

Perception of female engineering students on engineering course and profession: a case of Public Colleges in Nairobi, Kenya

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Abstract:- Although rapid development of engineering sector is witnessed where the need for engineering professional grows, the participation of women in this profession is not convincing. Therefore, the present study aimed at determining the perception of female engineering students on engineering course and profession. The study adopted descriptive research design with the target population comprising of all female engineering students pursuing diploma in middle level public TVET institutions in Nairobi and its environs based on census technique. Self-administered Questionnaires with open and close ended questions were distributed among the respondents. The obtained data was subjected to descriptive statistics. In general finding reported that female engineering students had a positive perception towards engineering as a profession and as a field of study. However, a few negative perceptions were recorded. On the basis of the above findings, the study concluded that women students generally have a positive attitude towards engineering. Therefore, the relevant bodies should enhance positive image of the engineers and engineering profession to boost positive perception among females.

Keywords:- Females in engineering; Perception of Engineering; Engineering course and profession.

I. INTRODUCTION

Engineering has been viewed as one of the most important fundamentals of human advancement with the prospective for adding value to product and services which contribute to the economic growth and more so, improving the lives of people quality of life (Balakrishnan and Low, 2014). However, over the years gender equality in career participation has never been achieved and inequalities continue to exist especially in engineering courses, which are male-dominated. As Graham (1997) asserts that, “the nature of women’s labor force participation continues to differ greatly from men.

In this 21st century, the number of women pursuing and working in engineering is higher than before, equal representation is still far from being attained (Afeti, 2007). The low presentation of females in engineering courses and the engineering profession leads to concern on how to draw women to this male dominant career. Globally, the rate of enrolment of female engineers to the course and profession is not encouraging. For example in the year 2010 in Japan, only 10% engineering graduate students were female

(Balakrishnan and Low, 2014). The case is not different for Kenya. Ngerechi (2003) points out enrolment data from TVET institutions indicate that women comprise of 30% of the total enrolment but only 5% of the 30 % are in technical and vocational areas such as engineering and building construction to name a few.

Despite the concerted efforts put in place to increase women participation in engineering, women are still under-represented in this field. Several authors have given varied reasons for this under-representation. One of the reasons is females’ perception on the course and profession. From the studies that have been carried out before, investigating the perception of female students towards engineering as a course revealed that they have both positive and negative attitudes. In a study carried out by Baryeh et al. (2001) showed that women engineering students considered the course as suitable for anybody who has the qualifications to study the program regardless of gender, engineering is for extra intelligent people, engineering is a course for men, engineering is dirty, it requires physical ability and energy, engineering is interesting and creative, and engineering is boring and unfashionable. According to another study carried out by Angeluova (2001), women engineering students felt that engineering studies were very difficult for them and they were afraid of not being able to graduate. With most studies reporting a mixed perception of women on engineering course and profession, the present study therefore sought to determine perception of female engineering students on engineering course and profession: a case of Technical colleges in Nairobi area.

II. METHODOLOGY

A. Study area

The study was carried out in Public Technical training Colleges within Nairobi. The colleges offer Diploma courses in engineering.

B. Research design

The study adopted descriptive research design. This type of research design is a conclusive type whose major purpose is the description of the state of affairs as it exists (Kombo and Trump, 2009, p.71). In this study, descriptive research design was used to describe the variables that are associated with enhancing women participation in engineering courses in Kenya with special reference to Nairobi area. The study surveyed the women students in their study environments to understand the dimensions of their participation in the engineering profession.

C. Target population

The target population for the study comprised of Diploma female engineering students in middle level public colleges in Nairobi area. In Nairobi area the public colleges that train engineering courses are listed in the table below;

COLLEGE	POPULATION SIZE			
	Mechanical	Electrical	Civil	Totals
KHIBT	4	7	24	35
PC KTTI	12	13	0	25
NYS ENG	3	24	0	27
KPUC	38	43	13	94
KIMC	0	11	0	11
KPLC SCHOOL	5	10	0	15
RTI	7	10	10	27
NTTI	6	10	0	16
TDC	11	9	0	20
KTTC	5	7	20	32
KABETE	2	5	8	15
COURSE TOTALS	93	149	75	317

Table 1: Number of Women Undertaking Engineering Courses

Source (Class records)

A. Sample size and sampling Procedures Target population

This study employed the use of census instead of sampling the populations. A census is the study of the entire group of elements or individuals in a population (Shenoy and Pant, 1994). The present study used census because the respondents were located in the same geographical area and the population was not too large and therefore studying all the elements in the population was manageable within the available resources.

B. Data collection instrument

Questionnaires were used to collect necessary information from the respondents. The instrument questionnaire contained both closed-ended and open-ended questions. The questionnaires were self-administered and collected information on perception of the target respondents on both engineering course and profession.

C. Reliability and validity

Reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trials while validity is the degree to which results obtained from the analysis of the data actually represent the phenomena under study (Mugenda and Mugenda, 2003). In the present study, reliability of the instrument was determined through pilot test. A sample of the questionnaires were distributed to a sample of the population. After piloting, the responses were analyzed to determine whether the questions were understood by the respondents by subjecting to Cronbach's test where an alpha value greater than 0.7 was obtained. Therefore, the instrument was considered reliable. For validity test, the instrument was subjected to experts' judgement.

D. Data Analysis

Both qualitative and quantitative data were obtained from the respondents. Quantitative data was subjected to descriptive statistics. In this case, frequency, percentage and means were calculated. Tables, graphs and pie charts were used to represent the data. Qualitative data analysis was used to analyze the responses given to probing questions.

III. FINDINGS

A. Demographic information of the respondents

The study recorded a rate of 70% which was found to give a representative information. Age, type of school and academic strength formed the demographic information of the respondents.

B. Distribution of respondents by age

Table 2 below presents age brackets of female students undertaking engineering. As the table indicates, majority of the women students undertaking engineering are young, aged between 18 and 22 years. This age bracket accounts for 75.1% of the total number of students considered in this study. This is followed by 23 to 27 years age bracket which comprises of 24.4% of the respondents. Only a small percentage of 0.5% is aged between 28 and 32 years. Among the respondents no student was aged 33 years and above. These findings show that majority of the women students in TVET institutions are young people who are direct from high school.

Age	Frequency	Percentage (%)
18 – 22	166	75.1
23 – 27	54	24.4
28 – 32	1	0.5
33 – above	0	0
Total	221	100

Table 2: Age of Female engineering Students

C. Type of school attended

Majority of female students who pursue engineering courses came from single schools as table 4.8 shows. It is clear from the table that majority (66.1%) of the women students pursuing engineering courses came from single (girls only) schools as compared to the small number (33.9%) that come from mixed schools. This could mean that when girls are in a single high school, they are likely to pursue engineering as compared to their counterparts in mixed high schools who are likely to consider engineering as a course for men.

Type of school	Frequency	Percentage (%)
Mixed school	75	33.9
Single school	146	66.1
Total	221	100

Table 3: Type of school attended

D. Academic strengths

Majority (87.3%) of the female engineering students indicated that their strengths are in sciences while only a small percentage of 12.7% indicated that their strengths are in humanities. This finding may be interpreted to mean that

women pursue engineering courses are those who consider themselves to be good in sciences.

Response	Frequency	Percentage (%)
Sciences	193	87.3
Humanities	28	12.7
Total	221	100

Table 4: Academic strengths of the respondents

E. Perception of Female towards Engineering as a Course and as a Profession

Perception of female towards engineering as a course and as a profession the respondents were presented with various descriptions of the engineering discipline and the engineering profession. The response was rated as positive, neutral and negative depending on the attitude stated and were summarized in Table 5 below.

Perception on engineering course and profession	Negative		Neutral		Positive	
	Freq.	%	Freq.	%	Freq.	%
Engineering is an “unfeminine” profession	24	10.9	21	9.5	176	79.6
Engineering is not family friendly	28	12.7	32	14.5	161	72.8
Engineering makes a valuable contribution to society	11	5	2	0.9	208	94.1
Engineering is a physically demanding profession	137	62	48	21.7	36	16.3
Engineers are workaholics	81	36.7	58	26.2	82	37.1
Engineers are exciting and innovative people	16	7.2	9	4.1	196	88.7

Table 5: Perception of Female towards Engineering as a Course and as a Profession

From the Table 5 above, majority of the respondents (79.6%) had a positive perception towards engineering profession while only 10.9% of them had a negative perception on the same. Therefore, women engineering students did not perceive engineering profession as “unfeminine” since a great percentage disagreed.

A good number of female students did not consider engineering profession as being family unfriendly. For example, 72.8% had a positive attitude towards engineering and family relationship because they disagree with the attitude stated above. About 12.7% of them had a negative perception on the same. This result could mean that women engineering students do not consider the engineering profession family unfriendly but friendly.

Furthermore, female students perceived engineering profession as making a valuable contribution to society. This is demonstrated by over 90% of respondents having a positive attitude towards this description. About 5% have a negative description towards this description. This means that the engineering profession makes a valuable contribution to society. On whether engineering profession is physically demanding, the findings indicated that majority (62%) of the respondents agree with the description that it is a demanding profession while a few (16%) of them had a negative perception towards this. It can be deduced that women engineering students perceived the profession as physically demanding to them given their limited physical energy.

There was a divided opinion on whether engineers are workaholics. Those who positively disagree with the description and those who negatively agreed with the description form about 37%. This indicates that there is no clear-cut perception on the description of engineers as workaholics hence respondents were indifferent on this matter.

On the other hand, over 88% of the respondents had a positive perception of engineering being an exciting and innovative course. A part from the above descriptions on the perception towards engineers and engineering profession women students identified the following description on how they perceive them. They described engineers as: adventurous; intelligent focused professionals; ambitious people and goal achievers; are keen in their undertaking; highly gifted; open minded people; they are courageous people; tough and strong people; solution oriented;

The negative perception included the description of engineers as: dishonest. The engineering profession was described as: a tough profession, dangerous profession, a psychologically and mentally demanding profession. These findings are in line with what Baryeh et al (2001) in whose study they found out both positive and negative attitudes of women engineering students. The positive attitudes that these researchers found out were that the course is for both men and women regardless of gender, engineering is interesting and creative. The negative attitudes that the authors found out included that engineering is for people who are more intelligent, it is a male profession, it is dirty, it is demanding physically and it is boring and unfashionable. Marketable course; helping in critical thinking.

IV. CONCLUSION

Regarding the attitudes of women engineering students towards the course it can be said that women had both positive and negative attitude. Among the positive attitudes include: women students did not consider the profession unfeminine, family unfriendly and they felt that the course makes a valuable contribution to the society a marketable course; helping in critical thinking a respectable profession; a profession like any other. These can be considered as positive attitudes. The negative attitudes were that: they considered the profession physically demanding, a tough profession and dangerous profession. This leads to a conclusion that except for a few negative perceptions, women engineering students view the engineering profession and the engineers positive. Therefore, the study recommends that relevant bodies should enhance positive image of the engineers and engineering profession to boost positive perception among females.

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