EMPOWERING WOMEN THROUGH TVET TRAINING IN MALE DOMINATED TRADES: A PROJECT SUPPORTED BY CANADIAN EMBASSY AT NAKURU TRAINING INSTITUTE, KENYA

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ABSTRACT

Globally a wide gender gap has persisted over the years at all levels of Science, Technology, Engineering and Math (STEM) disciplines. Girls and women are systematically tracked away from science and math throughout their education, limiting their access, preparation and opportunities to go into these fields as adults. Women make up only 28% of the workforce in STEM. Men vastly outnumber women majoring in most STEM fields in college and in the market place. There is still a gross underrepresentation of women in the STEM fields in Sub-Saharan Africa (SSA) where the share of females graduating from tertiary education engineering fields is below 30%. The under-representation is a concern both for gender equality and economic competitiveness.

This study was based on Instructional Theory for Skills Development. It applied descriptive survey method. The study sample was 76 TVET female students, 36 for pre-training survey and 40 for post training survey. A gender based survey on the issues affecting women in the society, their employability and if young women would enroll in male dominated course given an opportunity was done. The project trained 40 women in technical skills for employability in two male dominated careers; electrical wireman and plumbing and pipe fittings. The 40 women were linked to industries for job related experience and were further registered for examination by National Industrial Training Authority (NITA) in Kenya. They recorded 100% pass rate and were certificated. 80% of the young women and girls are gainfully employed while 20% are pursuing further training. The study found out that young women are willing and are capable of training in skills in male dominated TVET sectors.

KEY WORDS: Women Empowerment, TVET, STEM, Male Dominated Sectors

1. Introduction

Science, Technology, Engineering and Mathematics (STEM) related Technical and Vocational Education and Training (TVET) has a potentially significant role to play in providing the skills and competencies required to support innovation, productivity and international competitiveness as well as areas of social development including health and education. It is thus an important driver for achieving a range of the United Nations' Sustainable Development Goals and contributing to inclusive and sustainable societies (Tikly et al., 2020). In addition it is expected that in 2025, 46 per cent of STEM-related occupations will require medium-level qualifications which are mostly acquired through upper-secondary-level TVET

According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), globally, women are underrepresented in the field of research and experimental development, which includes STEM fields. On average women represent 29% of the world's researchers and 35% of global higher education enrolment in STEM fields. While women now represent 58 % of university graduates in OECD countries, they are significantly under-represented in STEM subjects (Science, Technology, Engineering and Mathematics). Only 20% of computer sciences graduates in 2012 were female, three points lower than in 2000 (OECD, 2015).

According to UNESCO study on "Women in Science" (2015) the share of female researchers worldwide in 2013 was 28%. Women in developing countries also tend to be under-represented in STEM fields, while still facing an overall gap in higher education. In the Middle East and North Africa (MENA) region women make up less than half of students in engineering, production and construction careers (OECD, 2012). However there are a few exceptions such as such as Indonesia where women and men choose very similar fields of study (OECD, 2012). Furthermore, women who obtain STEM degrees are significantly less likely than men to pursue a career in those fields. On average, 71% of male graduates from STEM subjects work as professionals in STEM fields, as compared to only 43% of female graduates (OECD, 2015).

This underrepresentation of women will continue to disadvantage them when it comes to their employability and empowerment. This is because it is said that over the next several decades, job openings requiring STEM skills are expected to grow more than twice as fast as non-STEM occupations and to pay better than non-STEM jobs (*Employment in STEM Occupations*, 2020). STEM-related jobs grew at three times the rate of non-STEM jobs between 2000 and 2010. By 2018, it was projected that 2.4 million STEM jobs will go unfilled (*The STEM Imperative | Smithsonian Science Education Center*, n.d.). This underrepresentation means that minorities lack qualifications to access STEM-related jobs, which, in addition to being more plentiful, are also better paid than many other jobs.

In Africa, the numbers are even more dismal. The greatest imbalance is in engineering. In 2010 only one in four engineering students was a woman. Guinea had the lowest percentage of women in science (5.8%) which is equivalent to one student in 17 students (Hill et al., 2010). In addition two countries did extremely well on gender parity in STEM disciplines: Lesotho (55.7%) and Cape Verde (52.3%).
South Africa may be scoring below the global average of 30% of women pursuing Science, Technology, Engineering and Mathematics (STEM) careers, the country was still leading in Sub-Saharan Africa (*SA Narrows the Gap of Women in STEM Careers, Ranking Highest in Sub-Saharan Africa*, n.d.).

According to Hill et al. in Kenya STEM participation shows a clear gender disparity ranging from 30%-35%. Fewer women participate and even fewer complete their studies. In addition, their graduation scores are low compared to those of males. According to their study Hill et al. between 2009 and 2013, the number of women earning university STEM degrees in Kenya declines as they move through the educational ladder, a phenomenon referred to as the "leaky pipeline". This can be attributed to the masculinity of the disciplines, stereotypes and associated prejudices. Employability in Kenya tends to favor those with Job-specific skills. Women and young mothers miss out opportunities in areas that are largely dominated by men.

To give them an advantage and a cutting edge to equally compete, this project deliberately planned to train the young women and girls in technical skills ideal for employability. Where job opportunities in network engineering and hardware repairs and maintenance become available, majority of girls miss out the opportunities, despite the $^{2}/_{3}$ guarantee in the constitution, especially now that the government is rolling out numerous digital programs in the country.

Women when not economically empowered are more vulnerable to abuse by men, engagement in social vices and tend to be abused by men in the society. Women are usually the caregivers to the children, elderly and ailing in society, and they are also role models to the girl child. Further, analysis done by NTI observed that women participation in TVET Engineering and PC Repair courses in Nakuru town is strikingly low, ranging between 1% to 5% in County Polytechnics and 3% to 7% in the government technical, vocational education training (TVET)

institutions. There is therefore need to increase women participation in TVET courses through advocacy and sponsorship. This project sponsored 40 women to be trained in 2 male dominated trades; plumbing and electrical wireman.

1.1 Statement of the problem

Globally a wide gender gap has persisted over the years at all levels of Science, Technology, Engineering and Math (STEM) disciplines. Women in developing countries also tend to be under-represented in STEM fields, while still facing an overall gap in higher education. In Kenya STEM participation shows a clear gender disparity ranging from 30%-35%. Fewer women participate and even fewer complete their studies. Due to this disparity it is of importance to keep investigating the issues of female in relation to STEM and give interventions to narrow the gender gap. This project began with investigating issues influencing number of female in STEM TEVET courses and careers and proceeded to offer interventions to narrow the disparity gender gap.

1.2 Research questions

1. What are some of the causes of low numbers of women in STEM TVET courses and careers in Nakuru County?
2. What are the outcomes of the low numbers of women in STEM TVET courses and careers in Nakuru County?
3. What is the impact of unemployment on women?
4. What are some of the STEM TVET male dominated courses young women would desire to train in?
5. How would the female students fair in training in the STEM TVET male dominated courses and careers?
6. How would the training of women in STEM TVET male dominated courses and careers impact their lives?

2. 0 Literature Review

According to the UNESCO groundbreaking report 'Cracking the code: Girls' and women's education in STEM, only 35% of STEM students in higher education globally are women, and differences are observed within STEM disciplines (UNESCO, 2018). According to this report only 3% of female students in higher education choose information and communication technologies (ICT) studies. This gender disparity is alarming, especially as STEM careers are often referred to as the jobs of the future, driving innovation, social wellbeing, inclusive growth and sustainable development.

2.1 Theoretical Framework

This study is anchored on theory for fostering skills development. The theory for fostering skill development outcomes, was proposed by (ROMISZOWSKI, 2009), can be used for fostering all types of skills. Romiszowski defines skill as "the capacity to perform a given type of task or activity with a given degree of effectiveness, efficiency, speed or other measure of quantity or quality (p.202)". He distinguishes between intellectual skills (that involve the mind), motor, sensorimotor, or psychomotor skills (that involve the body), personal skills (that involve emotions), and interpersonal skills (that involve interacting with others). Skill is distinct from knowledge, in that it develops with experience and practice, whereas knowledge is something you either have or do not have. This study dealt with the psychomotor skills in TVET courses.

3. Research Methodology

Descriptive survey method was used in this study. This approach blends quantitative and qualitative data to provide you with relevant and accurate information (*Descriptive Survey Design - Voxco*, 2021). In addition it engages the people who are at the center of the research objective.

3.1 Population

The target population was female students in Nakuru Training Institute (NTI) and young women and girls (with small children, out-of-school and unemployed) from various slum areas and from needy backgrounds in Nakuru County, Kenya.

3.2 Sample and Sampling Procedure

All the female students at NTI formed the study sample and filled a baseline survey questionnaire. This informed the project on male dominated courses the girls prefer and societal problems girls encounter. 40 young female from informal settlements in Nakuru County were randomly selected for training in the male dominated courses at NTI. Total sample was 76 young female students.

Female students sample was randomly selected from the female student population at NTI. A total of 36 students formed the sample of this study. The young women and girls trainees were sampled through random purposively sampling. Sampling was through churches and village administration office to ensure only the needy and disadvantaged are selected. 40 young women and girls who benefited from the training formed the second sample. In total 76 young women and girls formed the study sample. Google Form questionnaire was used to collect data from student sample. Enrolment forms were used to register the young women and girls trainees.

4. Data Analysis

Data collected were coded and the responses from the questionnaires arranged and grouped according to individual research questions. The data were then entered into appropriate categories in computer worksheets using the Statistical Package for Social Sciences (SPSS) and Microsoft Excel. Descriptive statistics including means, frequencies, and percentages were used to analyze the data. The results were presented in form of pie charts, graphs, and tables. The second category of data was collected by tracking the 40 girls' trainees in STEM TVET male dominated courses during training, attachment, assessment and after training. Simple descriptive statistics in form of percentages were used.

5. Findings and Discussion

Age Bracket

The study examined the age bracket of the women in the study (Figure 1).

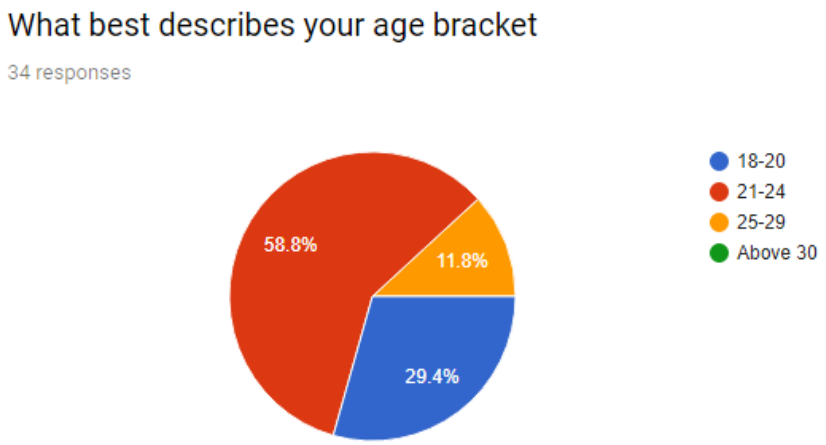

Figure 1: Age bracket of female students

58.8% of the young women were of 21-24 age bracket. This is significant considering that they were all unemployed, though all had attended high school education.

Research Question 1.

1. What are some of the causes of low numbers of women in STEM TVET courses and careers in Nakuru County?

Table 1

Hindrances to women uptake of STEM TVET in male dominated courses and careers

Hindrances	N	%
Cultural beliefs	17	50
Discrimination	14	41.2
Others	3	8.8

50% females said it was due to cultural beliefs while 41.2% stated it was as a result of gender discrimination. This confirms the need for sensitization for a mindset change and change of attitude to have more women trained and thus employed in all sectors of the industry.

Research Question 2

What are the outcomes of the low numbers of women in STEM TVET courses and careers in Nakuru County?

Problems in the community

The study examined the problems faced by the women in the community (Figure 2).

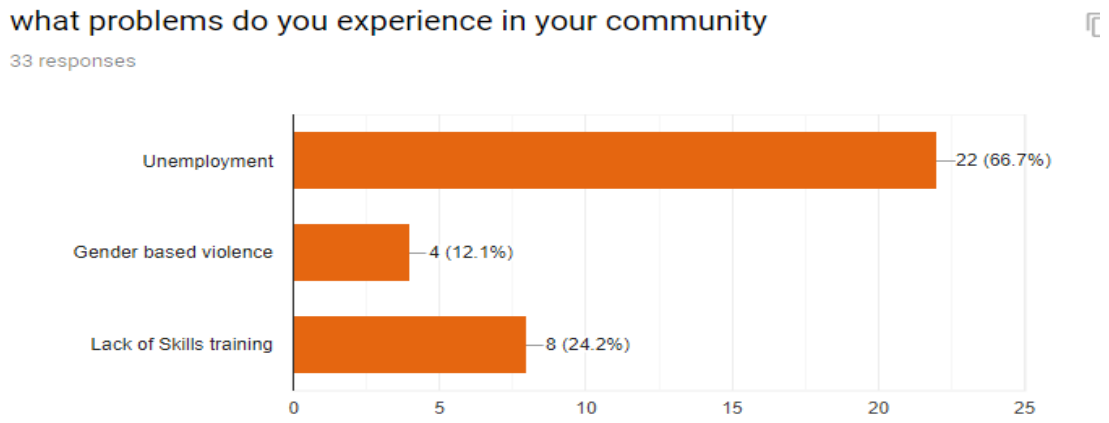

Figure 2: Problems experience by the young women in the community in Kenya

66.7% of the women indicated unemployment as the main problem they faced in the society. This is critical as employment creates a source of income thus economic empowerment. It is a fact that unemployment is directly related to skills training as demonstrated by 24.2% indicating that that they have a problem of lack of skills. As such, any intervention in skills training would ultimately make the women employable. This young women also experience gender based violence in the community as indicated by 12.1 % response.

Research Question 3

What is the impact unemployment on women and men?

Effects of community problems on the women and girls

Women were asked how the community problems were affecting them. This question was open ended and their responses are shown in Table 2.

Table 2
Problems faced by women in the community

Problem	Percent
1. Early marriages	12.3
2. Depression	11.34
3. Immorality	5.16
4. Drug abuse	4.13

Early marriages had the highest response at 12.3% followed by discouragement/depression at 11.34%. Leading to immorality and drug abuse responses were at 5.16% and 4.13% respectively.

Effects of unemployement on male

On whether the problem identified (unemployment was major) affected men differently responses are given in figure 3.

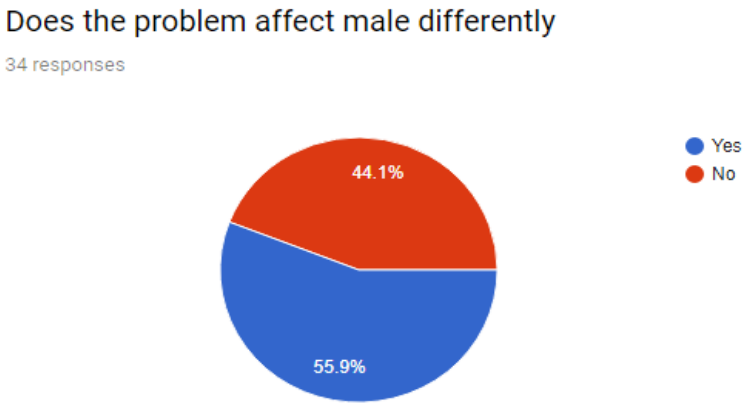

Figure 3: Whether unemployment affects men differently.

55.9 % of the women indicated that the problem affected men differently while 44.1 % indicated the effect of unemployement affected men in the same way it affected women.

Research Question 4

What are some of the STEM TVET male dominated courses young women would desire to train in?

Trades considered as male dominated by the women

An evaluation to ascertain which trades were considered male dominated by the women was done. Results are given in figure 4.

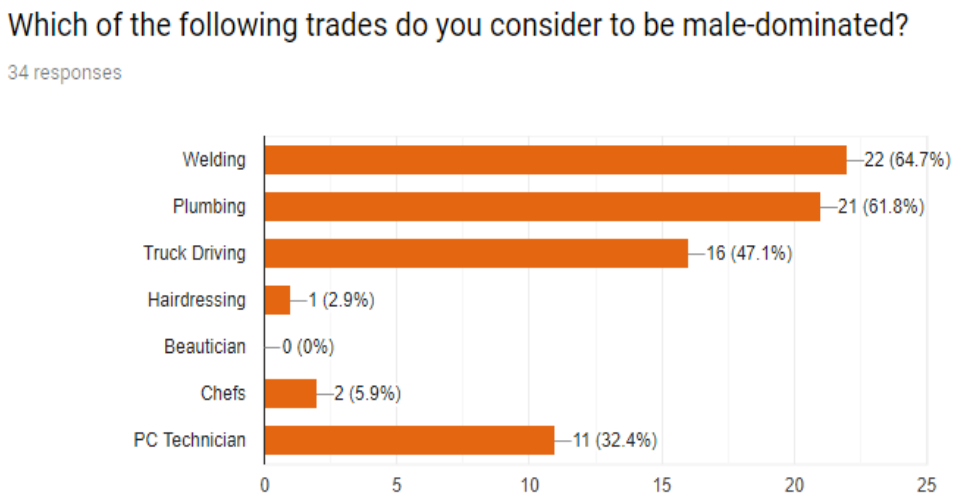

Figure 4: Trades considered male dominated by women

64.7% of the women felt that welding course/careers ate male dominated, 61.8% indicated plumbing is male dominated while 47.1% stated truck driving is male dominated. PC Technician trade is also male dominated in Kenya according to the women in this study.

Research Question 5

Which STEM TVET male dominated courses and careers would young women take up?

Uptake of male dominated courses given opportunity

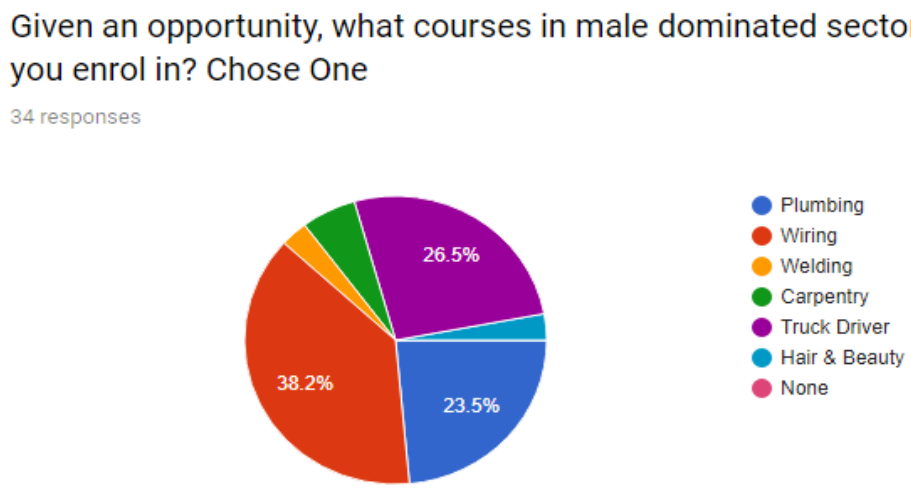

Figure 6: Preferred coursed by women in male dominated sectors.

38.2% indicated they would enroll for Electrical Wiring courses, 26.5% Truck Driving and 23.5% would enroll in Plumbing as shown in figure 6.

This project proposed to initially offer interventions in Electrical Installations and Plumbing in line with the governments Big 4 Agenda that would definitely absorb such skills immediately.

Research Question 6

How would the female students fair in training in the STEM TVET male dominated courses and careers?

Training of Women in Plumbing and Electrical Wireman

40 women were trained in 2 STEM TVET male dominated courses and careers in plumbing (20) and electrical wireman courses at NTI. These women were further linked to industry for job related skill.

- 100% of the women finished their training and proceeded for 2 months attached.
- Upon completion of the attachment all the women undertook a National assessment exam given by National Industrial and Training Association (NITA) in Kenya.
- These women recorded 100% pass rate and were certificated.

This results are in support of a study by Tikly et al that found out that biological differences at the brain level between boys and girls have no effect on ability or performance in STEM subjects (Tikly et al., 2020).

Research Question 7

How would the training of women in STEM TVET male dominated courses and careers impact their lives?

Impact of the Training on the Women

Table 3: Impact of the training on the women

Impact	Percentage %
1. Gainfully employed	80.0 %
2. Further Education	20.0 %
3. Certification	100%
4. Skills	100%

Training of the young women in the male dominated TVET courses gave 80% of them employment. This demonstrates availability of jobs in TVET trades. This is in agreement with projection that over the next several decades, job openings requiring STEM skills are expected to grow more than twice as fast as non-STEM

occupations and to pay better than non-STEM jobs (*Employment in STEM Occupations*, 2020). 100% of the young women got certificates and skills while 20% went for further education.

6. Conclusion

The following were the conclusions of this study project;

Majority of the young women in Kenya are unemployed, though having had attained high school education. Unemployment is the number one problem facing young women in Kenya. Other community problems young women in Kenya are facing in the community are lack of skills for employability and gender-based violence. Effects of these problems are: early marriages, depression, immorality, drug abuse in the order of severity.

One positive observation from this study is that young women in Kenya, are willing to take up training for skills in TVET in male dominated courses given an opportunity and support. However, there are hindrances towards women uptake of training in male dominated TVET skills are such as;

-cultural briefs that these causes are a reserve for men.
-gender discrimination in training institutions and in the work place.

Courses labeled as male courses by women in Kenya are;

- Trick driving
- Pc repair
- Electrical wiring
- Plumbing

Young women in Kenya, have mental capacity to train, pass and work in this male dominated TVET courses. These young women are willing to pursue further training in these TVET male dominated courses.

7. Recommendations

Young women and girls need to be educated about TVET courses so as to counter the cultural beliefs that they are for men and not women. Young women in Kenya should be sensitized towards the 2/3 gender rule as enshrined in the constitution. This would serve as a motivation in taking this TVET courses. Kenyan government should set aside money to sponsor this young, disadvantaged and needy women to train in these TVET male dominated courses.

In addition, non-governmental organizations and well-wishers should come in and sponsor these young, disadvantaged, need and willing women to train in these TVET male dominated courses for employability. This will go a long way in empowering women and raising mentors for the young girls on the same area. As the saying goes ‘you educated a woman and you educated a community’.

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