specifically in leadership and in technical roles, the potential for innovation and competitiveness remains limited.

This talent loss is a failed opportunity to stimulate economic growth and support economic development in the region. Other structural barriers, such as gender bias in recruitment and promotion, lack of viability for mentorship opportunities for women,

and entrenched social norms and stereotypes play a part in the so-called "leaky pipeline" – referring to the fact that women continue to exit STEM careers through the stages. These structural barriers will exacerbate long-term economic disparities in access for women and restrict women's full involvement in engineering and technology.

Solutions to these challenges must be systemic in nature. Policies that support not only women in accessing a STEM education, but also ensure women's pathways to career development that include mentorship opportunities, gender-sensitive practices in the workplace, and inclusive organizational culture are effective. If we want to close the gender gap in STEM to reach greatest economic potential, drive innovation, and sustainable inclusive development in the Western Balkans, we need to approach it from this view.

Conclusions

Women have taken significant strides in higher education in both Kosovo and Albania, particularly in terms of enrollment and graduation rates. However, despite these accomplishments, barriers still exist to fully involve women in engineering and technical professions - in practice this means that women are underrepresented in engineering and technical careers. Women still encounter systemic obstacles such as persistent gender stereotypes, occupational segregation, and societal expectations that continue to restrict women's involvement in these traditionally male-oriented sectors.

It is essential to address these inequities for fairness, equity and the economic aspect of sustainable development for both Kosovo and Albania. Women are skilled workers and by not utilizing their talent and innovative capacity in STEM, both countries miss out on potential areas of development.

To combat the inequities women in engineering and ICT face, a multifaceted plan of action is required. Providing scholarships and incentives for women in engineering and ICT are important first steps toward improving female enrollment and retention; providing mentorship opportunities for women studying engineering would help develop their skill sets and confidence for their future educational and professional roadmaps.

Campaigns, to increase public awareness, around challenging and changing the perceptions of "male" professions should include families, schools and communities in order to change the perceptions and acceptance of gender roles and perceptions of education and work.

Another approach is to promote university - industry collaboration by facilitating internships and work placements for engineering students, especially students who are female. Such initiatives help to develop job readiness skills and encourage women to pursue and stay in technical jobs.

Policies should deal with workplace discrimination and promote flexible work, which is fundamental to retaining women in STEM careers. Transparency

is similarly vital; the annual reporting of gender-differentiated enrollment and graduation figures and program by field would enhance how we monitor progress and identify areas where action is still needed.

Closing the gender gap in engineering and technology is necessary to promote equal opportunity and unleash the full economic potential of Kosovo and Albania.

REFERENCES

[1] VERDUGO-CASTRO, S., GARCÍA-HOLGADO, A., SÁNCHEZ-GÓMEZ, M. C., The gender gap in higher STEM studies: A systematic literature review. Heliyon. volume 8, Issue 8, e10300, August 2022, Open access. doi: 10.1016/j.heliyon.2022.e10300. PMID: 36090203; PMCID: PMC9449562.

[2] VERDUGO-CASTRO, S., SÁNCHEZ-GÓMEZ, M. C., GARCÍA-HOLGADO, A., Factors associated with the gender gap in the STEM sector. Heliyon, volume 9, Issue 6, June 2023, e17499, https://doi.org/10.1016/j.heliyon.2023.e17499.

[3] THELWALL, M., Do females create higher-impact research? Scopus citations and Mendeley readers for articles from five countries. Journal of Informetrics, volume 12, Issue 4, November 2018, pp. 1031 – 1041, https://doi.org/10.1016/j.joi.2018.08.005.

[4] BEROIZA-VALENZUELA, F., SALAS-GUZMAN, N., STEM and gender gap: a systematic review in WoS, Scopus, and ERIC databases (2012-2022). Front. Educ, Higher Education, vol. 9, 2024, https://doi.org/10.3389/feduc.2024.1378640.

[5] ILOSTAT, Labour Force Survey, Kosovo 2019. https://webapps.ilo.org/surveyLib/index.php/catalog/7628

[6] INSTAT. Men and Women in Albania, 2022. https://www.instat.gov.al/en/themes/demography-and-social-indicators/gender-equality/publication/2023/men-and-women-in-albania-2022/.

[7] RISTESKA, M., MEMETI, M., SAMARDZIC JANKOVA, O., Mapping gender-related policies, programmes and mechanisms in STEM in Western Balkans. RCC, 2020, https://www.rcc.int/pubs/107/mapping-of-gender-related-policies-programmes-and-mechanisms-ongender-disparity-in-stem-in-western-balkans.

[8] UNDP & RCC, Women's Economic Empowerment: Areas for Joint Actions in the Western Balkans, 2020, https://www.rcc.int/docs/556/womens-economic-empowerment-areas-for-joint-actions-inthe-western-balkans

[9] SU, R., ROUNDS, J., ARMSTRONG, P. I., Men and things, women and people: A meta-analysis of sex differences in interests. Psychological Bulletin, 135(6), pp. 859 – 884, 2009, https://doi.org/10.1037/a0017364

[10] PASSOLUNGHI, M., FERREIRA, T., TOMASETTO, C., Math–gender stereotypes and math-related beliefs in childhood and early adolescence. Learning and Individual Differences, vol. 34, pp. 70 – 76, 2014, doi: 10.1016/j.lindif.2014.05.005.

[11] KAÇANIKU, F., Gender and Selection of Undergraduate Programs: Factors Affecting Career Aspirations of Females in Prishtina District. Bachelor Thesis. Rochester Institute of Technology, 2015, https://repository.rit.edu/theses.
[12] VAN MIER, H. I., SCHLEEPEN, T. M. J., VAN DEN BERG, F. C. G., Gender differences regarding the impact of math anxiety on arithmetic performance in second and fourth graders. Frontiers in Psychology, Article 2690, 2019, https://doi.org/10.3389/fpsyg.2018.02690.
[13] LEE, S.S., WOTIPKA, C.M., RAMIREZ F.O., A Cross-National Analysis of Women Graduates with Tertiary Degrees in STEM, 1998–2018. In Ro et al. (Eds.), Gender Equity in STEM in Higher Education, pp. 13 – 26, Routledge, 2021, doi: 10.4324/9781003053217-32.
[14] MIDGLEY, G., Systems thinking for evaluation. In Systems Concepts in Evaluation: An Expert Anthology, pp. 11 – 34, 2007, ISBN 978-0-918528-22-3 (Paperback) 978-0-918528-21-6 (Hardback).
[15] HO FAI CHAN, BENNO TORGLER, Gender differences in performance of top cited scientists by field and country, Scientometrics, vol. 125(3), pp. 2421 – 2447, 2020, doi: 10.1007/s11192-020-03733-w.
[16] MARX, D.M. ROMAN, J.S., Female role models: Protecting women's math test performance. Personality and Social Psychology Bulletin, 28(9), pp. 1183 – 1193, 2022, doi: 10.1177/01461672022812004.
[17] EAGLY, A. H., NATER, C., MILLER, D. I., KAUFMANN, M., SCZESNY, S., Gender stereotypes have changed: A cross-temporal meta-analysis of U.S. public opinion polls from 1946 to 2018. American Psychologist, 75(3), pp. 301 – 315, 2020, https://doi.org/10.1037/amp0000494.
[18] PRENTICE, D. A., CARRANZA, E., What women should be, shouldn't be, are allowed to be, and don't have to be: The contents of prescriptive gender stereotypes. Psychology of Women Quarterly, 26(4), pp. 269 – 281, 2002, https://doi.org/10.1111/1471-6402.t01-1-00066.
[19] RUDMAN, L. A., GLICK, P., Prescriptive gender stereotypes and backlash toward agentic women. Journal of Social Issues, 57(4), pp. 743 – 762, 2001. https://doi.org/10.1111/0022-4537.00239.
[20] KIMMEL, M. S., Masculinity as Homophobia: Fear, Shame, and Silence in the Construction of Gender Identity. In P. D. Rothenberg (Ed.), Race, Class, and Gender in the United States, pp. 81 – 93, 2004. Worth.
[21] SWAMI, V., & VORACEK, M., Associations among men's sexist attitudes, objectification of women, and their own drive for muscularity. Psychology of Men & Masculinity, 14(2), pp. 168 – 174, 2013, https://doi.org/10.1037/a0028437.
[22] ASK – Agjencia e Statistikave të Kosovës. SAK – Statistics Agency of Kosovo. https://ask.rks-gov.net/.
[23] UN Women. Kosovo Gender Country Profile 2024. https://www.eeas.europa.eu/sites/default/files/ documents/2024/UNWOMEN_GEF_ENG.pdf.
[24] INSTAT. Men and Women in Albania, 2024, https://www.instat.gov.al/en/themes/demography-and-social-indicators/gender-equality/publication/2025/men-and-women-in-albania-2024/.

[25] WORLD BANK, Unleashing Economic Growth Potential in the Western Balkans by Improving Gender Equality in Access to Economic Opportunities 2018,
https://www.worldbank.org/en/events/2018/05/10/unleashing-economic-growth-potential-in-western-balkans-gender-equality-in-access-to-economicopportunities.

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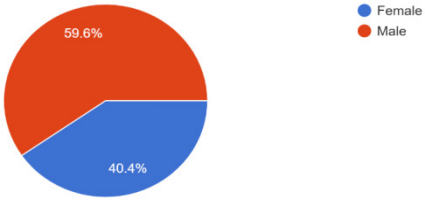
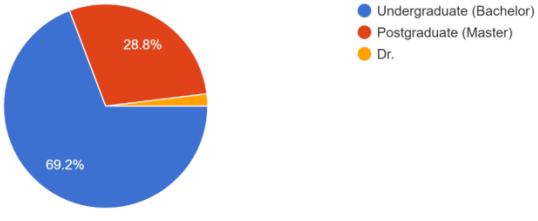
ANNEXES

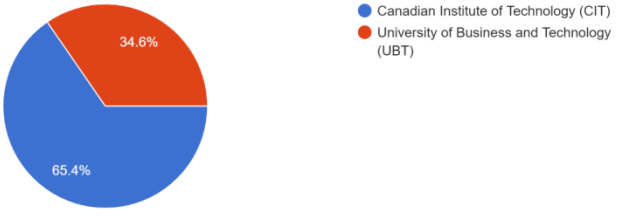
What is your gender?
104 responses



What is your current level of study?
104 responses

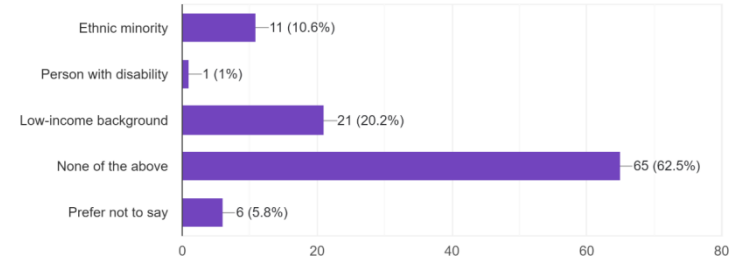


Which university are you currently enrolled in?
104 responses



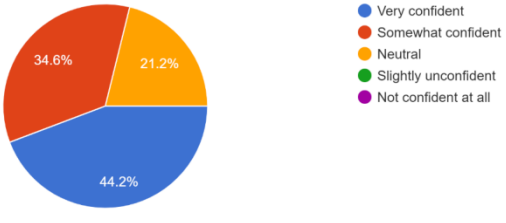
Do you belong to any of the following groups? (Select one)

104 responses



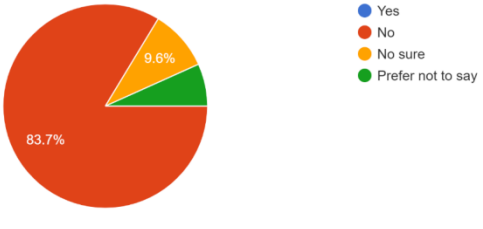
How confident are you in your ability to succeed academically in engineering?

104 responses

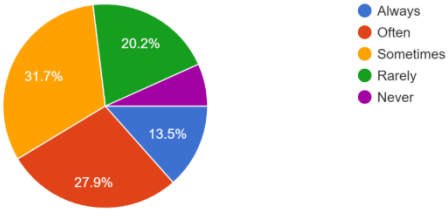


Have you ever experienced gender-based discrimination during your studies?

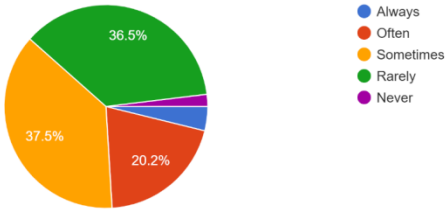
104 responses



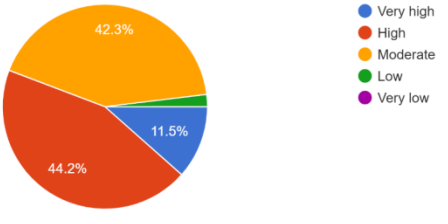
How often have you had access to female mentors or role models in your institution?
104 responses



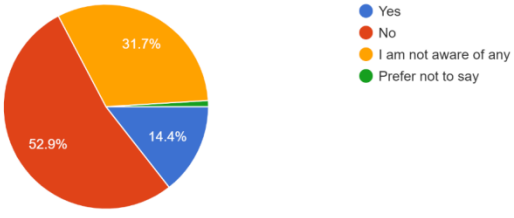
How frequently do instructors use gender-inclusive examples or language in classes?
104 responses



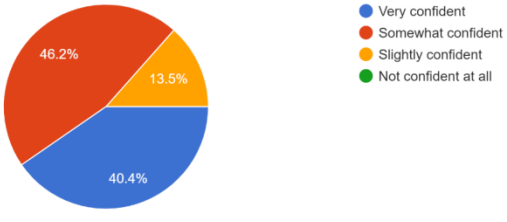
How would you rate your institution's commitment to promoting gender equity in engineering?
104 responses



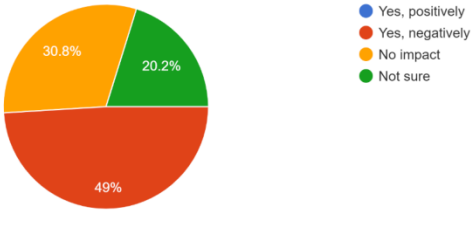
Are you involved in any student group or network that promotes gender equality in STEM?
104 responses



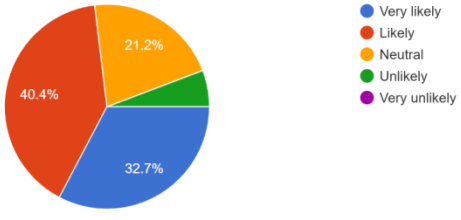
How confident are you about pursuing a successful engineering career after graduation?
104 responses



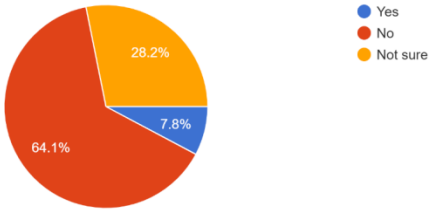
Do you believe that your gender will affect your future career opportunities in engineering?
104 responses



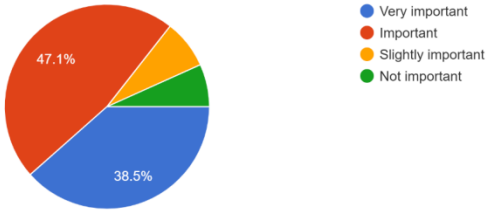
How likely do you think it is that women are paid less than men for the same engineering role?
104 responses



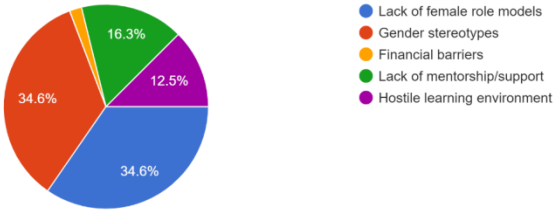
Have you received any career guidance or job placement support specifically aimed at female students?
103 responses



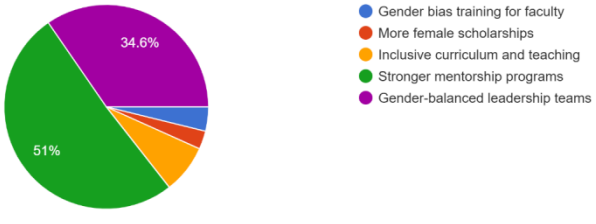
How important is it to include gender-sensitive content in engineering courses?
104 responses



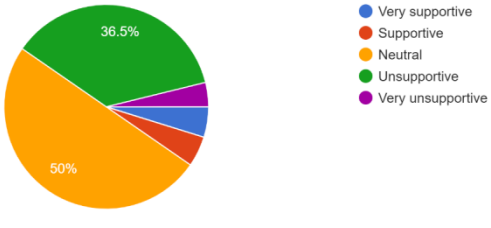
What do you consider the main barrier to female participation in engineering education?
104 responses



Which of the following actions do you think would be most effective in promoting gender equity in engineering?
104 responses



How supportive do you think national labor policies are toward gender equity in engineering careers?
104 responses



Should engineering institutions be held accountable for gender equity outcomes (e.g., graduation rates, employment)?

104 responses