ALiGN | Advancing Learning and Innovation on Gender Norms

ALIGN REPORT

Investigating gender disparities in electrical engineering training

A case study of technical colleges in Zimbabwe

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About Restless Development

Restless Development is a global agency for youth-led development, supporting young people in demanding and delivering a just and sustainable world for all. We support young people in leading change, providing opportunities and helping build confidence, networks, and skills to lead initiatives that have a lasting impact. Our work is delivered by young people, for young people, giving them the skills and resources to deal with the issues facing their communities.

Restless Development actively champions youth leadership by decisively shifting power to young people, enabling them to take leadership roles in four impact areas: Voice and Democracy, Gender and sexual rights, Climate Justice, and Education and Livelihoods. Our robust approach is anchored in comprehensive youth training and empowerment, youth-led accountability initiatives, dynamic community mobilisation, and impactful youth-led research.

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Table of contents

Acknowledgements 2

Foreword 5

Key acronyms and terminology 6

Executive summary 7

1 Introduction 11

2 Research methodology 12

3 Findings 15

4 Conclusion 38

5 Recommendations 40

References 42

Annex: Young researchers' profiles 44

Figures

Figure 1: Components of the youth-led approach 12

Figure 2: Survey participants disaggregated by gender 14

Figure 3: Survey respondents disaggregated by name of programme of study 15

Figure 4: Young people's motivations to study electrical engineering 17

Figure 5: Students' ratings of the effectiveness of their electrical engineering training, disaggregated by gender 19

Figure 6: Descriptions of courses by electrical engineering students, disaggregated by gender 21

Figure 7: The experiences of electrical engineering students on securing internships disaggregated by gender 22

Figure 8: Word cloud summarising young women's experiences in the electrical engineering field 24

Figure 9: A job advertisement that was circulated on various social media platforms 25

Figure 10: Responses of young women and men to challenges women face in electrical engineering. Survey data 26

Figure 11: Forms of prejudice experienced by young women in the electrical engineering field 27

Figure 12: Current gender perceptions that exist within tertiary institutions (survey data) 28

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Tables

Table 1s: The proportions of students in each tertiary institution, disaggregated by sex 7

Table 1: Summary of research tools and total respondents by sex 13

Table 2: The reach of focus group discussions disaggregated by gender 15

Table 3: The proportion of tertiary institution students disaggregated by sex 31

Table 4: Proposed strategies to improve gender inclusivity and equality 34

Foreword

Dear Reader!

In a world that increasingly recognizes gender equality in education and the workforce as critical for sustainable development, insights from this study on the experiences of young women in Zimbabwe's technical colleges, particularly in their electrical engineering courses, are both timely and essential.

For decades, female students have faced barriers in their attempts to penetrate traditionally male-dominated courses. This research study, conducted by a dedicated team of young researchers – Nobukhosi Dube, Hazel Mukume, Tinarwo Mutwira, Zvikomborero Nyamugure and Lucia Tigere – sheds light on the unique challenges and triumphs experienced by young women navigating these environments, while also comparing their experiences to those of their male counterparts.

Through focus group discussions, interviews, and surveys, the team captures the nuances of educational experiences, including the impact of societal norms and expectations, institutional support, and personal aspirations. The research highlights the existing disparities and outlines the support needed by these young women as they strive to excel in their chosen fields.

The researchers commend Restless Development for giving them this opportunity to contribute to an understanding of gender dynamics in technical education. They hope that this work will inform policymakers, educators, and advocates as these stakeholders strive, collectively, to create a more inclusive and equitable learning environment for all students.

The Researchers
ND, HM, TM, ZN, LT

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Key acronyms and terminology

Acronyms and abbreviations

ALIGN	Advancing Learning and Innovation on Gender Norm
FGDs	Focus group discussions
KII	Key informant interview
STEM	Science, technology, engineering, and mathematics.
ZIMDEF	Zimbabwe Manpower Development Fund

Terminology

Affirmative action: Policies and practices designed to address historical disadvantages and promote diversity. These are often used to reduce gender disparities in education and employment.

Equality: Providing the same resources or opportunities to all individuals, regardless of gender, race, geographical location, or other characteristics.

Equity: Ensuring fair treatment by recognising and addressing different needs and circumstances to achieve equal outcomes.

Gender bias: The preferential treatment or unfavourable attitudes experienced by individuals based on their gender.

Gender disparity: The gaps in opportunities, resources, and outcomes that are caused by the unequal treatment or perceptions of individuals based on their gender.

Gender gap: The differences in outcomes, opportunities, and access between genders in various areas such as education, employment, and leadership.

Intersectionality: A framework for understanding how different aspects of a person's identity (e.g., gender, sex, race, socio-economic status) combine to create unique experiences of discrimination or privilege.

Stereotypes: Preconceived ideas or generalised beliefs about specific genders that can influence behaviour and decisions.

Under-representation: The condition where a particular group is present in smaller numbers than expected in a given field or context.

Executive summary

Zimbabwe is at a critical juncture. It is embracing renewable energy as part of its commitment to achieving a just transition from fossil fuels, aiming to mitigate climate change while addressing social and economic inequalities. With its abundant solar resources, the country is uniquely positioned to harness renewable energy, reduce reliance on fossil fuels, and contribute to global sustainability goals.

To achieve this transition, Zimbabwe requires deliberate strategies to ensure inclusive participation, particularly for women, who are often under-represented in the fields of science, technology, engineering, and mathematics (STEM), including electrical engineering. This is a field where renewable energy projects, such as solar installations and microgrid systems, demand skilled professionals. By addressing barriers like gender bias, limited access to technical education, and insufficient mentorship for young women, Zimbabwe can support its female workforce to take on key roles in the green economy. In doing so, Zimbabwe will foster economic growth, reduce unemployment, and enhance social equity, making the shift toward renewable energy truly just and sustainable.

Recognising the urgent need to identify and challenge gender and social norms that affect young women's access to electrical engineering courses in Zimbabwe, Restless Development, with support from the ALIGN platform at ODI, conducted a study titled *Investigating Gender Disparities in Electrical Engineering Training: A Case Study of Technical Colleges in Zimbabwe.* This aimed to answer one question: **'How do young women from technical colleges in Zimbabwe experience training in the electrical engineering course compared to their male counterparts?'** Five tertiary institutions were sampled in Bulawayo, Harare, Manicaland, and Midlands provinces.

The research highlights the barriers faced by young women as they attempt to pursue and excel in this male-dominated field. It identifies the institutional and societal factors that contribute to gender disparities and provides actionable recommendations to foster gender inclusivity. Ultimately, this research aims to generate insights that can inform policy and practice and contribute to the creation of a more inclusive and sustainable environment for women in electrical engineering courses.

The study utilized a mixed-methods approach, combining quantitative and qualitative data from technical colleges with qualitative insights gathered through focus group discussions (FGDs) with 200 young people (100 young women and 100 young men) in their final year of electrical engineering study, and 10 key informant interviews (KIIs) with lecturers and heads of departments from the five tertiary institutions. Using a census sampling approach, quantitative data was collected through a survey that reached 186 respondents (60% young women and 40% young men).

Key quantitative findings

Table 1s: The proportions of students in each tertiary institution, disaggregated by sex

Name of tertiary institution	Proportion of students disaggregated by gender	
	F	M
Bulawayo Polytechnic	40%	60%
Gweru Polytechnic	30%	70%
Harare Institute of Technology	22%	78%
Harare Polytechnic	21%	79%
Mutare Polytechnic	40%	60%

Key survey findings

- 62% of the respondents are studying electrical power engineering, while those studying instrumentation and control systems and electronic engineering students account for 13% each, and 11% are students studying electronic communication systems.

- 43% of young women were motivated to study electrical engineering because of their personal interest, while 29% wanted financial gains to be expected as a result of taking the course. It suggests that women's drive and zeal to study the course are primarily intrinsic.

- Most young women (65%) believe the current electrical engineering training is limited in impact, compared to 49% of young men. Conversely, 51% of young men view the training as very effective, while only 35% of young women share this sentiment.

- 55% of young women and 49% of young men rate the electrical engineering course as either difficult or very difficult.

- 67% (19% males and 48% females) reported that the prevailing gender perceptions in electrical engineering within tertiary institutions portray women as weak and slow learners.

- 50% of the young women indicated that gender hinders their studies, while only 21% stated that it benefits their electrical engineering career prospects.

Key qualitative findings

- **Gender bias and stereotypes:** Female students in the electrical engineering course often encounter societal prejudice rooted in long-standing gender stereotypes that label engineering as a 'man's field'. This is the result of a combination of historical, cultural, and structural factors that have reinforced gender imbalances. These biases are grounded in the belief that men are inherently more suited for technical, logical, and problem-solving roles. At the same time, women are stereotyped as lacking the aptitude or interest for such disciplines. This misconception is reinforced by cultural norms, media portrayals, and early educational experiences, where boys are often encouraged to pursue STEM subjects. Similarly, girls are steered toward traditionally 'feminine' fields that usually reflect their perceived caregiving responsibilities, such as nursing, teaching, office management, etc.

- **Sexual harassment:** Sexual harassment in the workplace, including during internships or job placements, is a serious issue that has a disproportionate impact on women. It can take various forms, from subtle comments and inappropriate jokes to overt actions or pressure for sexual favours in exchange for professional opportunities or career advancement. This harassment can be perpetrated by colleagues, superiors, or even clients, creating an unsafe and hostile environment for women. The impact of such behaviour can be profound, leading to emotional distress and loss of confidence, and can even affect job performance. For interns, the power dynamics in internships or job placements mean that speaking out against inappropriate conduct can be brutal, and women may fear retaliation or the loss of their career prospects.

- **Practical training gaps:** The practical training for both young men and women is inadequate, but the challenges for young women in the field are exacerbated by gender bias and a lack of mentorship. Young women face greater disadvantages than their male counterparts because of unfair treatment by lecturers and employers. Young men, for example, are often favoured over young women for practical assignments and tasks, a bias rooted in gender stereotypes such as the belief that young women are slower learners and incapable of building a practical project

on their own. This relegates young women to more menial duties. The unequal distribution of opportunities leaves males better equipped with practical knowledge and more experienced than their female counterparts. In all, 90% of the young women in the FGDs said that this creates barriers to their professional growth and discourages them from pursuing careers in electrical engineering.

- **Academic pressure and societal expectations:** Young women studying electrical engineering face immense pressure as a result of the intersection of academic demands and societal expectations. Unlike their male counterparts, they are expected to balance rigorous studying with additional responsibilities such as household chores, caregiving, and marriage. This dual burden often leads to heightened stress, reduced study time, and hindered academic performance, disproportionately affecting women and reinforcing gender disparities. The societal pressure to conform to traditional roles exacerbates these challenges, sometimes resulting in dropouts as young women struggle to meet both academic and social expectations. These deeply ingrained gender norms pressure young women to excel in both their personal and academic lives, a daunting challenge for most. As a result, many young women feel compelled to prioritise their roles as wives, mothers, and caregivers, often at the expense of their academic pursuits. These societal responsibilities are often unpaid and undervalued, yet they demand significant time and energy, leaving less room for academic focus.

- **Job/internship placement issues:** Gender biases and stereotypes have had a negative impact on the academic experiences of young women, making their journey more challenging and widening the educational gap between young men and women. While both genders face challenges in securing internships, young women suffer disproportionately as a result of gender discrimination from possible employers who prioritise men based on the biased belief that they are more productive. As a result, many young women find themselves in a situation where, despite having the necessary academic qualifications, they struggle to secure internship placements.

Strategies to improve gender inclusivity and equality within electrical engineering training and preparing women for the renewable energy sector

To address the gender disparities in electrical engineering and foster an inclusive environment that promotes young women's participation in the course, this study identified the following strategies.

Offer mentorship programs that pair female students with successful female electrical engineers

Respondents emphasised mentorship as a vital tool to inspire and support female engineering students. Structured programmes that connect students with accomplished female electrical engineers were recommended to serve as role models and provide guidance and insights into navigating the engineering industry. Workshops featuring industry professionals, such as engineers from mines, were suggested to expose students to real-world experiences and challenges.

Increase recruitment efforts that target women specifically

Targeted outreach and career guidance for high school girls, particularly in marginalised rural areas, were strongly recommended to inspire more young women to pursue careers in electrical engineering. This strategy emphasises the need to reach out to communities where cultural and economic barriers often limit girls' access to higher education and technical fields. Such outreach would include awareness campaigns to educate students and their families about the opportunities and benefits of electrical engineering careers. These campaigns would highlight success stories of women engineers, showcase role models, and debunk stereotypes that suggest engineering is a 'man's' profession.

Organize workshops or seminars to address gender bias and stereotypes

Workshops and seminars that aim to challenge gender stereotypes, discrimination, and harassment were identified as critical tools to foster inclusivity and equality in both academic institutions and workplaces. These initiatives would serve as platforms to educate participants about the harmful effects of unconscious biases, gender-based discrimination, and workplace harassment. They would also promote awareness of the importance of diversity and inclusivity in creating a conducive environment for all individuals, particularly women, in engineering.

Create scholarships or financial aid opportunities for women

Financial aid and scholarship programmes were identified as critical to alleviating the economic barriers faced by women in engineering, particularly those from disadvantaged backgrounds. These programmes would enable women to focus on their studies and avoid negative influences, such as transactional sex, to cushion their financial vulnerabilities while fostering gender equity in technical education. In addition, the provision of scholarships or financial aid for males and female students, with a greater emphasis on women, is a powerful tool to alleviate financial barriers. These scholarships would not only support students academically but also motivate parents and guardians to prioritise their daughters' education in technical disciplines like electrical engineering. By addressing financial concerns and raising awareness, these initiatives aim to shift societal perceptions, empower young women, and encourage families to actively support their daughters in their pursuit of careers in engineering.

Reintroduce ZIMDEF to assist students

The reinstatement of the Zimbabwe Manpower Development Fund (ZIMDEF)[1] was proposed to alleviate the financial burden on companies while providing stipends for engineering students during internships. This initiative aims to reduce financial barriers, particularly for women, and encourage students to engage in practical training opportunities that support their academic growth and professional advancement.

This study underscores the importance of addressing gender disparities in electrical engineering training to harness the untapped potential of women and drive innovation and inclusivity in Zimbabwe's technical workforce. By implementing these recommendations, stakeholders can create an environment where women are equally represented, supported, and empowered to make a meaningful contribution to the country's electrical engineering and its transition from fossil fuels to renewable energy.

1 ZIMDEF is a government initiative that financially supports students, by paying stipends while on internship.

1 Introduction

Zimbabwe is making a gradual transition from fossil fuels to renewable energy, with the National Renewable Energy Policy targeting 16.5% of total energy generation capacity from renewables by 2025 and 26.5% by 2030 (Mutekwe et al., 2011). This transition is set to accelerate as a result of the construction of two large hydropower plants, biogas plants to replace coal-fired power, commercial solar, off-grid solar, solar LED street lighting, and solar water heaters (Mutekwe, 2011). The growth of the renewable energy sector will increase employment opportunities, with most skilled workers emerging from electrical engineering courses. Yet, this growth could be skewed in favour of men, who traditionally outnumber women in engineering programmes in Zimbabwean institutions.

Technical colleges that offer electrical engineering courses often serve as gateways to employment opportunities. In 2016, research carried out in tertiary institutions showed that in 2011, roughly twice as many men were enrolled in electrical engineering as women (33 males versus just 17 females), while in 2015, this ratio was 4:1 (256 males compared to 64 females) (ZIMSTAT, 2016). The statistics show a 14-percentage point decrease in the proportion of females enrolling in electrical engineering over these four years.

In 2024, with support from ALIGN, Restless Development conducted research entitled '***Investigating Gender Disparities in Electrical Engineering Training: A Case Study of Technical Colleges in Zimbabwe***' using its youth-led research methodology. Five young people were selected and capacitated to design the research, collect and analyse data, and draft the report. The five young researchers were selected from Bulawayo Polytechnic, Gweru Polytechnic, Harare Institute of Technology, Harare Polytechnic and Mutare Polytechnic. The research findings highlighted a continuing disparity between males and females, with tertiary institutions recording a high of 40% and a low of 21% of females pursuing electrical engineering.

The research aimed to understand the structural barriers, including stereotypes, cultural norms, and institutional biases, that impede the participation and advancement of women in electrical engineering courses. It recognises the persistent gender gaps within the courses and the need to address these disparities to advance social and gender equity. By examining the training experiences of young women in comparison to their male counterparts, this research seeks to reveal the underlying factors that contribute to gender disparities and propose strategies to promote gender equality within technical training institutions.

By equipping young women with the skills and knowledge to participate in the renewable energy sector, technical training institutions can contribute to their economic empowerment and the overall socio-economic development of Zimbabwe. Ultimately, this research aims to generate insights that can inform policy and practice and contribute to the creation of a more inclusive and sustainable environment for women in electrical engineering courses.

1.1 Research questions

Main question

How do young women from technical colleges in Zimbabwe experience training in electrical engineering courses in comparison to their male counterparts?

Specific questions

a. What are the experiences of young women and men in the electrical engineering courses of five technical colleges of Zimbabwe?

b. What are the perceptions of lecturers and administrators regarding gender disparities in the electrical engineering course in these five institutions?

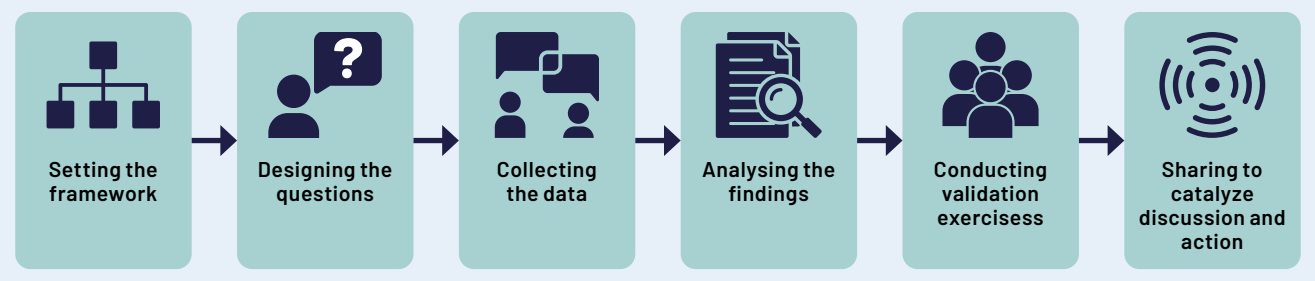
c. What strategies can improve gender inclusivity and equality in electrical engineering training and prepare women for the renewable energy sector?

2 Research methodology

2.1 Design, sampling and data collection

Restless Development employed its six-step youth-led approach to conduct the research, placing young researchers at the centre of knowledge production and translation. The approach enables young people to realise their capability as creators of knowledge and evidence that centres on lived experience expertise. The approach also allows those directly affected by an issue to become co-researchers and advocate for evidence-based change. Five (3 female, 2 male) young researchers were recruited from the sampled tertiary institutions, undergoing a five-day foundation training in which they developed the data collection tools. These researchers then collected and analysed data with technical support from the Restless Development staff.

Figure 1: Components of the youth-led approach



Recognising the multifaceted nature of the topic, the research used a mixed-methods approach that blends qualitative and quantitative methods to triangulate results and ensure data quality

(see Table 1). The qualitative methods used were focus group discussions (FGDs), key informant interviews (KIIs) and literature reviews. A survey was administered using the quantitative method.

Table 1: Summary of research tools and total respondents by sex

Research tool	Total number of respondents	Number of female respondents (percentage)	Number of male respondents (percentage)
Focus group discussions	200	100 (50%)	100 (50%)
Key informant interviews	10	5 (50%)	5 (50%)
Survey	186	111 (60%)	75 (40%)

Focus group discussions

The researchers facilitated 10 FGDs, reaching out to 200 young women and men in their final year of electrical engineering from the five tertiary institutions. Each tertiary institution conducted two same-gender FGDs using purposive sampling. These were instrumental in drawing out key reflections and gaining a deeper understanding of the experiences of young women and men during their enrolment period at the institutions and identifying touchpoints and opportunities that can be developed into recommendations. The researchers used the FGDs to draw out the converging and diverging challenges faced by young women and men, which enabled them to identify the unique, gender-fuelled challenges faced by young women. Through the FGDs, the researchers also captured the journeys of five young women, using the technique of journey mapping to trace the participants' actions, thinking, feelings and experiences.

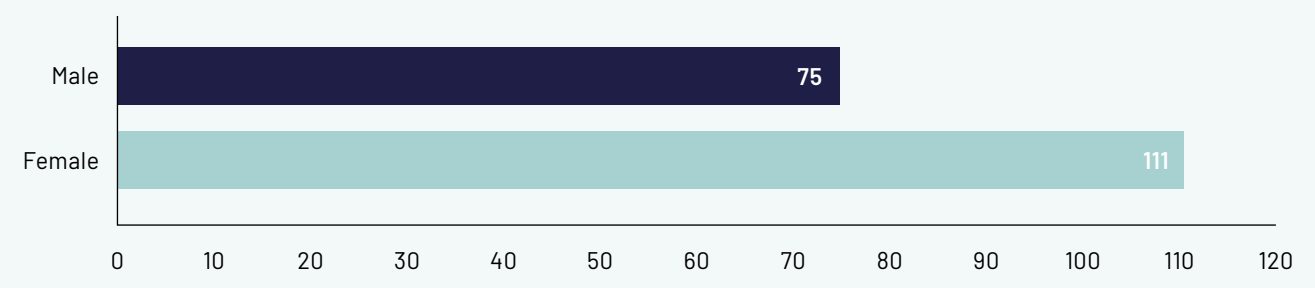
Key informant interviews

Ten interviews (five female and five male) were conducted with electrical engineering experts from the five tertiary institutions. These interviews targeted the heads of departments and lecturers, with a preference for female lecturers based on their availability. This permitted the research team to understand the contextual environment related to electrical engineering training and existing policy frameworks. The deliberate targeting of female lecturers provided insights that allowed the research team to gain perspectives and understanding using a gender lens.

Literature review

A deep dive into key documents, including academic articles and reports from the different institutions for the period 2014-2024, helped to generate a deeper understanding of the contextual environment. This included documentation on the potential of the renewable energy sector in Zimbabwe, current gaps in the training programmes, and gender disparities within the tertiary institutions and the renewable-energy sector. Fourteen documents were reviewed, comprised of seven journal articles, six reports, and one book. This review was pivotal in providing valuable insights and supporting evidence for the research. It provided foundational resources, offering theoretical frameworks, empirical data, and diverse perspectives that enriched the study's analysis. By highlighting key trends, challenges, and opportunities within the field, the articles were instrumental in shaping the research's direction and ensuring a comprehensive understanding of the subject matter.

Figure 2: Survey participants disaggregated by gender



Survey

The class with the highest number of final-year students across the tertiary institutions was selected as the baseline to determine the survey sample size. Based on this approach, the target sample size per institution was set at 40 final-year students, ensuring a representative and consistent sample across all participating institutions. The overall target was 200. In all, 93% (186) of these were reached: 60% (111) of them young women and 40% (75) of them young men, with the survey administered through KoboCollect, as shown in Figure 2.

The survey was used to weigh and validate the insights with a larger sample, measuring the prevalence, significance or strength of patterns across the electrical engineering students. This sequence allowed a nuanced understanding of the issue, backed by evidence from larger-scale data.

Data analysis

Data analysis is an integral part of the Restless Development youth-led research methodology. Using the inductive approach, researchers were supported in analysing qualitative data through thematic coding. Through this process, the research team developed complete code books with codes and themes of interest. Advanced Excel and pivot tables were used to analyse the data for quantitative data.

Limitations

While the research team gathered in-depth data across the five tertiary institutions within Zimbabwe, the team could not interview one head of department due to competing activities. The team did, however, interview another lecturer in their place, gathering essential data. One significant limitation of this study was the limited availability of contextual literature on gender disparities within the STEM field in Zimbabwe. This scarcity of localised research constrained the ability to draw extensively on existing studies specific to the Zimbabwean context, necessitating reliance on broader, global literature. As a result, this limitation impacted the depth of contextual analysis and highlights the need for further research in this area.

3 Findings

Electrical engineering is the study of generating electrical power from other forms of power (mainly heat, but now including mechanical systems such as wave and wind), its transmission from one place to another, and its industrial and domestic use (Sinclair, 2011). It encompasses various technologies and industries, from power generation and distribution to electronics and communication systems. The researchers gathered valuable insights and experiences from students pursuing courses in computer systems; electronic communication systems; electrical power engineering; and electronic engineering, instrumentation control systems. The students were studying at National Certificate, National Diploma and Degree level. Figure 3 and Table 2 show the respondents reached, disaggregated by the name of the programme of study and the type of research method used.

Figure 3: Survey respondents disaggregated by name of programme of study

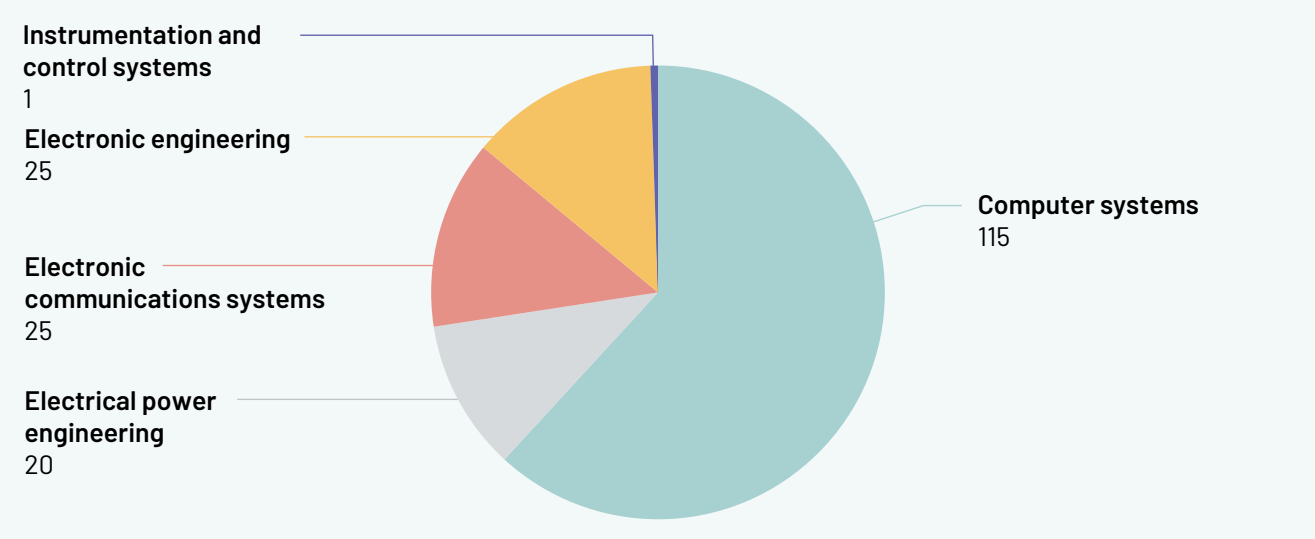


Table 2: The reach of focus group discussions disaggregated by gender

FGD respondents	Reach by gender		Total reached
	F	M	
Electrical power engineering	30	30	60
Electronic communications systems	10	10	20
Electronic engineering	10	10	20

3.1 Summarised findings

Gender imbalances across electrical engineering courses: There are fewer women studying electrical engineering, with the representation of young women ranging from 21% to 40% within the five tertiary institutions.

Institutional academic barriers to effective learning: This cross-cutting issue affects both young women and young men. Over 90% of the FGD respondents felt that the curriculum was outdated and was failing to keep pace with current technological trends. Coupled with limited practical learning training, this has resulted in student redundancy.

Specifically, some respondents highlighted inadequate hands-on practical experience in their courses, making it challenging to transition to useful and real-world work. However, the effects are more pronounced for young women, as these challenges are exacerbated by gender biases, unequal opportunities, and the added burden of balancing academic and societal responsibilities. These combine to result in reduced confidence, lower educational performance and limited professional growth. This, in turn, hinders young women's ability to advance and thrive in the STEM sector.

Weak family and community support systems for young women pursuing electrical engineering: Women's decisions to pursue electrical engineering are driven, predominantly, by their own determination and personal interest, despite the challenges and stereotypes associated with the field. These factors have empowered them to challenge conventional norms and carve out their space in a traditionally male-dominated industry. However, they find only limited support and encouragement from the community, and face a lack of representation, mentorship opportunities and acknowledgment of women's contributions.

In many cases, societal norms and biases reinforce the notion that engineering is not a suitable field for women, which can create an isolating environment for young women striving to excel in this area. Roughly 80% of the female respondents stated that the community ridicules young women pursuing electrical engineering and considers electrical engineering a waste of their time with limited career options. Other options, such as teaching and nursing, are deemed to be a better fit for women than electrical engineering.

Gender bias and stereotypes: Over 90% of female respondents face societal prejudice from peers, family, employers, lecturers and their communities. This stems from gender socialisation practices that are embedded in childhood, such as assumptions that males are smart in maths and females are good in the kitchen, which have contributed to the gender gap in STEM (Régner et al., 2014).

According to the FGD respondents, young men are often given preference over their female counterparts because they are deemed more capable of executing electrical engineering tasks. At the same time, girls are often steered toward more conventional or nurturing roles. Young women also suffer from peer belittlement as their fellow male counterparts perceive them as **'weak'** and **'unable'**. This labelling is based on deeply rooted stereotypes that associate technical and engineering skills with masculinity.

In environments where traditional gender roles prevail, such perceptions are reinforced by societal expectations that view men as more capable in STEM fields. As a result, young women may face doubts about their abilities, and this can weaken their confidence and engagement in a field where their contributions are often overlooked or undervalued.

Sexual harassment: Almost 75% of the young women who participated in this research have experienced inappropriate behaviour, harassment or pressure to exchange sexual favours for opportunities during their internships or job placements. Young women also expressed profound discomfort with the body shaming and the stares they experience at work.

Sexual harassment emerged as a significant impediment to young women's self-confidence and personal development. The respondents indicated that such experiences erode their self-esteem, instilling doubts about their abilities and overall sense of self-worth. The implications of sexual harassment go beyond the psychological to undermine young women's capacity to fully engage in academic and professional activities, further compounding the barriers they face in achieving their potential in the electrical engineering field.

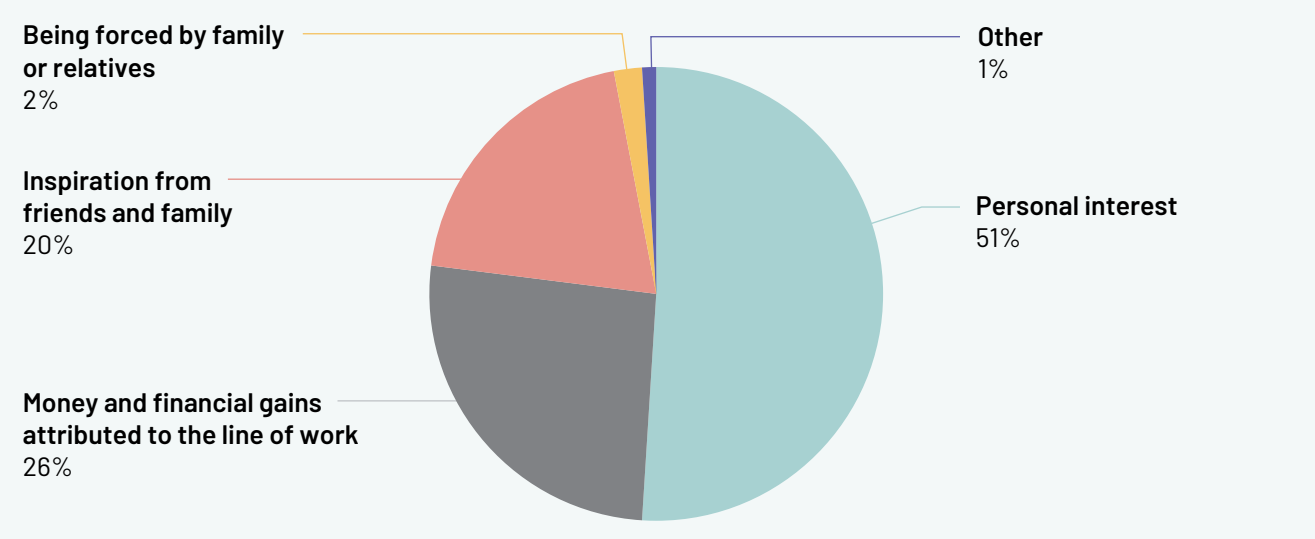
3.2 Detailed findings

Experiences of young women and men studying electrical engineering

The experiences of young people pursuing electrical engineering, as shared by the respondents, are not entirely negative. An estimated 70% acknowledged the opportunity to develop essential skills that foster independence, including the ability to sustain themselves through entrepreneurship. This entrepreneurial spirit allows them to contribute positively to innovations and drive the industry's growth.

In addition, there is a strong support system among young women in the field, and they motivate each another to persist, despite their challenges. Both young women and men recognise the potential for greater economic independence offered by the STEM fields, particularly in growing the renewable energy sector. Their motivation to pursue electrical engineering is driven by personal interest and the financial rewards it offers, as highlighted in Figure 4.

Figure 4: Young people's motivations to study electrical engineering



It is interesting to note that young women account for half of those who cited personal interest as their motivation (26% of the 51%). This finding challenges the prevailing community perception that young women enrol in electrical engineering solely in response to a lack of alternative career options, a view echoed by one female who stated that people '**choose electrical engineering due to pressure rather than capabilities'**. Such a narrative undermines the agency, ambition, and passion young women exhibit when pursuing careers in STEM. This data and responses suggest that their decision to enter the field is often driven by genuine interest, intellectual curiosity, and a desire to make a meaningful contribution to technological advancements and societal progress.

Scholars have provided evidence indicating that female students with elevated levels of self-efficacy are more inclined toward pursuing careers in STEM fields. Self-efficacy – an individual's belief in their capacity to accomplish tasks – is closely associated with career aspirations and opportunities (Tandrayen-Ragoobur and Gokulsing, 2021). Research has, therefore, indicated that individuals with robust STEM self-efficacy are more likely to enrol in STEM programmes, persist for longer durations, and achieve superior outcomes than those with lower levels of STEM self-efficacy (Falco and Summers, 2017).

Other research confirms that, in general, women obtain better academic performance rates than men in the first two academic courses of electrical engineering. Furthermore, women generally

present lower attrition rates than men, particularly in the first year, and better graduation rates. Their achievement of better academic performance rates could be explained by their higher motivation when enrolling in engineering programmes and their determination to persist despite the adverse stereotyped context. This leads to higher retention rates throughout their academic years as compared to their male counterparts (Rodríguez-Rodríguez et al., 2019).

The misrepresentation of women's motivations for enrolling or pursuing electrical engineering not only perpetuates stereotypes but also overlooks the broader systemic barriers they face, such as limited encouragement, insufficient representation and societal bias

The motivation and determination of young people to pursue electrical engineering are often challenged by negative experiences in the field, with common challenges for both young men and women. These include institutional academic barriers to effective learning, resource constraints and financial barriers, and limited internship opportunities for students. However, young women tend to carry the heavier burden as they are further subjected to more challenges because of their gender, such as gender bias and stereotypes, sexual harassment, and a limited and weak support system.

While the two groups share some common challenges, it is prudent to acknowledge that they are affected differently, with young women being affected more than young men.

Institutional academic barriers to effective learning: This challenge affects both male and female students. The students expressed dissatisfaction with the quality of education available to them. They said that the curriculum is outdated and were unanimous in their view that it fails to incorporate current trends and innovations, particularly in emerging fields like renewable energy.

Respondents noted that they are still taught about outdated technologies, such as X-ray machines and portable radio transceivers, while the industry has moved on to advanced technologies like smart grids and energy storage technologies. In electronics, there is a growing emphasis on the creation of more compact, efficient and environmentally friendly devices using Artificial intelligence (AI) and machine learning.

> I don't feel prepared because at school, as students, the lecturers teach us more theory than practical. For instance, there is this module that was introduced about solar. We are taught how it works and the components needed, but as students, we don't know what it looks like when we go for attachment. Imagine if the supervisor calls me to work on an inverter whilst I only know how to calculate its size so it does not help. We need practical lessons.
>
> Female electrical engineering student

> Just like now, we learned about PLC, programmable logic controllers. When I was shown the actual thing, it was so small that I was shocked that the practical aspect of the course was lacking.
>
> Male electrical engineering student

> We only wire four circuits the whole three years repeating the same thing over and over again.
>
> Male electrical engineering student

They expressed frustration with the curriculum's heavy theoretical focus and lack of practical experience, deeming it inadequate to prepare them with the skills they need to address real-world challenges. The respondents attributed the lack of practical experience to insufficient resources within tertiary institutions to fund practical lessons. As a result, students' options have been limited in terms of innovation as they have resorted to creating 'redundant' projects, such as 'temperature maintenance systems',[2] to cope with the financial burden. Based on the respondents' research findings, the current status quo of tertiary institutions is that they are not adequately equipped, prepared or funded.

This financial burden has had a negative impact on young women as they need to find alternative means to cushion their finances. As a result, some young women from economically deprived communities are driven to engage in transactional sex for financial support.

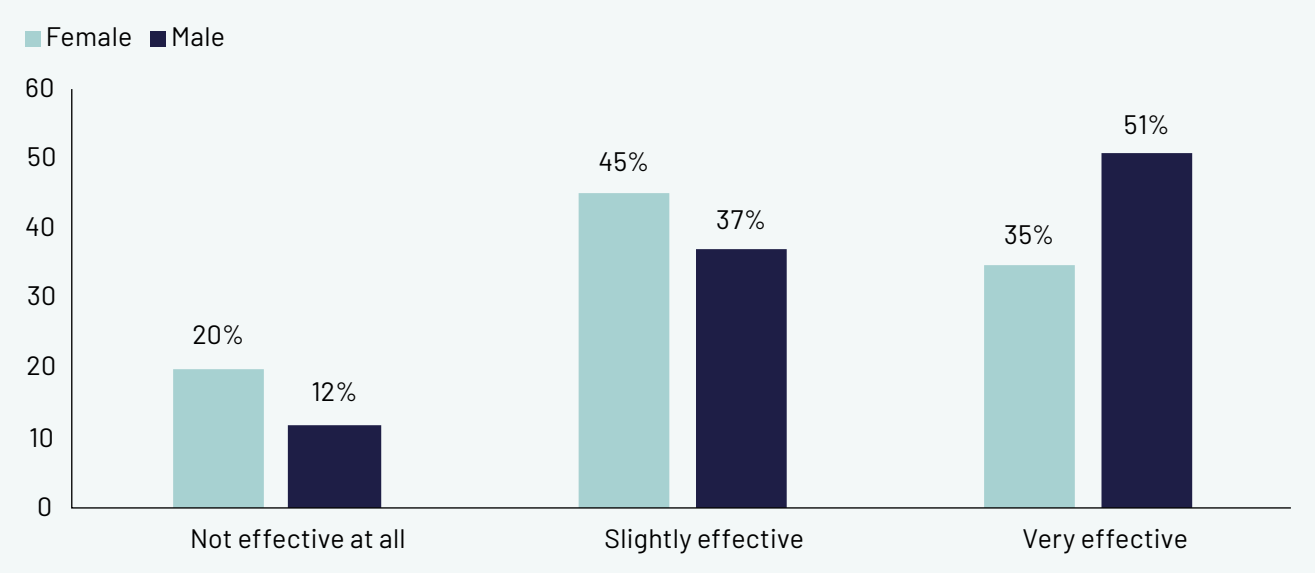
One young female respondent stated that:

> **Looking for money is very hard; thus, we end up engaging in transactional sex or dating blessers[3] to cope with the financial pressure.**

Such testimonies reveal the hardships faced by young women: circumstances may lead them to compromise their physical and emotional well-being to sustain themselves. For some, the inability to secure financial stability means that they drop out of their programmes entirely, further exacerbating gender disparities in access to education.

Institutional academic barriers have heightened the vulnerability of young women in electrical engineering. In comparison with their male counterparts, young women are confronted with system inequalities that are further exacerbated by gender biases, unequal opportunities, and the added burden of balancing academic and societal responsibilities, all of which combine to create additional barriers to their career success.

Figure 5: Students' ratings of the effectiveness of their electrical engineering training, disaggregated by gender



2 A temperature maintenance system is a system that uses a temperature sensor, a fan, a heater and a microcontroller to control temperature. So, the system keeps the temperature in a preset range. This project is cheap and so easy that even a first-year student can do it.

3 A blesser is a rich man who offers support (typically financial and material) to a younger female companion in exchange for sex, friendship, etc.

Figure 5 shows that many young women (45%) feel that their electrical engineering training is only slightly effective, while the majority of young men (51%) rate it as very effective. Through the FGDs this research found that young women were unsatisfied with the delivery of the practical lessons, as well as the theoretical content being taught.

> **In some cases, the lecturer doesn't seem to fully understand some of the concepts they are teaching us because they've never encountered them in practice. Yet they expect us to know these things. We really need proper guidance and resources to ensure we gain the knowledge we need.**
>
> Female electrical engineering student

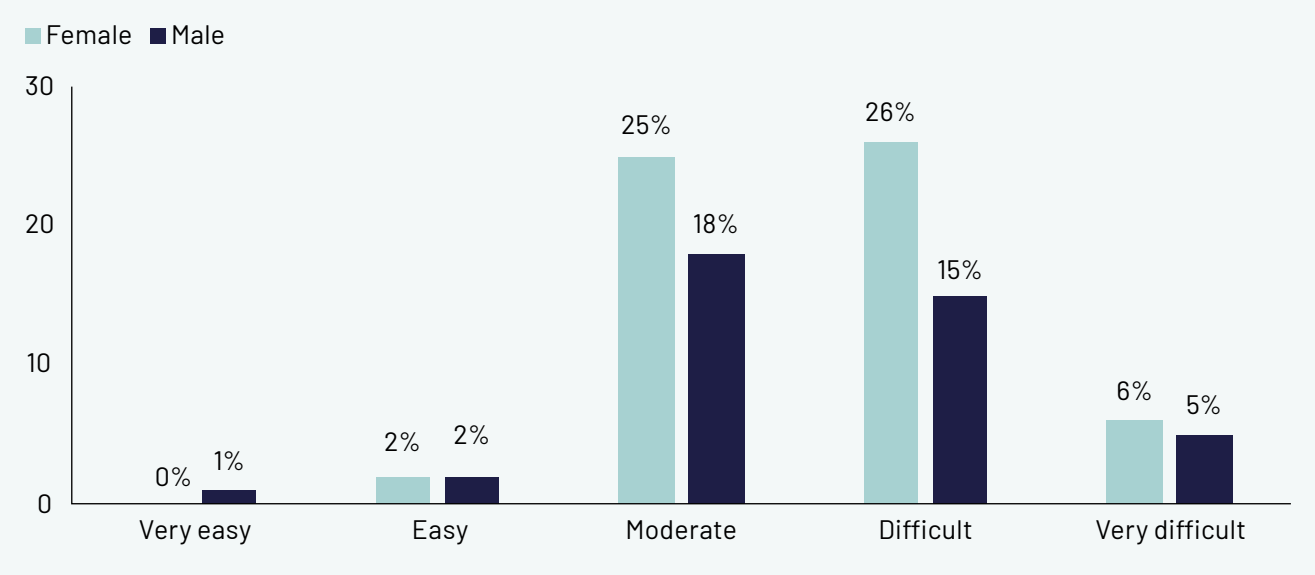
Research findings indicate that young men have a comparative advantage over their female counterparts in internships. This advantage arises because young men tend to face less discrimination, allowing them to gain valuable experience from their assigned tasks. In contrast, young women are often relegated to menial tasks unrelated to electrical engineering, limiting their opportunities for growth and skill development.

Again, the current engineering training has impacted young women and men differently, with notable divergences in their experiences and outcomes. This has accentuated the gendered impact of the training framework, which, in turn, shapes the professional preparedness and opportunities available to each group. For men, the current training often aligns more closely with their expectations and experiences and offers a relatively seamless transition into practical applications and workforce integration. For young women, however, systemic challenges and biases embedded in the training system create significant obstacles.

A scholar indicated that inadequate training has a disproportionate impact on women in engineering, contributing to a range of adverse outcomes that affect their professional trajectories. Other research also confirms that women are more likely to leave engineering positions as a result of insufficient training, citing limited opportunities for advancement and professional development (Fouad et al., 2017). This lack of adequate preparation not only undermines their career progression but also hampers the development of a strong professional identity, leading to diminished confidence and a reduced commitment to the field. Furthermore, the absence of comprehensive training exacerbates feelings of isolation and a diminished sense of belonging among women during their educational journey and in their professional careers (Fouad et al., 2017).

All of these shortcomings have contributed immensely to students labelling electrical engineering as complex or challenging – a finding that emerges from both the survey and FGD participants. Most classified the course as either moderate or difficult, with slightly more women inclined to see it as 'difficult', while men were more inclined to view it as 'moderate'. Only a handful regarded the electrical engineering course as very easy, as shown in Figure 6.

Figure 6: Descriptions of courses by electrical engineering students, disaggregated by gender



Respondents indicated that inadequate training leads to high-stress levels, anxiety among young women, and student dropouts. The findings from the FGDs reveal an average of 10 engineering students drop-out each year at each tertiary institution. In 2022, Harare Polytechnic experienced 100 drop-outs as students transitioned from the National Certificate to the Diploma level, starting with 150 students at the National Certificate level and ending with 50 students at the National Diploma, with approximately 40% of the dropouts being young women. Similarly, 10 students dropped out from Gweru Polytechnic, six of whom were young women.

According to the key informants, dropouts are the result of a mismatch in achievement, status, and comfort needs, which differ among young men and females. The reasons for drop outs among young women are more related to gender and social norms, for example. This assertion is confirmed by a study from Mauritius, which found that comfort (or rather, the lack of it) was the most significant contributor to young women dropping out - they cited wanting more time with family as the main reason (Fouad et al., 2019). Again, the drop out of young women dropouts only adds to the gender disparities in tertiary institutions.

Limited internship opportunities for students: One academic requirement for students is that they serve a 12-month internship period. If they do not meet this requirement, they must repeat or defer that part of their studies, which places an extra financial burden on the students.

Securing an internship placement is another cross-cutting challenge that affects both young men and young women. All electrical engineering students struggle to secure internships, given the high numbers of students seeking placements.

There is no balance between the demand for placements and their supply. Zimbabwe's industry space has shrunk as a result of deindustrialisation over the years, leading to a decline in the number of companies operating in the electrical engineering sector. This has reduced internship opportunities and the number of private firms that can offer internships is limited. State-owned enterprises cannot often accommodate interns due to budget constraints. On the demand side, there is over-saturation as many electrical engineering students graduate annually, leading to fierce competition for the few internship positions that are available. In addition, the internships offered by companies are often unpaid placements, making it financially challenging for students to afford transport, food, and other costs during their internships (Chasokela et al., 2024).

Our respondents were unanimous in saying that it was hard to secure internship placements: 90% stated that they failed to secure internship placements within their first three months of searching. While both men and women struggle to secure internship placements, the experiences of young women are exacerbated by gender norms. Students reported that companies have a preference for – and bias toward – young men, as women are deemed lazy and incapable. One respondent stated that a company foreman described working with women as unproductive because they get 'sick monthly' referring to women's menstrual cycle. According to young women from the FGDs, most of the young men have managed to get a placement, while the majority of the young women are still searching.

Figure 7: The experiences of electrical engineering students on securing internships disaggregated by gender

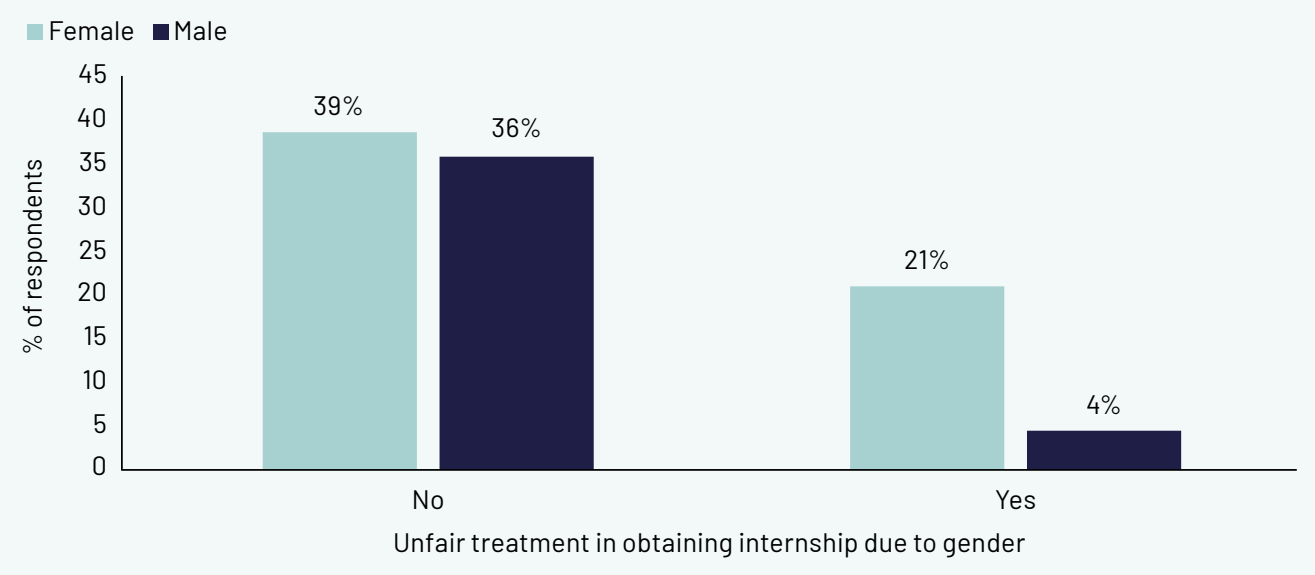


Figure 7 shows the distinct difference between young men's and women's experiences in securing internships. A significant percentage (21%) of women encountered unfair treatment in securing internships compared to their male counterparts, with only 4% of young men citing unfair treatment. Such experiences, coupled with very low response rates from employers, inflicts pressure and anxiety on the students, especially young women. One respondent stated that;

> **Securing an internship place is hard; thus I consider marriage, cross-border trade, selling bales, and vending as plausible and viable options for career path.**
>
> Female electrical engineering student

These choices reflect deeply ingrained social and gender norms that often dictate women's career paths, steering them toward domestic roles or informal economic activities rather than male-dominated fields like engineering. Faced with structural barriers such as limited internship opportunities and workplace discrimination, young women may consciously or unconsciously opt for socially accepted alternatives that offer immediate financial security and align with traditional gender expectations.

Some young women have questioned the availability of jobs for women in the electrical engineering field. Such sentiments and experiences have vastly contributed to young women dropping out. Respondents shared 10 examples of students who dropped out exploring other lucrative avenues in search of a financial buffer – feeling that other avenues were a better option than continuing with electrical engineering. Young women opted to work in supermarkets, while others opted for vending. All the decisions to leave electrical engineering were influenced by gender and societal norms.

Participants in the FGDs felt that marriage was the main factor that led young women to drop out. Young women who got married during their internship did not return for the final year, with four young women being cited as examples by respondents from two tertiary institutions. One female electrical engineering student said that:

> **One dropped out due to financial issues, and the other dropped out due to marriage – she was pregnant, and her pregnancy had complications, so the husband made her choose between finishing her studies or thinking about the health of the baby.**

These gendered obstacles reflect conservative norms that limit young women's ability and freedom (Tandrayen-Ragoobur and Gokulsing, 2021). In Zimbabwe, young women are conditioned to be submissive to their husbands and to believe that family roles and responsibilities take precedence. Therefore, when there is an imbalance between professional and domestic responsibilities, young women are usually forced to prioritise their domestic duties.

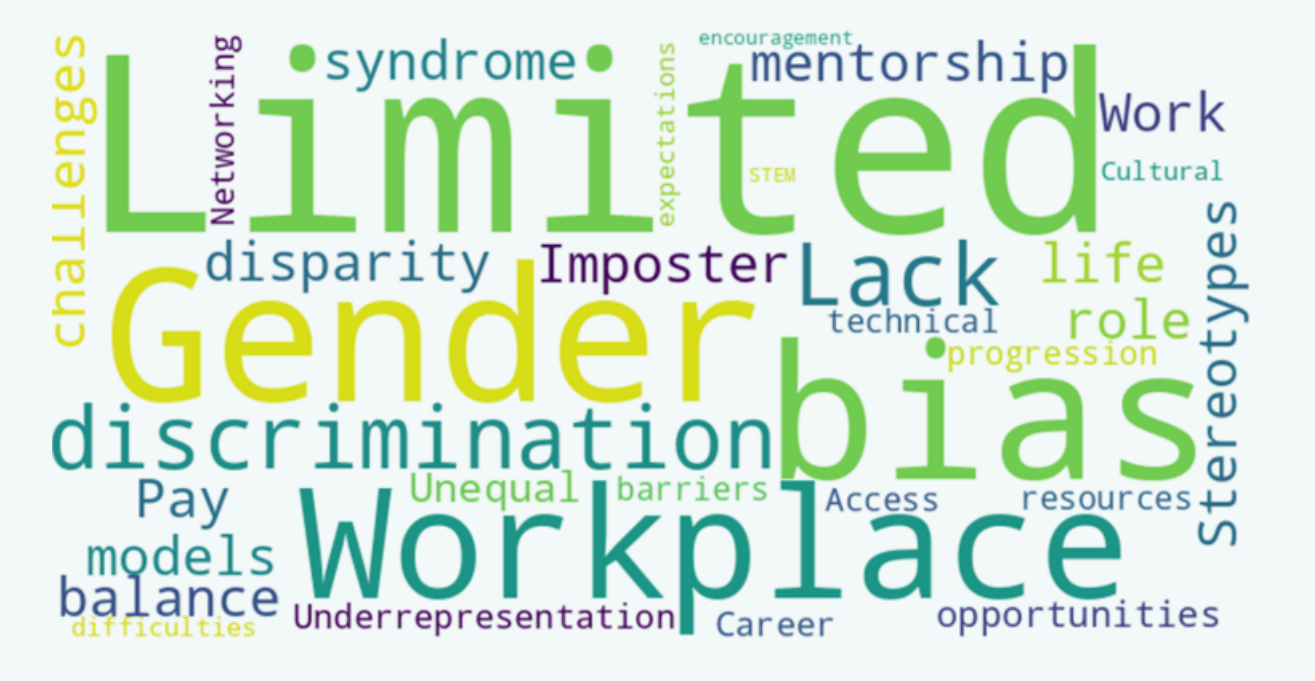
The young women respondents revealed that some men still believe women must not work and should be housewives, while some men do not accept the idea of their wives working the night shift. This cultural dynamic creates significant barriers for young women, limiting their opportunities for growth and success in electrical engineering. Previous studies have noted that such gender norms may have such an impact on young women's participation in STEM education that STEM is viewed as a perfect match for male gender role behaviour. At the same time, it is seen as contrasting with female behaviour (Tandrayen-Ragoobur and Gokulsing, 2021).

The research team notes that the challenges of inadequate learning opportunities and difficulty securing internships manifest differently for young women and men due to societal, cultural, and systemic factors. While both genders face hurdles in accessing quality education and professional experience, young women are affected disproportionately by gender biases, cultural expectations, and limited support systems. These barriers often result in fewer opportunities for women to excel in technical fields like electrical engineering, further perpetuating the gender gap in such industries.

Experiences of young women studying electrical engineering

The field of electrical engineering, traditionally dominated by men, presents unique challenges and opportunities for young women who aspire to break into this discipline. Despite advancements in education and gender equality, young women continue to face significant barriers, ranging from cultural expectations and societal norms to systemic issues such as limited access to mentorship, as outlined in the previous section. In the Zimbabwean context, deeply ingrained gender roles often discourage women from pursuing careers in technical fields, prioritising domestic responsibilities over their professional ambitions. As a result, young women in electrical engineering frequently encounter hurdles such as gender bias stereotypes, and sexual harassment in the industry. As well as discussing these hurdles, the research sheds light on the unique struggles and resilience of young women in navigating and excelling in the field of electrical engineering. Figure 8 summarises the challenges that young women face as they pursue their studies in electrical engineering.

Figure 8: Word cloud summarising young women's experiences in the electrical engineering field



Studies have consistently shown that young women in technical fields, including electrical engineering, face many challenges that differ significantly from those experienced by their male counterparts. Research highlights those societal expectations, particularly in patriarchal societies, often discourage young women from pursuing careers in engineering, framing these fields as unsuitable or overly demanding for them (Tandrayen-Ragoobur and Gokulsing, 2021).

In addition, studies reveal that young women often encounter stereotypes and biases in educational settings, where their capabilities are often underestimated or overlooked. This affects their confidence and reduces their chances of being encouraged by their educators and peers (Tandrayen-Ragoobur and Gokulsing, 2021).

Our research findings align closely with existing theories and prior studies, reinforcing established knowledge in the field. They have confirmed that young women pursuing electrical engineering in tertiary institutions face significant challenges, including gender bias and stereotypes, gender discrimination, sexual harassment, and inadequate support systems.

Gender bias and stereotypes

These challenges manifest in both academic and professional settings, creating compounded barriers for young women in electrical engineering. In educational institutions, gender biases and stereotypes often result in unequal treatment, where female students may be overlooked for leadership roles, collaborative opportunities, or access to resources.

These issues persist in the workplace as women encounter discriminatory hiring practices and limited access to mentorship or advancement opportunities. Stereotypes about women's capabilities in technical roles further exacerbate these challenges, often leading to underestimation of their skills and contributions.

The young women who participated in the FGDs indicated that they often face heightened scrutiny from lecturers and peers in the tertiary institutions' setting. They are judged based on their appearance and how they dress or present themselves, with comments or attitudes implying that

their appearance could influence how seriously they are taken in the field. According to the female respondents, they are not allowed long hair and nails as electrical engineering students. One female electrical engineering student stated that:

> I saw a young woman's hair being pulled by the lecturer saying the long hair was not allowed.

Research findings reveal that both lecturers and male students tend to concentrate on superficial aspects, such as the appearance of young women, rather than focusing on their skills and competencies. The young women reported their male counterparts often perceive them as slow learners, which creates significant challenges in collaborative settings such as group practical projects. In addition, lecturers were reported demonstrate a more welcoming and supportive attitude towards young male students, often providing them with additional encouragement and resources. In contrast, female students often find their abilities and potential in practical assignments overlooked or underestimated. This dynamic suggests a disparity in the treatment of students based on gender, which may adversely affect the confidence and performance of female students in their academic pursuits.

The young women reported that such treatment creates a sense of both pressure and exclusion. Superficial judgements can lead to a sense of alienation, as they may feel compelled to conform to rigid, often contradictory, societal expectations — balancing femininity with the need to appear 'serious' or 'competent' in a male-dominated space (Tandrayen-Ragoobur and Gokulsing, 2021).

In addition, this perception leads to a reluctance among young men to work with female peers, as they believe that involving young women in group tasks will hinder progress or compromise the quality of the work. One can argue that such attitudes not only marginalise young women but also reinforce the gender stereotype that men are inherently more competent in technical fields like electrical engineering. This dynamic results in unequal participation, with women often excluded from key responsibilities or decision-making processes within group projects. As a consequence, young women miss out on valuable opportunities to develop their technical skills and confidence, further perpetuating the cycle of inequality.

Given that electrical engineering is a male-dominated field, one can assume that men hold most of the management positions within companies. Figure 9 highlights the deep-seated bias in this field, showcasing a job advertisement posted on various social media platforms that discriminates explicitly against young women in electrical engineering. The underlying message is that men are the preferred candidates.

Employers may, whether consciously or unconsciously, favour men for technical roles, assuming they are more capable. According to Longe (2019), some employers also prefer to recruit male engineers rather than female engineers, arguing that the former will be more valuable and relevant to the everyday tasks at work than the latter – an illustration of gender bias and discrimination in the electrical engineering field.

Figure 9: A job advertisement that was circulated on various social media platforms

As indicated earlier, the preference of men over women is a lived reality experienced by women in electrical engineering and has compelled young women to work harder than their male counterparts to prove their abilities and value. This places them under immense pressure, which affects their mental health. One female engineering student spoke of her experience of mistreatment from her male co-workers:

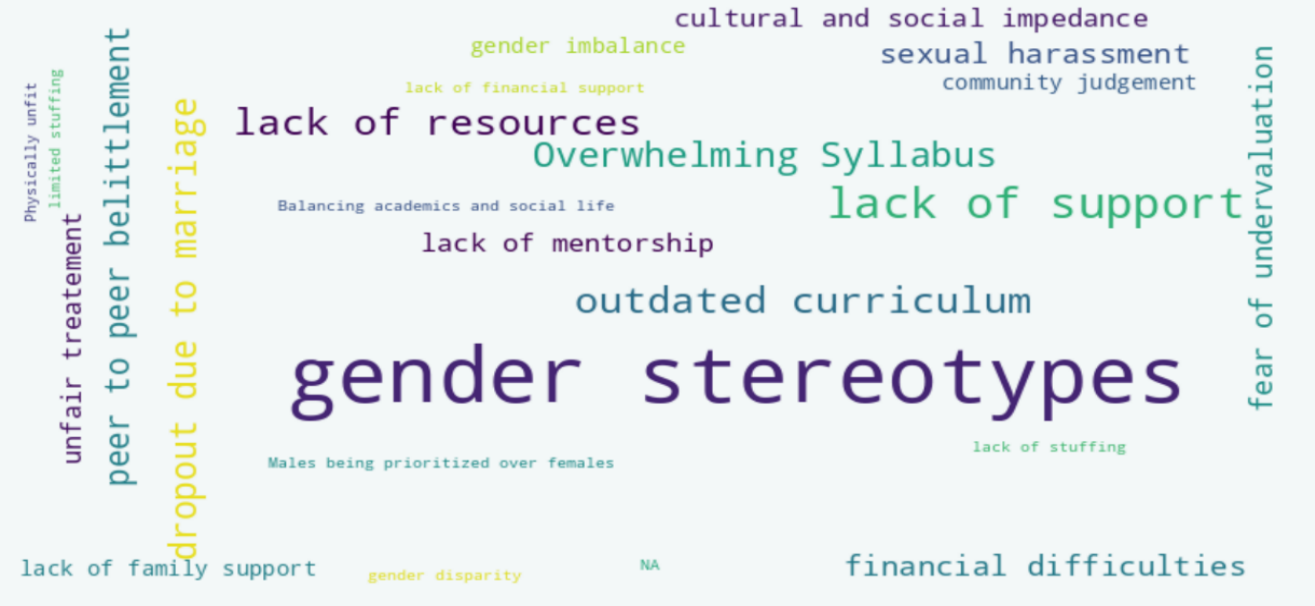
> I was being side-lined when we went to the field to fix a fault; the team would assign me to cook for them and task me to pass them the tools they would need to fix the fault.

She is one of the many young women who have been subjected to menial and gender-stereotyped jobs during their internships. Approximately 85% of respondents from the young women's FGDs said that they were assigned irrelevant tasks during internships, such as cooking for the team and cleaning the offices. Both tasks are connected to the societal expectations that view women and girls as caregivers and home keepers.

In some instances, the young women were given lighter tasks to execute, with the installation of solar systems given as an example. One respondent was only allowed to install solar systems of 5KV and below, while men were allowed to do the installation for anything more significant. In addition, the female respondents were prohibited from touching workshop machinery and executing workshop duties such as splicing fibres. Assigning irrelevant tasks to young women tasks during placements hinders their exposure to the field, crushing both their confidence and professional development.

Such gender stereotypes have resulted in young women feeling undervalued. Respondents were asked an open-ended question during the survey about the main challenge faced by young women pursuing electrical engineering, with 56% of young women and 51% of young men cited gender stereotypes. Other challenges were numerically insignificant as they were below 10%, as shown in Figure 10, which uses a world cloud to capture the frequency with which participants reported various challenges.

Figure 10: Responses of young women and men to challenges women face in electrical engineering



Source: Survey data

One male electrical engineering student stated that:

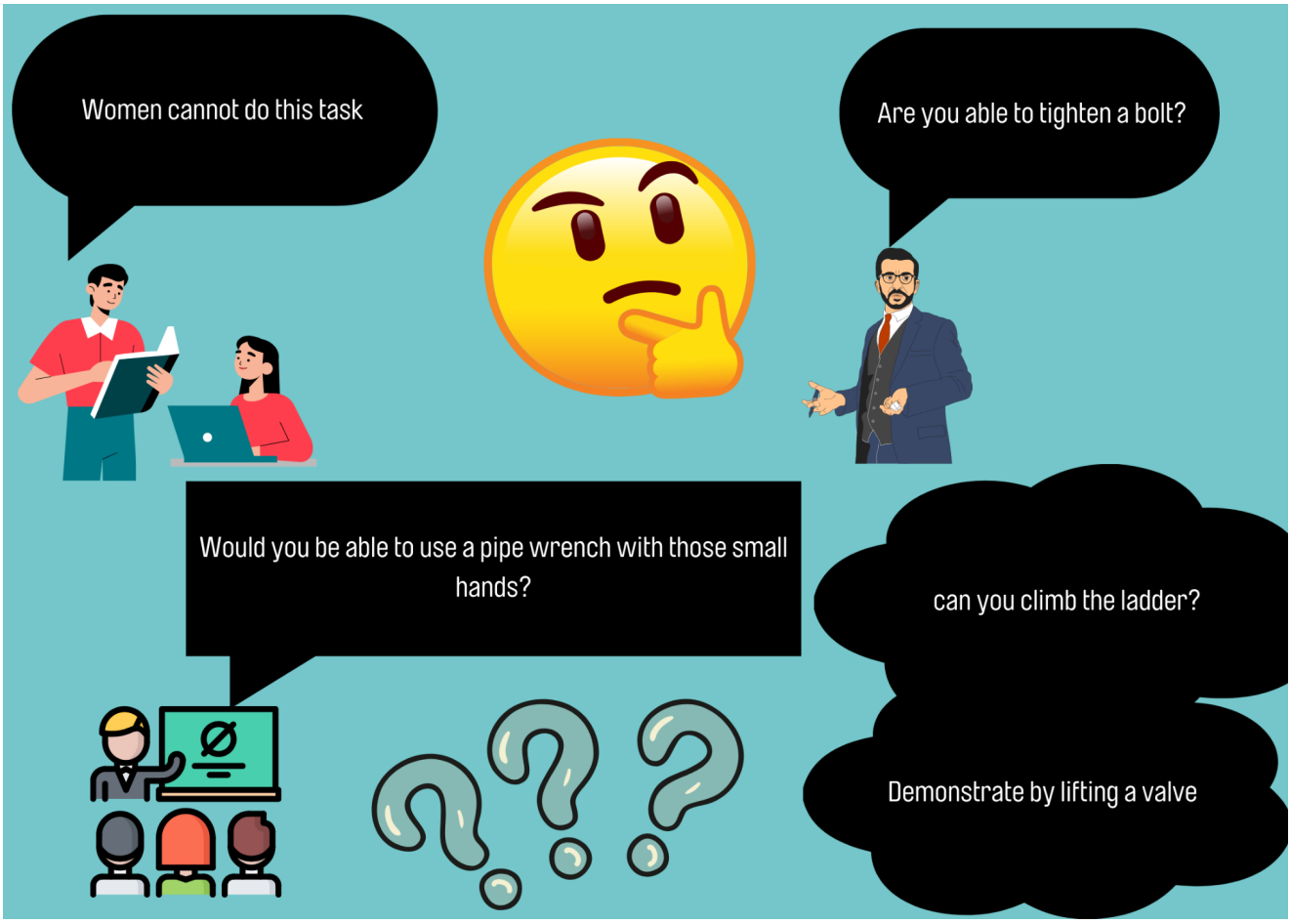
> **Females are seen as if they do not qualify and cannot solve specific challenges in the electrical field.**

While another stated that:

> **Female students are given low expectations and fewer priorities.**

Figure 11 shows the forms of prejudice young women experience as they pursue their courses and later transition to electrical engineering careers.

Figure 11: Forms of prejudice experienced by young women in the electrical engineering field



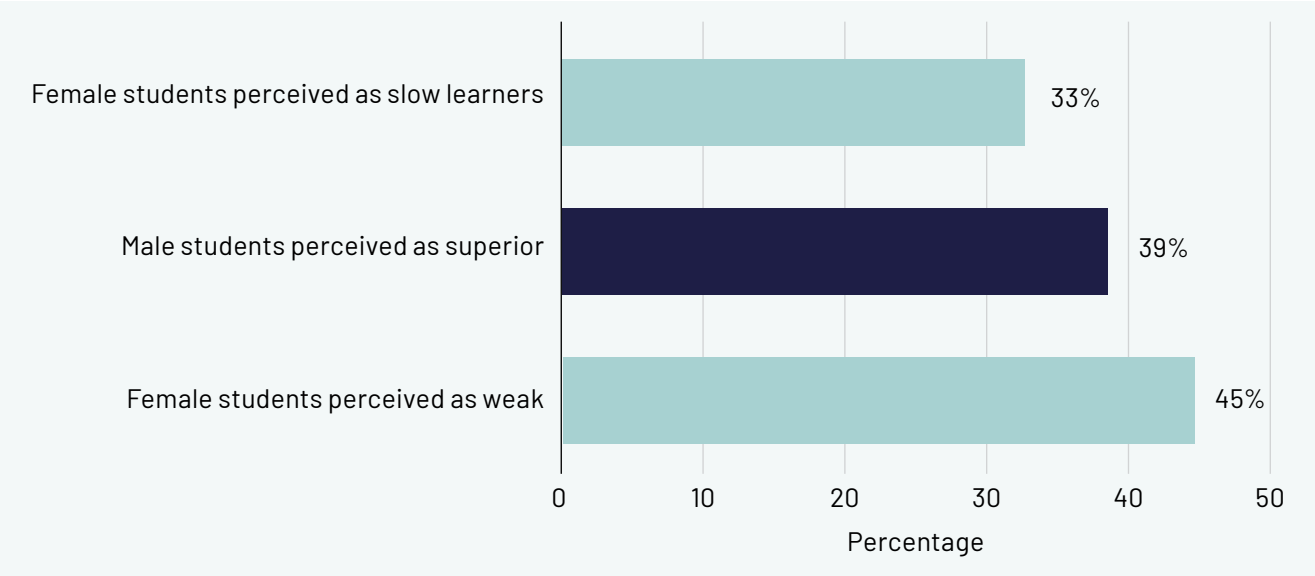
Source: Focus group discussion data created by Sharon Manenji

In all, 40 of the 186 survey respondents (22%) attested that they have experienced or witnessed gender discrimination. Of these, 27 were young women who had experienced discrimination, and the remaining 13 were young men who had witnessed gender discrimination – confirmation of the presence of gender bias and stereotypes in the tertiary institutions participating in the study. Gender discrimination weakens some women's zeal for engineering: most of the female respondents said that they have considered quitting the course because of the challenges they had encountered, with some stating they completed internship without gaining any practical experience.

Discrimination by some employers against women in engineering is also informed by the biased notion that men will deliver better than women in engineering tasks.

Figure 12 provides a visual representation of the negative perceptions faced by young women in the field of electrical engineering. This visualisation underlines the prevalence of gender discrimination, as evidenced by the experiences experienced by electrical engineering students.

Figure 12: Current gender perceptions that exist within tertiary institutions



Source: Survey data

> **Academically, we end up performing poorly because at the end of the day, I ask myself why I should have sleepless nights studying and only for what to be told that I cannot do it.**
>
> Female electrical engineering student

One respondent shared that a lecturer made a bet with a student, claiming she wouldn't be able to climb a ladder – a reflection of the unfair treatment of young women who are seen as 'incapable', and an assumption that someone else is doing the work for them. The young women from three FGDs also reported that their project presentations are subjected to greater scrutiny than those of their male counterparts and that young men's projects are swiftly approved without question.

The notion that male students are perceived as superior in electrical engineering reflects deeply ingrained societal biases and stereotypes. In all, 51% of young women agreed that gender discrimination can hinder their career prospects.

Sexual harassment

This challenge is evident in both tertiary institutions and work settings, (though it is more blatant in the workplace). The feeling of isolation that was alluded to earlier in the research findings heightens young women's vulnerability in electrical engineering. The absence of adequate support structures in the tertiary institutions adds to this vulnerability, leaving room for the exploitation of young women.

The self-doubt in women that has been perpetuated by gendered socialisation has led to young women engaging in transactional sex with either their male peers or lecturers. Two FGDs with young women indicated that when they reach out to their peers for assistance on assignments or practical projects, those peers tend to ask for sex in return. In contrast, others mentioned that they often find themselves bargaining for marks with lecturers because their capabilities are questioned and perceived as weaker than their male counterparts.

The young women claimed that lecturers exhibited unfair treatment after young women turned down their sexual proposals. They claimed that the lecturers would give young women low marks in response to the rejection. As a result of the power dynamics at play, young women may end up accepting such proposals, and this is unspoken of because the young women try to protect each other from further victimisation and labelling. One female student stated that:

> When a male student is making a late submission of assignments, the lecturers accept money as a bribe, but if it's a female student, the lecturers expect sex.

While both practices are wrong, they reflect the societal norms where men are viewed as the providers (hence lecturers requesting money), and females are viewed as wives and girlfriends (leading to requests for sex).

Young women have also been sexually harassed during their search for internship placements, claiming that men tend to take advantage and request sex in exchange for such placements. According to the female respondents' supervisors, employees of some companies sometimes ask young women for sexual relationships to secure internships, making it even more difficult for them to progress in the electrical engineering field. One young woman stated that a work supervisor once bought her a dress and expected her to go on a date with him.

In some instances, sexual harassment is expressed verbally, with male peers making explicit and vulgar comments, including direct references to sexual intercourse. Additional inappropriate remarks include body-shaming comments such as 'you are too fat' or 'you have big buttocks', as well as ridiculing women for their choice of attire. Such behaviours are highly detrimental to the development and growth of female engineers.

The Equal Employment Opportunity Commission (EEOC) recognises two basic types of sexual harassment: 'quid pro quo' sexual harassment and 'hostile environment' harassment. Quid pro quo harassment refers to a situation in which a job or educational opportunity is conditioned on some kind of sexual performance. Hostile work environment harassment is defined as pervasive sexual behaviour from co-workers, which can create odious conditions of employment. Both types of harassment constitute illegal discrimination (Hock et al., 2023).

Sexual harassment has a negative impact on the likelihood of female engineering students, educators and professionals remaining in engineering. Experience in America suggests that female students are less likely to return to their university after experiencing sexual harassment, and that female engineers tend to leave their positions, companies, or the field of engineering entirely (Moss-Racusin, 2012).

Weak family and community support systems for young women pursuing electrical engineering

There is little or no appreciation for electrical engineering among young women's family members or their communities. According to the theoretical models proposed by Herrera et al. (2012), Master and Meltzoff (2016), and Bandura's general social cognitive theory (Bandura, 1999), social and demographic factors contribute significantly to gender disparities in the field of electrical engineering. These theories suggest that social, cultural, and contextual dimensions are crucial in shaping beliefs about 'appropriate' behaviour for both males and females. In Zimbabwe's patriarchal society, there is, in general, only limited understanding and support for young women studying electrical engineering.

Several arguments suggest that societal influences have led to families and communities being less supportive of young women pursuing electrical engineering. One argument is that this emanates from a social and cultural belief that a woman's place is the kitchen, and that this has led families to encourage other professions and caregiving career paths. The female respondents stated that

community members ridicule them for studying electrical engineering. According to the respondents, a community member asked:

> Why not become a doctor if you are going to be spending six years in school because at least doctors are well paid?

This corresponds with the study of universities in Mauritius by Tandrayen-Ragoobur and Gokulsing, which found that electrical engineering is viewed as less prestigious than other STEM courses. Traditional gender role beliefs tend to push young women away from STEM fields as it is often believed that women should take secure jobs in the public sector with regular working hours to better undertake their domestic and care responsibilities (Tandrayen-Ragoobur and Gokulsing, 2021).

This perception of electrical engineering as less prestigious is reflected in this study. One female electrical engineering respondent, for example, mentioned that her family discouraged her from pursuing this field and encouraged her to consider nursing or teaching as a career path – a view that could be attributed to lack of knowledge around electrical engineering.

The study conducted in Mauritius (Tandrayen-Ragoobur and Gokulsing, 2021) also argues that parents own STEM knowledge and their education levels tend to have a significant influence on their children's studies and choice of subject. The study notes that parents who have only a limited knowledge of STEM subjects, may hold negative attitudes about STEM in general, and that this will restrict their ability to support their children in STEM learning.

Giving Mauritius as an example, Tandrayen-Ragoobur and Gokulsing argues that many parents believe the financial sector provides better job prospects for their children because of the growing contribution of the industry to GDP. Hence, parents very often encourage their children to enrol in soft sciences like finance, law, accounting and economics so that they are in a better position to access job opportunities in the financial sector. This resonates with this study findings: the respondents stated that their parents and communities do not appreciate electrical engineering or hold it in high regard, so they encourage females to pursue other professions.

This report's findings also show that young women often encounter limited support and encouragement while engaged in their practical projects. Their families often undermine them and remind them that they would not have faced difficulties with project components or execution if they had chosen a different course of study. As a result, socialisation has a notable impact on the number of young women who choose to enrol and remain in the field.

According to the female respondents, some community members have raised concerns about the marital prospects for young women who pursue studies in electrical engineering. In the Zimbabwean context, there is a high regard for married women because marriages are seen as a cornerstone for family life and social organisation. Marriage is, therefore, an essential institution that communities expect young women to uphold. One respondent cited the kind of comments facing young women in this field:

> Who would want to marry you when you become an engineer?

One lecturer also noted the phenomenon of societal expectations as a hindrance to women's progress in the field. This resonates with the experience of a married young woman who almost quit studying electrical engineering because she was struggling to balance schoolwork and care responsibilities. She only able to continue because her husband is very supportive, and this might not be the case for many women. As noted, this dual burden of meeting academic demands while navigating societal pressures places significant strain on young women, often leading to a perception that they are less capable than their male counterparts.

STEM subjects are often seen as a threat to the social lives of young women. This perception stems from the belief that the demanding nature of these fields can lead to lengthy study hours, intense competition, and a focus on academic achievement that may detract from opportunities for social interaction, which inhibits marriage prospects. A study conducted in Israel, for example, indicated that parents encourage young women to pursue other courses so that they are able to balance academic careers and personal relationships (Chachashvili-Bolotin et al., 2016). Drawing back to this report's research findings, they illustrate a distinct approach in which parents or guardians do not support young women in pursuing these subjects. The male respondents said that they can choose their career path independently, while young women stated that they are more guided by their parents – guidance that includes discouraging electrical engineering as a career choice.

Perceptions of lecturers and administrators regarding gender disparities

Understanding the perceptions of lecturers and administrators allows tertiary institutions, through the Ministry of Higher and Tertiary Education, Innovation, Science and Technology Development, and stakeholders to build a robust approach to gender inclusion and equality in electrical engineering. The lecturers who participated in this research shared both positive and negative perceptions on how these qualities can be moulded to promote women's participation in electrical engineering and support gender parity.

Gender disparity

Gender disparity remains a prominent issue in electrical engineering, as observed by both lecturers and administrators. This disparity is evident in the under-representation of women in both academic programmes and professional roles. One lecturer said: 'There are less than 10 female students, maybe 8, out of 30 students, so the rest are all boys'. Table 3 indicates the proportions of students in tertiary institutions disaggregated by gender.

Table 3: The proportion of tertiary institution students disaggregated by sex

Name of tertiary institution	Proportion of students disaggregated by gender	
	F	M
Bulawayo Polytechnic	40%	60%
Gweru Polytechnic	30%	70%
Harare Institute of Technology	22%	78%
Harare Polytechnic	21%	79%
Mutare Polytechnic	40%	60%

A low proportion of women in a discipline probably sends a message to girls that the discipline may be unattractive to them, and that they should avoid it (Clark Blickenstaff, 2005). This imbalance is attributed primarily to societal norms and expectations that discourage women from pursuing technical careers. In addition, a lack of female role models and mentors within the field makes it difficult for women to picture themselves succeeding in such roles.

Based on the findings from key informants, young women's limited school qualifications in mathematics and science is a significant factor in this disparity, particularly if they did not perform well in these subjects at secondary school. Respondents highlighted that while girls mostly pass science, they often struggle with mathematics, yet both subjects are prerequisites for admission into electrical engineering programmes.

Lecturers have observed that the curriculum's heavy reliance on mathematics and physics often deters women as they appear less confident or interested in these subjects – an appearance stemming from societal stereotypes that question their abilities in technical subjects and fields. One lecturer noted that the extensive mathematical calculations required can discourage women, who are often socialised to believe they are less competent in such areas, even when they meet the entry requirements. A wider societal 'phobia' around science and mathematics also has a disproportionate impact on women, discouraging them from engaging fully with technical disciplines.

Young women's participation in the electrical engineering field can be described as a 'leaky pipeline', according to one key informant. This term implies that students abandon STEM pursuits at various stages: when STEM high school graduates choose non-STEM majors, when STEM undergraduate students graduate and decide to pursue another discipline at the Master's level, and finally, when STEM graduates enter non-STEM careers (Clark Blickenstaff, 2005). Lecturers attributed this apprehension to cultural conditioning that frames engineering as a male-dominated and overly challenging field, which creates a psychological barrier for female students.

Many women who lack access to foundational support in STEM subjects at both secondary and tertiary levels may find it more difficult to study engineering. In addition, the increasing rigour of electrical engineering courses at advanced levels intensifies the challenges faced by young women – particularly if they have not had a solid grounding in STEM during their secondary education.

Administrators also highlighted the reluctance of some women to enrol in engineering programmes, citing – once again – the male dominance that frames engineering as a 'masculine' field. As noted, these perceptions often lead to self-doubt among female students, who may question their ability to succeed in a demanding and traditionally male-oriented discipline. As a result, many talented young women may shy away from pursuing engineering, not because of a lack of capability but because of the pervasive belief that they might not perform as well as their male counterparts. Such stereotypes are reinforced through cultural messaging, educational environments (mostly within secondary schools), and even family expectations, creating a significant barrier to increasing female participation in engineering field.

These challenges are compounded by the lack of tailored support systems to address these perceptions. A lecturer highlighted an institutional gap in strategies to help female students overcome technical factors that can be intimidating, such as complex mathematical calculations, and develop their own practical projects. Without such interventions, women may continue to feel overwhelmed by the demands of the discipline, potentially limiting their participation and success.

To address these challenges, administrators emphasise the need for targeted recruitment strategies, mentorship programmes, and support systems to bridge the gender gap. They feel that these initiatives would not only promote inclusivity but also help female students gain the confidence and qualifications they need to pursue careers in engineering.

Gender stereotypes

Lecturers and administrators also highlighted stereotypes that create an unwelcoming and often discouraging atmosphere for women in engineering, making them feel undervalued, overlooked, and out of place in both academic and professional settings – all of which contributes to, and may further compound, the gender disparity outlined above. This environment can have a negative impact on women's confidence and their willingness to engage fully in their studies.

Lecturers have observed that these stereotypes have a direct influence on classroom dynamics by, for example, discouraging female students from active participation in discussions, voicing their opinions, or asking questions. During group projects, women may hesitate to take on leadership roles, fearing criticism or resistance from their peers. This reluctance is often a direct consequence

of implicit biases that associate technical leadership and decision-making with men. As a result, female students may feel pressure to conform to passive or secondary roles, which can limit their opportunities for growth and development.

In addition, lecturers noted that these gender dynamics not only hinder the personal and professional growth of female students but also deprive the academic community of diverse perspectives and innovative approaches that women can bring to problem-solving and collaboration. One lecturer elaborated:

> **Our society still has the mentality of the female child sticking to commercial subjects and the kitchen. If you ask students how they got into engineering, many will mention a parent, aunt, or someone encouraging them to go into teaching, nursing, or cooking instead.**

Female proficiency

Despite the challenges faced by women in the male-dominated field of electrical engineering, lecturers have a high regard for their capabilities and contributions. According to lecturers, female students – though a minority – consistently exhibit exceptional diligence, technical proficiency, and academic leadership, positioning themselves as vital contributors to the field and broader societal advancement.

Standout qualities often highlighted by lecturers are women's diligence and perseverance. Female students are noted for their unwavering commitment to their studies, even when confronted with significant obstacles. This determination not only enables them to excel academically but also challenges traditional biases about gender roles in engineering.

In addition to their academic rigour, female students are recognised for their practical skills. Lecturers have observed that women excel in hands-on activities, demonstrating impressive technical proficiency and adaptability – key qualities for success in electrical engineering.

Female students also possess a set of strengths, including focus and organisational skills, which lecturers believe often surpasses that of their male counterparts. These attributes enable women to approach tasks with precision and effectiveness. However, the small number of female students can lead to their contributions being overshadowed in group settings, particularly during discussions and collaborative projects.

Beyond academia, lecturers emphasised the broader societal impact of women's contributions to electrical engineering. Their work ethic, unique perspectives, and problem-solving abilities are seen as critical assets for innovation, particularly in advancing Zimbabwe's renewable energy sector. Lecturers believe that greater representation of women in the field could play a pivotal role in achieving the Sustainable Development Goals and fostering economic growth.

It is important to note that the perspectives of the female and male lecturers highlight different but complementary aspects of the challenges faced by women in electrical engineering. The female lecturers place a strong emphasis on resilience and active participation among women, recognising their ability to overcome obstacles and excel despite the systemic barriers in the field. Female lecturers advocate the fostering of confidence, encouragement for women to assert themselves in discussions, and an emphasis on their strengths in problem-solving and leadership. Their focus is on empowering women to navigate and thrive within the existing structures while challenging biases through their achievements. This is interesting because women are generally taught to be

resilient and to work within the established status quo, which speaks to the social norms that define perceptions: even those of female teachers.

Male lecturers, however, underscore the broader societal stereotypes and logistical challenges that act as barriers to women's participation. They point to ingrained cultural perceptions of engineering as a male-dominated field, which can discourage women from pursuing it. They also highlight practical challenges, such as limited access to resources, mentorship, and exposure to professional opportunities, particularly for women in marginalised or rural areas. Their perspective stresses the need for systemic changes, such as targeted outreach, mentorship programmes, and policy interventions, to address these issues at their root.

Together, these viewpoints suggest a dual approach: empowering women through strengthening their confidence and active participation while simultaneously addressing societal and institutional barriers to create a more inclusive and supportive environment in electrical engineering.

Strategies to improve gender inclusivity and equality within electrical engineering training and prepare women for the renewable energy sector

Gender inclusion and equality in electrical engineering are essential to promote innovation, drive economic growth, and create a more equitable and sustainable industry. A diverse workforce introduces varied perspectives, ideas, and problem-solving approaches, which enhances creativity and innovation in tackling complex engineering challenges (Stout et al., 2011). A gender-balanced workforce better reflects societal needs, resulting in more inclusive and user-friendly designs and solutions.

Research indicates that diverse teams improve productivity and profitability, with gender equality in engineering contributing to organisational and economic success (Stout et al., 2011). Furthermore, increasing women's participation in STEM careers can have a significant and positive impact on both national and global economies.

Research conducted in the United States shows that exposure to female experts in STEM fields has a positive influence female students' attitudes and aspirations in relation to STEM careers (Stout et al., 2011). In a separate study by Zhou et al. (2021) in China, which focused on primary students, researchers compared the students' career interests in STEM subjects. The findings revealed a greater interest in engineering/technology and a lower level of interest in mathematics and science.

Table 4 draws on survey data to outline the strategies identified by the research respondents as potentially beneficial for the promotion of gender inclusivity and equality in the electrical engineering and renewable energy sectors.

Table 4: Proposed strategies to improve gender inclusivity and equality

Proposed strategy	Number of Respondents
1. Offer mentorship programmes that pair female students with successful women engineers	112
2. Increase recruitment efforts that target women specifically	107
3. Organise workshops or seminars focused on addressing gender bias and stereotypes in engineering	105
4. Create scholarships or financial aid opportunities	80
5. Re-introduce ZIMDEF to assist students	61

1. Offer mentorship programmes that pair female students with successful women engineers

One student respondent remarked:

> I am not sure how this aligns with college or higher administration, but I think we should regularly host workshops where engineers from mines, e.g. UNKI mine, can share their experiences. Many of us haven't had the opportunity to interact with professionals in the field, and it's crucial to hear their insights to better understand what to expect and how things work.

The respondents emphasised the importance of mentorship as a powerful tool to motivate and support female engineering students. They highly recommended the development of structured mentorship programmes to connect female students with accomplished women engineers. Such initiatives would provide valuable guidance, role models, and insights into navigating the engineering industry. By fostering these connections, mentorship programmes can help women overcome challenges, enhance their skills, and build the confidence necessary for long-term success in their careers.

Research in the United States indicates that female role models and mentors can significantly increase women's interest and participation in STEM (Wang et Degol., 2017). Clark Blickenstaff (2005) outlined several possible causes for the 'leaky pipeline' of women in STEM careers, suggesting that a lack of female role models in STEM careers and the 'chilly' dynamics in the environment in which women work may explain, in part, why young women do not enter STEM fields or why they choose to leave.

2. Increase recruitment efforts that target women specifically

A key informant emphasised the importance of outreach and career guidance for girls in secondary schools, stating:

> Visiting schools to show young women that they are capable of excelling in electrical engineering and solving major challenges could inspire them. Implementing policies to support such initiatives would be impactful.

Another informant recommended targeted outreach programmes that focus on marginalised girls in rural areas, suggesting that tertiary institutions conduct awareness campaigns that promote gender equality and provide incentives like free tuition for the first 20 female applicants, aiming to attract more women into engineering programmes. These recommendations align with a call by American Association of University Women for employers and educational institutions to enhance recruitment efforts by targeting women through outreach programmes, career fairs, and advertisements. Highlighting female role models and fostering inclusive environments can further encourage women's participation in engineering (Wang et al., 2017).

3. Organise workshops or seminars that focus on addressing gender bias and stereotypes in engineering

To address gender stereotypes, bias, discrimination and sexual harassment, the respondents recommended workshops and seminars that raise awareness on gender-related issues amongst staff and employers. These should be organised to challenge gender biases and stereotypes, fostering a more inclusive workplace and academic environment. According to UNESCO, such sessions help raise awareness, educate participants about unconscious biases, and promote equal opportunities for women in engineering (Chavatzia, 2017).

Respondents emphasised that these sessions should target both students and staff: it is crucial to equip everyone in the academic and professional ecosystem with the knowledge and tools necessary to identify and address gender-related issues. Topics could include recognising implicit bias, fostering allyship and implementing inclusive practices. Such discussions can aim to encourage behavioural change and promote mutual respect.

These initiatives would serve as platforms to educate participants about the harmful effects of unconscious biases, gender-based discrimination and workplace harassment. They would also promote awareness of the importance of diversity and inclusivity in creating a welcoming environment for all individuals, particularly women, in engineering fields.

One lecturer proposed that institutions develop programmes to provide mentorship specifically for female students enrolled in the course as a way to address the issue of young women dropping out.

In addition, the respondents felt that initiatives should extend beyond workshops; tertiary institutions should also establish and implement gender equity boards. These boards would serve as independent entities dedicated to addressing grievances related to gender bias, discrimination or harassment in an objective and impartial way. In contrast with the current practice of reporting concerns directly to lecturers or supervisors – who may have conflicting interests or biases – equity boards would provide a safe and confidential space where women can express their concerns. These boards could also be instrumental in monitoring institutional policies, ensuring compliance with gender equity standards, and providing recommendations for improvements (Wingfield et al., 2021). They could also advocate on women's issues, support institutional efforts to bridge gender gaps, and actively promote initiatives that advance women's participation in engineering fields.

By integrating workshops, seminars and institutional mechanisms (such as gender equity boards), the measures proposed by participants aim to create a fair, supportive, and inclusive environment that empowers women and enhances their ability to thrive in academia and the workplace.

4. Create scholarships or financial aid opportunities for women

Financial aid programmes and scholarships should be established to support women pursuing engineering studies. These funds can help alleviate financial constraints and encourage more women to enrol in technical education and engineering courses, which would promote gender equity in the field (National Science Foundation, 2018).

A lecturer emphasised the critical need for targeted scholarships and financial aid policies for women, particularly those from disadvantaged backgrounds. Many young women face significant challenges when transitioning to higher education, particularly if they come from low-income families. The challenges include financial instability and limited access to essential resources for women, as men are often prioritised. Insufficient financial support can women's academic engagement, particularly in demanding fields like engineering, which require intense focus.

The same lecturer also highlighted the importance of comprehensive support systems, including mentorship and counselling services, to help these women navigate their educational journeys and build resilience against negative influences. By implementing such policies, educational institutions can empower women to overcome barriers and achieve success in their academic pursuits.

5. Reintroduce the Zimbabwe Manpower Development Fund (ZIMDEF) to assist students

Respondents strongly suggested that ZIMDEF should be reintroduced as a way to overcome the barrier of employers offering only unpaid internships for students. They believed that this would create more internship opportunities for students as employers and companies would not carry

the financial burden of paying them stipends. The reinstating of ZIMDEF would provide financial assistance for students in engineering programmes, through an allowance that should cover their basic needs, such as the costs of transport and lunch. Such support would enhance access to education, particularly for women, by addressing the financial burden.

Promising practices

Our research noted that Harare Polytechnic introduced the WITED[4] (Women in Technical Education Development) programme in 2024, which has yielded positive results in promoting inclusion and gender equality. The programme has assisted a few female students to finish their final year projects. According to the Harare Polytechnic lecturers, the programme aims to assist more female students finish and further their electrical engineering studies, with such support also being extended to female lecturers who wish to further their own studies.

In addition, awareness and outreach campaigns by Bulawayo and Gweru Polytechnics have contributed to increased enrolment of female students in electrical engineering. According to the KIIs, this approach led to an additional 10 female students at Bulawayo Polytechnic – with the number rising from 45 to 55 in 2024.

Gweru Polytechnic introduced its integrated skills outreach expansion programme during the final term of 2024. Through this initiative, lecturers go to different rural areas to educate people about electrical engineering using a practical approach i.e. wiring a classroom. Although new, the programme has already recorded a positive impact: the feedback received indicates that many people are interested, including young women who have enquired about electrical engineering. These new initiatives should be evaluated after at least 2-3 years in practice. Such efforts aim to foster a culture of equality and support that empowers female students to succeed in electrical engineering. While these initiatives are most welcome, they should also be reinforced by the creation of more inclusive and supportive classroom environments.

Previous research by Clark Blickenstaff (2005) has identified steering mentorship and peer support as effective strategies for the promotion of gender inclusivity and equality in the STEM fields as peer support groups create a sense of belonging amongst students. Research indicates that girls are often influenced by the interests and activities of their friends, as well as prevailing trends. Therefore fostering an interest in STEM subjects among girls at an early stage, particularly at the secondary level, presents an opportunity for these individuals to motivate and support one another in developing a passion for STEM disciplines. Clark Blickenstaff also suggests that students should have equal access to teachers and to classroom resources, with teachers avoiding dividing students by sex and eliminating sexist language or behaviour.

According to the International Labour Organization (ILO) the inclusion of women in the governance structures of the renewable sector, and the building of 'energy democracy' (more community control of energy management and consumption) through, for example, energy cooperatives, motivates young women to pursue the STEM field as they will have role models they would want to emulate. It would also allow women to make a meaningful contribution to innovations that address community needs and the expansion of the renewable sector.

4 The programme provides financial support and necessary resources for young women who are at the stage of building their practical projects.

4 Conclusion

The landscape of electrical engineering in Zimbabwe can be described as a multifaceted field that integrates science, technology and innovation to design, develop, and improve electrical systems and devices. This field showcases various applications, is experiencing rapid technological advancements, and is fostering collaborative efforts across disciplines. Education in electrical engineering at tertiary institutions in Zimbabwe plays a critical role in facilitating the country's technological advancement and driving economic development. Nevertheless, these institutions face a multitude of challenges – not least gender stereotypes and discrimination – that hinder effective learning, stifle innovation, and limit their contributions to industrialisation.

The collection and analysis of the experiences of young men and women in the field has revealed key challenges that require collective action. Many of these multi-faceted challenges have a major impact on the educational experience for both young men and women. They include a scarcity of essential resources, which hampers effective learning, as well as curricula that are outdated and that fail to equip students with the knowledge and skills they need in today's fast-paced world. Practical training opportunities are also lacking, leaving students under-prepared for the real-world application of their education. In addition, restricted access to modern technology limits their ability to engage with essential tools and information, ultimately affecting their overall development and future prospects.

We explored the specific challenges that young women face in electrical engineering and how these impact broader themes of gender inclusion and equality within the field of electrical engineering. This process entailed a thorough examination of several critical factors that shape individual experiences, such as an analysis of their academic backgrounds and experiences, which have a major influence on their perspectives and opportunities. It also involved a close investigation of the impact of gender roles within various contexts, as these roles dictate expectations and limitations in both personal and professional spheres. Finally, the researchers assessed the work environment, as this encompasses the culture and atmosphere that either support or hinder individuals in their endeavours. Together, these elements have provided a comprehensive understanding of how prevailing gender norms interact with other factors to create the challenges faced by young women as they navigate their electrical engineering studies.

Our research has found that young women pursuing careers in electrical engineering face challenges that stem from societal, cultural, institutional, and industry-based barriers. From the enrolment stage, young women lack adequate encouragement and support from guardians and parents. Then during their studies, young women experience gendered micro-aggressions, biases from peers, instructors or employers, and the questioning of their technical competence or leadership abilities. This has left some women demotivated and disadvantaged as compared to their male counterparts. It also places pressure on young women to prove their capabilities and their equal worth.

Gender and social norms have discouraged young women from pursuing engineering, as it is perceived as a male-dominated field. This, coupled with gender bias and sexual harassment in the workplace, has been the biggest challenge faced by young women pursuing electrical engineering, as the environment is not conducive for young women. Being subjected to prejudice and sexual harassment has led to low self-esteem among many young women and a lack of confidence in their own abilities. Tertiary institutions, therefore, need to foster a conducive environment for young women to promote gender inclusion and equality in electrical engineering.

Tackling the challenges in electrical engineering and renewable energy requires a comprehensive approach that includes several key strategies. First and foremost, there should be a significant increase in funding dedicated to programmes that offer specific support to young women pursuing careers in the field. This funding can provide scholarships, mentorship programmes, and hands-on training opportunities that empower students – particularly students who are young women.

To further tackle the issue of gender bias, it is important to implement a multifaceted approach that examines the roots of inequality and introduces comprehensive strategies for change. It was suggested, therefore, that awareness campaigns be conducted to educate communities about gender equity issues. In addition, campaigns could aim to engage various stakeholders in building a culture of inclusivity and support for gender rights. There were also calls to explore the idea of setting up dedicated gender equity boards to promote fair practices and provide oversight, aiming to ensure equal opportunities for all, regardless of gender.

Sexual harassment must be addressed. A multi-faceted approach could be used, involving the promotion of awareness through education and training programmes. By creating a safe and supportive environment, tertiary institutions and energy companies can empower individuals to speak out against harassment and implement preventive measures that foster respect and equality in the workplace. This would be a step towards the creation of a more just and balanced society, based on an environment that values and respects contributions from all genders.

In summary, electrical engineering is a cornerstone of modern innovation. It is continuously evolving to minimise carbon emissions and support the transition to greener practices that protect the environment. Gender inclusion is, therefore, critical in the field of electrical engineering as it promotes sustainable solutions to community needs and challenges and this, in turn, can help to expand the renewable sector.

To achieve this, a holistic and robust approach is vital. This means implementing policies and practices that support diverse perspectives, encourage collaboration among all genders, and address any barriers or biases that may exist. By fostering a culture of respect and inclusivity, tertiary institutions can empower individuals, enhance creativity, and drive overall success in schools, workplaces and beyond.

5 Recommendations

5.1 Recommendations for the Ministry of Higher and Tertiary Education, Innovation, Science and Technology Development

- **Gender parity:** The respondents highlighted the need to address gender disparities within technical colleges. They recommended recruiting more female lecturers to create a balanced and supportive environment. In addition, they proposed initiatives such as gender sensitivity training for staff and students, as well as leveraging social media to celebrate the achievements of female engineers and promote inclusivity in engineering programmes.

- **Strengthening industry-academia collaboration:** The students recommend that educational institutions strengthen industry-academia collaboration with employers and companies. This could include active engagement in project exhibitions, with companies evaluating students' projects and providing feedback on their alignment with local industry needs. Such collaboration can ensure that academic innovations are relevant to the challenges facing Zimbabwean industry and foster a stronger connection between academia and the workplace (Shah et al., 2017).

- **Dismantling systemic barriers:** The lecturers felt that it is vital to dismantle systemic barriers and promote equitable access to quality education in mathematics and science. This entails introducing foundational support in STEM subjects at both secondary and tertiary level.

5.2 Recommendations for tertiary institutions

- **Gender-sensitive outreach workshops:** There is a need for the Government and institutions to develop and implement gender-sensitive outreach workshops focused on equity and inclusivity. These can cover topics such as gender stereotypes, discrimination, and strategies for fostering inclusive practices. This would raise awareness among students, staff and the broader community while promoting a more inclusive and equitable institutional culture. It would entail training lecturers on inclusion and anti-oppression particularly when dealing with group dynamics.

- **Women's empowerment programmes:** The respondents recommend that the Government and institutions support women's empowerment programmes, such as WITED (Women in Technical Education Development), to promote gender equity in technical and engineering fields. This initiative aims to create an inclusive environment that motivates women to excel in traditionally male-dominated sectors. According to Tomlinson (2014), WITED offers mentorship, knowledge-sharing opportunities, and essential resources to support female students and lecturers in developing their skills and implementing innovative projects.

- **Gender rights and equity board:** The students are recommending that tertiary institutions establish gender rights and equity board to address gender inequality within tertiary education. These boards could investigate cases of discrimination, develop and enforce fair policies, provide support services for students, and raise awareness about gender parity to create a more inclusive environment.

- **Early orientation:** Tertiary institutions need to offer early orientation and career guidance to primary and secondary school students, deliberately targeting girls to help them better understand the scope of the various programmes on offer. This may encourage more female

students to develop an interest in the field (Yelick and McGowan, 2021).

- **Promote career awareness:** There is a need for tertiary institutions to implement awareness campaigns to challenge the misconception that women are less committed or capable, particularly in fields like electrical engineering. These campaigns should aim to boost female students' confidence and encourage their participation in these programmes (Moss-Racusin, 2014).

- **Affirmative action to promote gender balance:** The students need tertiary institutions to adopt affirmative action policies. These would aim to address historical inequalities that have limited women's access to education and professional fields. By creating opportunities for greater female participation, such policies can empower women, reduce gender disparities, and contribute to a more equitable society. Encouraging more women to enrol not only fosters diversity, but also drives progress across various sectors by unlocking untapped potential.

5.3 Recommendations for employers

- **Equality of opportunity:** Young women recommend that employers ensure equality of opportunity and foster fair and inclusive hiring processes by addressing the tendency to favour apprentices over graduates from polytechnics and universities. Respondents emphasised the need for employers to provide equal chances to all candidates, regardless of their institutional background. An approach based on equality of opportunity would ensure inclusivity and maximise the talent pool. Employers should also ensure that all employees, regardless of gender, have equal opportunities for advancement based on their competence and performance rather than personal relationships with their superiors.

- **Gender sensitive outreach workshops:** The students are calling on employers to organise gender-sensitive outreach workshops to address critical issues like sexual harassment, including the indirect pressure on women to exchange sexual favours for job opportunities. To address this, employers should establish clear policies and mechanisms to prevent and respond to harassment, creating a safe and inclusive work environment for all employees. In addition, the students recommended that employers provide regular training for employees and management on recognising and preventing power abuse and harassment in the workplace. This can foster a more respectful and equitable work environment.

- **Regular evaluations of workplace culture:** The students are calling on employers to conduct regular evaluations of workplace culture through surveys or assessments to identify potential issues related to power dynamics and employee satisfaction. The feedback can then guide the implementation of any necessary changes. These assessments should include anonymous feedback mechanisms to ensure employees feel safe when sharing their honest insights. The data collected can then be analysed to identify patterns of potential issues, such as power imbalances, communication gaps, or instances of bias. Once identified, actionable steps can be taken to address these concerns, such as implementing targeted training programmes, revising policies to promote fairness, and establishing clear channels for the reporting of grievances.

The promotion of gender inclusion and equality in electrical engineering is not just a moral imperative but a practical necessity. It enhances innovation, addresses skill shortages, and contributes to economic and social progress. By removing barriers and fostering supportive environments, the industry can fully leverage the talents of both men and women to ensure a brighter and more sustainable future.

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Annex: Young researchers' profiles

Name: Zvikomborero Nyamugure

Age: 26

Current occupation: Restless Development Young Researcher

Degree: Bachelor's Degree in Geography and Environmental Studies

Zvikomborero is passionate about addressing gender disparity within the field of electrical engineering. He is keenly interested in exploring the factors that contribute to the under-representation of women in this field and developing strategies to increase female participation and success

Testimonial

Witnessing the limited number of women pursuing careers in electrical engineering in Zimbabwe has fuelled a deep-seated passion within me to address this disparity.

From a young age, I was fascinated by how electricity powers our world, but I rarely encountered female role models in this field. This lack of representation not only limits the potential contributions of women but also perpetuates harmful stereotypes. I believe that fostering an inclusive and supportive environment for women in electrical engineering is crucial for the advancement of our society.

By breaking down barriers, challenging biases, and empowering young women to pursue their dreams in this field, we can create a brighter future for everyone.

Name: Lucia Tigere

Age: 19 years

Current occupation: Student

Course: National Certificate in Electronic Communication Systems

Lucia is deeply committed to this research because she has personally experienced the challenges young women face in electrical engineering. She aims to empower women, advocate for inclusion, and inspire positive change.

Testimonial

I had the privilege of participating in a ground-breaking research study on the challenges faced by young women in electrical engineering departments. The study's findings were eye-opening, shedding light on the systemic barriers and biases that hinder the progress of women in this field.

The research was meticulous, thorough and thought-provoking. It not only identified the problems but also offered actionable solutions for creating a more inclusive and supportive environment.

As someone who is passionate about promoting diversity and inclusion in STEM fields, I believe this research is a game-changer. It has the potential to inspire meaningful change and empower young women to pursue their dreams in electrical engineering.

Name: Nobukhosi Dube

Age: 27

Current occupation: Student

Course: National Diploma in Electrical Power Engineering

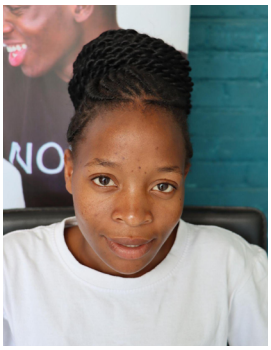
Nobukhosi is deeply passionate about promoting gender equality in technical disciplines and empowering young women. She believes that diverse perspectives are vital for innovation and progress. With a background in engineering, she is an active mentor for young female students, helping them navigate challenges in their academic and professional journeys.

Testimonial

As a student pursuing electrical engineering, I am deeply committed to empowering young women in technical fields and promoting gender equality. My journey hasn't been without its challenges; I've faced bullying and skepticism about my abilities, which only fuelled my determination to succeed.

Through my experiences, I've come to understand the vital role of resilience and support in overcoming challenges. This realisation drives my passion for mentoring others and creating a safe space where young women can share their experiences and learn from one another, fostering a sense of community and solidarity.

The project I'm part of is not just important; it has the potential to be life-changing. By equipping young women with the skills and confidence they need to succeed in technical fields, we can break down barriers and challenge stereotypes. Together, we're not only shaping individual futures but also paving the way for a more inclusive and innovative industry.



Name: Hazel Mukume

Age: 24

Current occupation: Student

Course: National Certificate in Electrical Power Engineering

Hazel is dedicated to bridging the gender gap in the field of electrical engineering. She is committed to being a voice for change, inspiring others to pursue their dreams and proving that women have a powerful role to play in shaping the future of engineering

Testimonial

Growing up in Zimbabwe I was captivated by the wonders of electricity and how it transforms lives. However, I couldn't help but notice how few women were present in the field of electrical engineering. This realisation ignited a passion in me to be part of the change that bridges this gap.

I often dreamed of contributing to innovations in this field but the lack of visible female role models made it seem like an unattainable goal. This absence of women in this field not only stifles the dreams of many young women but also holds back the progress that diversity brings to the industry.

I believe that empowering women to pursue careers in electrical engineering while dismantling societal biases, is essential for building a more inclusive and innovative future for Zimbabwe and beyond. Together, we can spark the change needed to build a more equitable and progressive society.

Name: Tinarwo Mutwira

Age: 22

Current occupation: Student

Degree: Bachelor's Degree in Electronic Engineering

Tinarwo is an aspiring engineer driven by a vision of a future where women and men collaborate equally to advance the progress of this continent and the world at large.

Testimonial

As an Electronic Engineering student, I have observed a significant imbalance in gender representation among both students and staff within our department. This disparity has always intrigued me and I often found myself questioning the reasons behind it. Undertaking this research has shed light on the deeper societal issues that contribute to this imbalance; it all stems from pervasive gender disparities rooted in societal norms and stereotypes. These disparities are not just statistics; they have far-reaching implications for our society. We are losing out on the valuable contributions of talented female engineers who are deterred from pursuing careers in the field. The fear of entering a male-dominated profession, coupled with societal biases, creates barriers that prevent many women from fully realising their potential in engineering.

One particularly troubling outcome of these stereotypes is their impact on female students' participation in practical, hands-on activities, which are critical in engineering education. These limitations not only hinder their skill development but also perpetuate the cycle of under-representation and exclusion. By addressing these issues and fostering an inclusive environment, we can unlock the full potential of all aspiring engineers, irrespective of gender, and drive meaningful progress in our society. This research has not only deepened my understanding of the problem but also strengthened my resolve to advocate for gender equity in engineering and beyond.

ALiGN **Advancing Learning and Innovation on Gender Norms**

About ALIGN

ALIGN is a digital platform and programme of work that supports a global community of researchers, practitioners and activists, all committed to gender justice and equality. It provides new research, insights from practice, and grants for initiatives that increase our understanding of – and work to change – patriarchal gender norms.

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Young Researchers analysing data during a data analysis workshop held in Harare

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