BRIDGING THE GENDER GAP IN ENROLMENT INTO MECHANICAL ENGINEERING DEPARTMENT IN HIGHER INSTITUTIONS IN NIGERIA

Aderemi DADA[1], Oluyemi RAJI [2]
Department of Mechanical Engineering,
The Federal Polytechnic, Ilaro
Ogun Sate, Nigeria
E-mail: aderemidada18x@gmail.com
E-mail:rajioluyemi3@gmail.com

ABSTRACT
The focus of the paper is to examine the wide gap between the number of male and female students enrolment into mechanical engineering programme in some tertiary institutions in Nigeria with a view to proffer feasible solutions. The study employed descriptive research method for the investigation on the low enrolment of female students into mechanical engineering department in some schools in the South West, Nigeria, to illustrate the gross disparity. The choice of mechanical engineering as a profession is not in the radar of many female students seeking admission into higher institutions because of the perceived difficulty associated with mathematics, physics and technical drawing. The perception that mechanical engineering profession is unbefitting and hazardous for women is another major factors that is responsible for the low enrolment of female students into mechanical engineering departments of the institutions that were examined. The result of the comparative analysis of the data available confirmed the huge gap in favour of male students. Conclusion and recommendations were made based on the comparative analysis.

Keywords: mechanical engineering, profession, women, gender, inequality.

1.0 INTRODUCTION

The perceived domestic and traditional roles of African women have significantly affected their contribution to industrial and technological development in Nigeria. These historical roles have deprived many women of their potential and willingness to contribute to advancement in science and technology, and industrial development of the country. The socially approved functions, such as child bearing, farming and house-keeping has hindered many women from exhibiting their true values, even though many of them believe that they are truly destined for these historical functions (Adeleke, 1990). This impediment has denied the country of innumerable contributions that would have been made to the development of the country by the female citizens.

Mechanical engineering can be defined as the design, production, operation and maintenance of machines and machinery (Collins Dictionary, 2018). Mechanical engineering profession has evolved over the years to the extent that it touches practically all aspects of human activities. Recent technological development has further widened the broadness of mechanical engineering from automotive, manufacturing and energy conversion to automation, robotics and artificial intelligence. Although mechanical engineering is often regarded as a male dominated profession; therefore women view it as an aberration to opt for such course of study in the higher institution. This assertion has been rejected and demystified long time ago in the developed world because enlightenment sensitization and other proactive measures have been used to convince young female school leavers on the benefits of engineering education. (ASME Newsletter, 2002)

The career prospect and the varieties of career options that mechanical engineering profession offers are too enticing to be dominated by one gender. The challenges and opportunities in engineering profession has been exploited to full advantage by women in the developed world where they compete on equal level with their male counterparts. The first female graduate engineer in the USA, Elizabeth Bragg, graduated from the University of California at Berkley in 1876 while Bertha Lamine graduated from Ohio State University in 1894 with a degree in mechanical engineering, whereas in Europe, Alice Perry became the first woman to graduate with a degree in engineering in 1906 from Queens

College, Galway (Society of Women Engineers, 2019). Although, it was recorded that Elizabeth Bragg never practiced engineering as she was a housewife. Furthermore, few female engineers were reported to have graduated with a degree in engineering in USA until after the First World War because most colleges did not accept women (SWE, 2019).

The achievement of female engineers in the developed world validates the early awareness in engineering profession and the Science, Technology, Engineering and Mathematics (STEM) initiative has been used to diminish the gender gap in engineering education. In the USA, 'Introduce a Girl to Engineering' campaign has been utilized by the American Society of Mechanical Engineers (ASME) to publicize the need to involve more women in engineering education and career, as well as to reach out to high schools with encouraging messages about science education and engineering careers (Legarsky, 2002). The campaign has resulted in considerable increase in enrolment of female students into mechanical engineering programme. In addition, the initiative such as 'For inspiration and Recognition of Science and Technology (FIRST) was employed by ASME to create awareness among high school students by forming teams with practicing engineers to built robots and awarding prizes for the best team (Bahner, 1996). These initiatives are meant to encourage young high school students, particularly the girl child, to opt for mechanical engineering as a career.

1.1 WOMEN AND ENGINEERING IN NIGERIA

The Association of Professional Women Engineers of Nigeria (APWEN), a division of the Nigerian Society of Engineers (NSE), was established in 1982 by some female engineers spearheaded by Engr. (Mrs) J. O. Maduka. The mandate of APWEN is to act as a catalyst for advancement of women in the engineering profession in Nigeria. In fulfilling the APWEN mission statement to continuously increase awareness of engineering education among girl child in Nigeria, the association is vigorously making efforts to increase the workforce of women engineers in Nigeria (Eterigho, 2018). Other attempts by APWEN to encourage and attract girl child into engineering profession are visits by APWEN members to primary and secondary schools for career talks, STEM competitions, establishment of graduate membership of APWEN in engineering institutions in the country and industrial visits by members to encourage engineering education among Nigerian girls.

The campaign to boost awareness on the derivable benefits of engineering education among girl child such as 'Invent it. Build it' initiative that was initiated in 2018 by APWEN is another bold step in the right direction. The awareness programme is to spread the message among school children, especially in the rural areas, by identifying a role model in the engineering profession that can promote the aims and objectives of APWEN. One major achievement of APWEN is the gradual increase of women in the membership of the Nigerian Society of Engineers in recent years. In addition, there has been sharp increase in the number of female enrolment into engineering programmes in Nigerian tertiary institutions which has positively impacted the profession and flaw the perception that engineering is a male dominated profession (Abdulqair, Shuaib-Babata, 2008).

The masculinity associated with engineering over the years is still very much apparent and it has underpinned the assertion that the profession is suitable for only male gender. Thus, women still formed small percentage of total enrolments in engineering departments in most of the tertiary institutions all over the world (Badekale, 2003). Although women constitute more than half the world population (50.6%), two-third of the world's work hours, yet two-third of the word's illiterate are women and the vast majority of the word poor are women (Abubakar, 2018). Therefore, it is glaring that more need to be done to improve the lots of women and one of way of enhancing and empowering women is by reducing the gap between male and female enrolment in mechanical engineering programmes and creating more awareness for engineering education in general.

2.0 METHODOLOGY

The paper employed descriptive research method and compared male and female enrolment into mechanical engineering departments in the Federal Polytechnic, Ilaro and University of Lagos. Three academic sessions were considered for both National Diploma (ND) and Higher National Diploma (HND) programmes in mechanical engineering from 2015/2016 to 2017/2018 in the Federal Polytechnic, Ilaro, while the data available for enrolment in 1995/1996 academic session in University of Lagos was considered. In addition, opinions from academic staff of mechanical engineering department and admission office were utilized to elicit information about the lopsidedness in the enrolment of male and female students into engineering courses in Nigeria tertiary institutions.

3.0 FINDINGS AND DISCUSSION

The findings from the student's enrolment into the department of mechanical engineering in the Federal Polytechnic, Ilaro revealed that just 2% of the students admitted in 2015/2016 and 2016/2017 academic sessions were female, while female constituted 3% in 2017/2018 for National Diploma (ND) programme. There was considerable improvement in the enrolment of female students in the Higher National Diploma (HND) programme. Female students constituted 20% in 2015/2016 and decline to 11% in 2016/2017 but slightly increased to 14% in 2017/2018 academic session. The trend did not change in the University of Lagos where 7% of the students admitted in 1995/1996 academic session were female. The data available is shown in table 1, 2, and 3 below, while the comparative bar charts are depicted in figure 1 and 2. The tables and the comparative bar charts illustrate the gross discrepancy in male and female enrolment into mechanical engineering programme in Nigeria higher institutions.

Table 1: National Diploma Enrolment (ND Programme)

Academic Session	Male Enrolment	Female Enrolment	Total Enrolment	Percentage Female	Whose Favour
2015/2016	41	1	42	2	Male
2016/2017	130 (Full Time & Part Time)	2	132	2	Male
2017/2018	30	1	31	3	Male

Table 2: Higher National Diploma Enrolment (HND Programme)

Academic Session	Male Enrolment	Female Enrolment	Total Enrolment	Percentage Female	Whose Favour
2015/2016	45	11	56	20	Male
2016/2017	59	7	66	11	Male
2017/2018	61	10	71	14	Male

Table 3: Enrolment in Mechanical Engineering Department, University of Lagos (1995/1996)
Source: Academic Planning Unit, University of Lagos (1996)

Year (Level)	Male Enrolment	Female Enrolment	Total Enrolment	Percentage Female
1	86	6	92	7
2	46	3	49	6

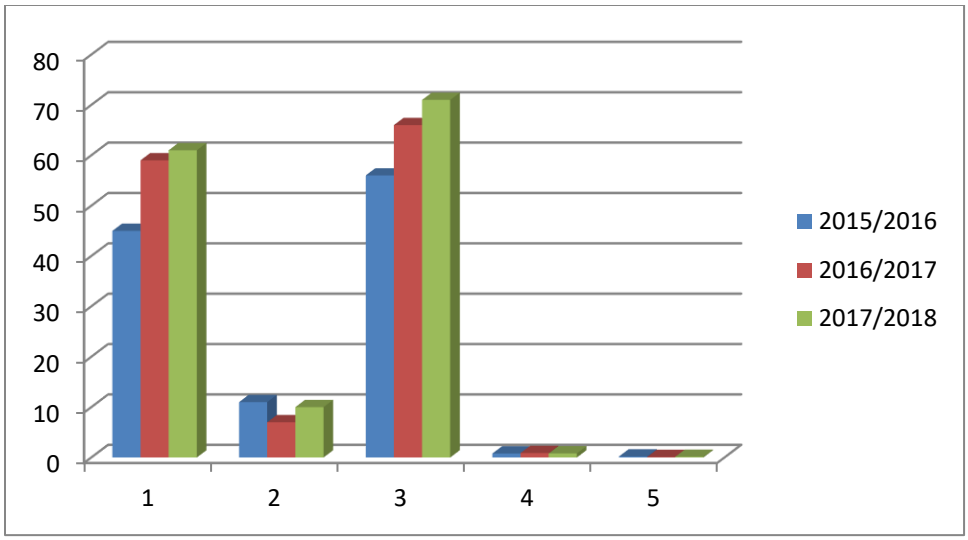

Figure 1: Comparative Bar Chart of ND Enrolment of Male and Female Students in Department of Mechanical Engineering, Federal Polytechnic, Ilaro (2015 to 2018)

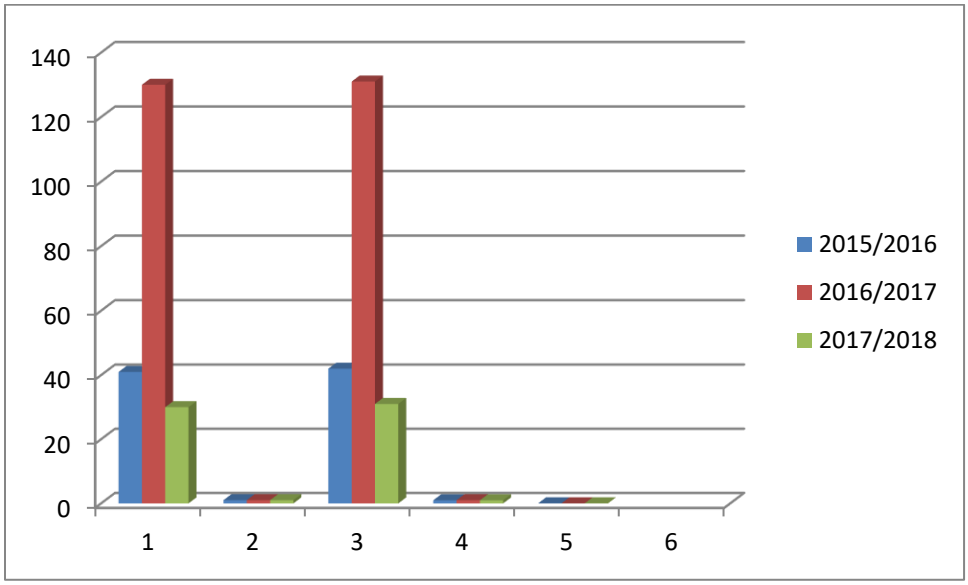

Figure 2: Comparative Bar Chart of HND Enrolment of Male and Female Students in Department of Mechanical Engineering, Federal Polytechnic, ilaro (2015 to 2018).

4 .0 CONCLUSSION AND RECOMMENDATIONS

It is obvious from all indications that the abysmal picture painted by this disparity started during the colonial years. However, the formation of the Association of Professional Women Engineers in Nigeria (APWEN) in 1982 open a new chapter in engineering profession among women in Nigeria, because APWEN has brought the issue into the front burner and lay bare the challenges impeding the growth of the profession as a career among women. Furthermore, efforts by international engineering associations such as the Society of Women Engineers (SWE), the American Society of Mechanical Engineers and the Nigerian Society of Engineers (NSE) has continue to yield positive result in abating the ugly trend in disparity. Other women association such as Women in Technical Education and Employment (WITED should also step up the campaign for more female participation in engineering activity.

WITED and other stakeholders in engineering education should strive to ensure that the female gender, as the true mother of the nation, remains a key player and partaker where critical decisions concerning women are to be

formulated. Additionally, APWEN should design a way of monitoring and enforcing every decision regarding engineering education in the country. This will go a long way in realizing the mission statement of APWEN to continuously increase the awareness that engineering is a career for girls, as well as promote the engineering profession in a positive force in enhancing the quality of life. Equally, APWEN and WITED should ensure that Nigerian women will form part of the generation that will raise future leaders in mechanical engineering profession. The following recommendations are imperatives in order to fast track the awareness of engineering profession among girl child:

- It has been observed that the stereotype surrounding engineering profession as a masculine profession can be reduced drastically if organizations such as SWE, APWEN and WITED can intensify their efforts to break the jinx associated with mathematics, science and engineering disciplines.
- The erroneous notion that mechanical engineering is dirty, stressful and incongruous with the traditional profession for women (e. g. teaching and nursing) should be discarded.
- Concerted effort should be made to involve more female engineering professionals in all activities of engineering associations.
- The balance between career and family life, which can pose serious problem in a marriage, can be managed if individual can prioritizing their daily activity.
- The long-established view that women belong to the kitchen should be expunge from anything that has to do with Nigerian women.
- Seminars and workshops by professional associations, successful engineers and engineering entrepreneurs should be encouraged to sensitize girl child in secondary schools and female students in higher institutions.

REFERENCES

Abdulqadir, B.L., Shuaib-Babata, Y. L. (2008) Excellent Performance of Female Engineers in a Masculine Dominated Profession. http:/www.researchgate.net/publication/260869007. Downloaded July 13, 2019

Abubakar, Oladeji (2018) Overcoming Gender Inequality for Sustainable Development in Nigeria. Journal of Educational Theory and Practice. Vol.7 (2).

Adeleke, M.R.A (1990). Women in Industrial Development in Nigeria. A Paper Presented at the National Seminar on Women in Management Organized by the Nigerian Institute of Management. Lagos. Nigeria.

Badekale, A. J. (2003) Women and Engineering in Nigeria: Towards Improved Policy Initiatives and Increased Female Participation. African Technology Policy Studies Network (ATPS). Nairobi. Kenya.

Bahner, B. (1996). Engineers and Students Learn from FIRST and Inspires Other. ASME NEWS. Newsletter of American Society of Mechanical Engineers. Vol. 5 (17).

Collins Dictionary (2018). Definition of Mechanical Engineering. Collins Online Dictionary and Thesaurus. www,collisdictionary.com/us/downloaded June 26, 2019

Eterigho, E. J (2018) APWEN Set to Increase Workforce of Women Engineers. Women Engineers. APWEN Official Newsletter. Vol.1. (6).

Legatski, M (2002). Introduce a Girl to Engineering Day. ASME NEWS. Newsletter of American Society of Mechanical Engineers. Vol.21. (2).

Society of Women Engineers (2019). History of Women Engineers. www.http://swe, org