

Engineering in Kenya: An Uncomfortable Experience for Women

Mercyline Chepkemoi ¹, Julius Kipkemboi Kollongei ¹, Dennis Tovesi Alima ²

¹ Department of Agricultural and Biosystems Engineering, University of Eldoret, P.O. Box 1125-30100, Eldoret

² Department of Environmental Planning and Management, University of Eldoret, P.O. Box 1125-30100, Eldoret

mercylinekemboi@gmail.com

Abstract

Engineering is the most male-dominated field with negligible percentage of the engineering workforce being women. Efforts have been made to attract more women to the field through promotion of their interest in mathematics and science subjects, that would encourage them to study engineering courses. However, women face several challenges that triggers them to quit the engineering field either during or after school. The major reasons being: working in uncomfortable work environment due to lack of women mentors in the field, unfavourable working conditions such as lack of advancement and low salaries, lack of interest by most women to join the field, lack of better maternity leave benefits like short leave days to take care of their infants, lack of confidence through doubting their problem-solving abilities, the negative group dynamics women tend to encounter while embarking on various projects makes the profession less attractive, cultural beliefs, myths and misconception about the engineering field, since most women have strong belief that the field is only meant for the masculine gender as the workload is not fit for women. From these challenges, retention strategies should be put in place to reduce exit rates and encourage more women to stay in the engineering field.

Keywords: engineering, field, leave, quit, retention, women

1. Introduction

Engineering is the most male-dominated field in STEM. From a study carried out by Silbey, (2016), it was observed that only 13% of the engineering workforce in the United States was made up of women. For decades, efforts have been made by the engineering mentors to improve the curriculum in order to attract more women to the field thorough promotion of their interest in mathematics and science subjects, that would encourage them to pursue engineering; however, the major challenge is the higher exit rates either during or after school. For instance, approximately 40% of women secure engineering degrees, however, most of them quit the profession to engage in other activities. Roberta, (2019) also stated that over 32% of women leave STEM courses to study other courses with about 30% of women leaving the engineering profession citing their major reasons to the organizational climate.

A study done by Malone, (2019) also shows that women in the United States are under-represented in the field of engineering. According to James and Singer, (2016) there is a general shortage of engineers in the United States. Groshen, (2015) reported that women comprised of 50% in the United States population, but only 11% represented the engineering workforce. Women have received approximately 17% of Bachelor's degrees in engineering every year, but not all women graduates choose engineering as a career (Singh, *et al.*, 2013). Female engineers have a 50% turnover rate by the time they reach 30 years of age compared to only 10% for men. Retention of more female engineers may help industry leaders address the general shortage in the workforce (Malone, 2019). The higher exit rates by women from the engineering fields has been majorly attributed to dissatisfaction with pay and promotion opportunities, family-related constraints and unfavourable working conditions among others. The relatively higher exit rate by women from the engineering field does not vary much from that of other fields, if only their interest in the masculine-related fields are generally appreciated by their peers (Hunt, 2016).

Each career acquaints students with its different cultural beliefs, skills, customs and ethics. Engineering students utilize these different norms through coming up with projects and working in groups in order to enhance their learning and thinking capacities as engineers. Through this, they learn that working in groups enables them to understand that collaboration makes up to the main component of being an engineer. For many women engineers, however, they are often treated in gender stereotypical ways by their male counterparts, especially while working in group projects. Women may have different experiences while working in groups. They can either report positive or negative experiences. For instance, they are often referred to doing simple tasks e.g., secretarial jobs, hence are normally left out from doing most of the engineering activities. The culture of engineering itself may affect women's future in making decisions on the jobs to settle in. Female engineers do as well or better than the male engineers in school, though often point to the belief that, engineering was only meant for the masculine gender (Silbey, 2016).

This study focuses on the major reasons why women who pursue Engineering courses quit the field in order to pursue other feminine-related fields. This paper also describes the retention strategies that should be put in place to reduce the higher exit rates especially for women in the Engineering field.

2. Materials and Methods

The materials and methods used included gathering information from the institution, magazines, workshops and any other relevant documents, that would guide to estimate the percentage of women engineers in the engineering workforce.

3. Results

From University of Eldoret statistics on the number of women working as both academic and technical staff in the School of Engineering, it was observed that out of a total of 39 academic staff, only 5 lecturers are women making a percentage of 5 % as shown in Table 1 and Figure 1 respectively. Moreover, in the technical field of engineering, only one technician out of a total of 11 technical staff, is working in the school, a percentage of 1% being women as shown in Table 1 and Figure 1 respectively.

Table 1: University of Eldoret, School of Engineering Statistics

Department	School of Engineering					
	Academic Staff			Technical Staff		
	Male	Female	Total	Male	Female	Total
Agricultural & Biosystems Engineering (ABE)	12	1	13	2	1	3
Civil and Structural Engineering (CSE)	8	3	11	3	0	3
Mechanical and Production Engineering (MPE)	14	1	15	4	0	5
Total	34	5	39	9	1	11

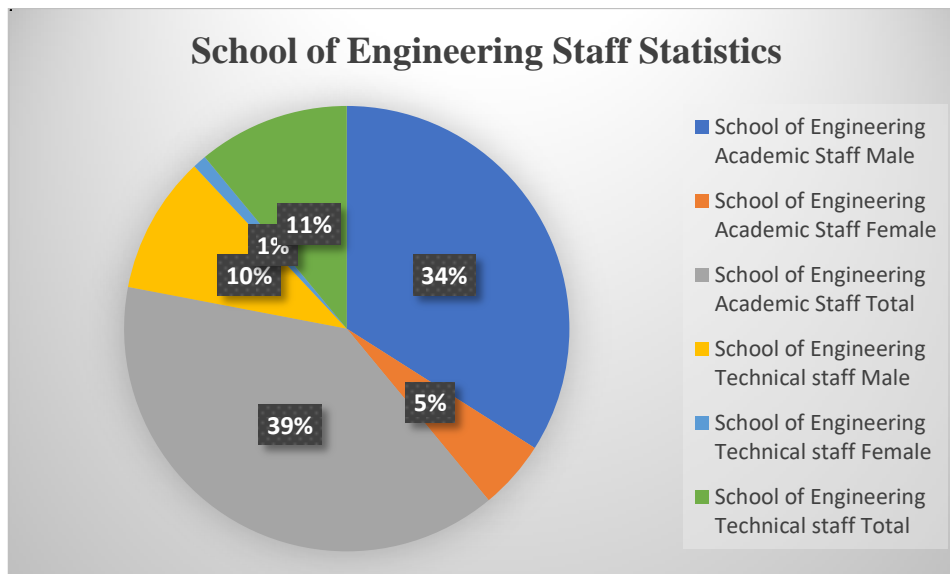


Figure 1: School of Engineering Academic and Technical Staff Statistics

From a two-day workshop attended by one of the authors that was organized by Moi University on 4th and 5th of August, 2021 with the main theme, ‘Gender capacity building workshop for stakeholders in the water sector,’ it was presented that, the global average of 35% in STEM fields are women and 29% of the researchers in Kenya are female engineers.

Ndung'u, (2019) reported that the IEK raised concerns over the alarming low numbers of female engineers in Kenya and wanted more women to be empowered in order to enrol to the engineering field. From the IEK statistics, only 436 female engineers of about 7% out of a total of 6444 engineers in Kenya are members of IEK. This alarming low percentage of women in IEK forced the institution to start women engineers’ conference in order to motivate more of the females to take up the career.

From these statistics drawn from the institution, magazine and workshop, the authors then formulated the major reasons why women engineers tend to leave the engineering field to study other feminine-related fields either before or after completion of studies and also stipulated the retention strategies that can be put in place in order to encourage more women to stay in the engineering field to reduce the high exit rates as discussed below.

4. Discussion

Why do Women Leave Engineering Field

- Child-rearing:** most women leave the profession to rear their babies at home after giving birth.
- An uncomfortable work climate:** most women experience loneliness due to lack of women mentors in the field. This is greatly attributed to the insufficient mentorship programs that would empower more women into the field.
- Unfavourable working conditions:** most women are discouraged by too much travelling, lack of advancement, low salaries and inflexible or non-supportive climates.
- Lack of interest** by most women to join the engineering field due to beliefs that the profession was only meant for the masculine gender. This has greatly lowered intake of women to the field.

- e) **Working in unfair conditions:** most women receive unequal compensation as compared to their male colleagues. For instance, they receive negligible support to balance between work and family and are being neglected to receive their deserved opportunities for progression.
- f) **Doubt from their superiors:** most women feel they are incapable of effectively using their skills more often because they are usually doubted by their superiors.
- g) **Lack of better maternity leave benefits** that supports work-life balance and keep women in Engineering. For instance, women are given short maternity leave days to nurture their infants.
- h) **Failure to provide flex-time to women employees:** most female employees are not given a chance to compose their own schedule in order to maintain better work-life balance. This discourages them from staying in the field despite shifting priorities that naturally come with age.
- i) **Lack of confidence:** Women tend to doubt their problem-solving capabilities. For instance, a woman would try to solve a problem after coming up with relevant solutions, but then, would keep on convincing herself that she must be wrong, while it could turn later that she has been correct all along.
- j) **The negative group dynamics women tend to encounter while embarking on various projects makes the profession less attractive:** Most women feel relegated especially while working as interns, group projects and other jobs as assigned by the bosses. In those situations, men seem to be given more opportunities than women especially while working on the most challenging problems. On the other hand, women tend to be assigned simple tasks because they are always thought they are incapable of carrying out the most challenging problems. This discourages women to stay in the field due to being taught of doing menial tasks. As a result, women who had developed high anticipations in their profession thinking of making a positive social impact as engineers can become disappointed with their career expectations.
- k) **Cultural beliefs, myths and misconception:**
 - ✓ the culture within engineering, the shared values, beliefs and norms, might contribute to the under-representation of women in the profession and may affect their future jobs decisions. For instance, the reason for leaving engineering often points to the hegemonic masculine culture of engineering itself.
 - ✓ Belief and misconception that men perform better than women given the engineering workload requirements discourages women from staying in the field.
 - ✓ Many women engineers have been treated in gender stereotypical ways especially by their male counterparts. For instance, while working on a given assignment in groups, most of them experience positive or negative reactions from their mates.

5. Conclusions

Retention strategies

The following are the main strategies that can be put in place in order to encourage more women to stay in the engineering fields:

- a) Provision of funded trainings e.g., scholarships to encourage more women to the field.
- b) Engaging women engineers in mentorship programs through workshops, where they can meet with other female mentors in the field to empower them.
- c) Provision of good working conditions through promotions and enhancing their salaries.
- d) Provision of adequate maternity leave days for women to nurture their infants.
- e) Provision of good work environments that supports work-life balance.
- f) Employing more women engineers as academicians so that they can empower more women to enrol for engineering courses.

Acknowledgement

Authors acknowledge the support offered by the School of Engineering and the whole of University of Eldoret fraternity.

References

- Groshen, E.L. (2015). Opportunities and challenges facing the Bureau of Labor Statistics. *Business Economics*, 50(2), 91-95.
- Hunt, J. (2016). Why do women leave science and engineering? *ILR Review*, 69(1), 199-226.
- James, S.M. and Singer, S.R. (2016). From the NSF: The National Science Foundation's investments in broadening participation in science, technology, engineering, and mathematics education through research and capacity building. *CBE—Life Sciences Education*, 15(3), fe7.
- Malone, J.P. (2019). *A Case Study: Strategies for Retaining Women Engineers*. University of Phoenix.
- Ndung'u, C. (2019). Kenya: Concerns over low numbers of Kenyan women engineers. *Daily Nation*.
- Roberta, R. (2019). SWE Research update: Women in Engineering by the Numbers.
- Silbey, S.S. (2016). Why do so many women who study engineering leave the field. *Harvard Business Review*, 1-2.
- Singh, R., Fouad, N.A., Fitzpatrick, M.E., Liu, J.P., Cappaert, K.J. and Figueredo, C. (2013). Stemming the tide: Predicting women engineers' intentions to leave. *Journal of Vocational Behavior*, 83(3), 281-294.