GENDER AND THE ENGINEERING PROFESSION IN NIGERIA

DR. T. C. MADUEME
Dept. of Electrical Engineering
University of Nigeria, Nsukka

ABSTRACT

The Engineering profession is one in which a knowledge of mathematics and the natural Sciences gained by study, experience and practice is applied with right judgement to develop ways to utilize economically the materials and forces of nature for the benefit of mankind. Engineers are interested in working towards the solutions of practical problems. The Engineering profession is seen as one that not only demands knowledge but also physical strength. It is seen as a male dominated profession and most Engineering companies normally have a majority of male staff. The female staff where they exist in such firms are found in the clerical and non-engineering jobs such as messenger, typist, secretary or cleaner. For many years the engineering profession was regarded as a restricted area for women. However, this picture is changing in Nigeria although at a very slow rate.

In this paper, an attempt is made to examine the engineering profession in Nigeria. The gender bias in this profession are highlighted. Attitudes and inhibitions to would-be girl candidates of engineering courses at the tertiary level are evaluated. Strategies that would enhance female participation in the engineering profession are put forward.

1 INTRODUCTION

The influence of Science and Technology on the development efforts of mankind is very great. That is why engineering has been one of the fields that every nation has to ensure that its citizens are interested in. Any country that neglects engineering is bound to live in under-development in all aspects of modern life. In fact, engineering is seen as a creative profession for sustainable development. The position of engineers and engineering in any society is an indicator of how productive that society is. According to Umenyi [1] the status of engineering is synonymous with the status of economic development in the society. It is sad to note that in Nigeria with a population of 88.5 million by the 1991 census, the Nigerian Society of Engineers can only boast of a membership that is less than 20,000 engineers in 1997 [2]. With the present population of Nigeria put at over 100 million people in 1997 this gives a ratio of 2 engineers per 10,000 inhabitants. This is grossly inadequate if the goal of national development is to be achieved. This poor ratio in the engineering sector is due to severe shortages in the number of engineers produced from our universities. It can also be said that these shortages in manpower will exist in the technical products from polytechnics.

According to Agbeyisi [3] and Badekole [4] women constitute a very small part of the total output in these institutions of higher learning. Harding [5] had earlier discovered that only a small number of women relative to men, were working within science and technology. This under-representation of women in the engineering profession is not limited to the developing nations. In a study in Britain, Keil and Newton [6] observed that girls were offered less "powerful" subjects and eventually were less likely to enter skilled work. This was identified as due to the prevailing thinking about the domestic and occupational roles of women; in which women were expected to give higher priority to the domestic role. The recruitment of female technicians and engineers in the British engineering industry vividly highlights the male dominance in manual and skilled labour according to Keil and Newton [6].

For our purposes, we shall look at the Nigerian society and see if there is any relationship between gender and the engineering profession. Gender imbalance in this profession will be investigated. Some strategies that would lead to enhanced female participation in the engineering profession would be suggested.

1.1 FEMALE ENROLMENT IN ENGINEERING

The female enrolment pattern in the University of Nigeria, Nsukka, Faculty of Engineering for the 1996/97 academic session is shown in table 4.

Table 1: Student Enrolment in the Faculty of Engineering, University of Nigeria, Nsukka for the 1996/97 academic session.

Departments	2nd Year		3rd Year
4th Years	5th Year		
	Female	Male	Female
Male	Female	Male	Female
Male			

Agricultural Engineering	38
Civil Engineering	61
Electrical Engineering	77
	2
Electronic Engineering	1
Mechanical Engineering	2
2	
	7
2	
	0
6	11
6	24
1	29
26	
	55
48	
	41
40	2
49	1
91	3
2	
	11
0	
	0
2	16
12	20
4	52
17	
	67
24	
	67

It is very clear from Table 4 that female enrolment in engineering courses is indeed very unsatisfactory. It is therefore necessary to identify the causes of this gender imbalance and offer solutions that are to lead to a reversal of this trend. Are there socio-cultural factors that repel females from the study of engineering courses? Could it be as a result of the general economic malaise? How is the treatment of girls in class by teachers or lecturers? Are girls adequately prepared and motivated at the secondary school level to go into science and engineering courses at the tertiary level? Whitelegg [7] indicates that the situation is improving in India, where there are 31.4 per cent women in Science, 30.4 per cent in Medicine and a 4 per cent increase in women in Engineering between 1976 and 1987. There is the need to put in place some educational reforms that are gender sensitive so as to redress the enrolment of females in engineering in Nigerian universities.

2.0 BIAS OF FEMALE PARTICIPATION IN ENGINEERING

It is a known fact that in every part of the world, all fields of engineering are dominated by men. Men are expected to learn about machines, engines, tools and how things work while women are expected to think of sewing, knitting and cooking. Indeed, men have an "engineering world view" which emphasizes objectively, rationality, control of natural resources and industrialization. Girls and women ought not to be interested in technical things. They are expected to focus on clothes, people and home making.

Chodorow [8] and Benston [9] have reported that women are considered to be less rational, less capable of abstract and objective thought. According to Eboh [10] the major reasons why Nigeria women are less technologically inclined included among others:

- there are very few women in technology in order to motivate the younger ones.
- many females shy away from scientific and technological fields to other areas that are regarded as feminine.
- women have consciously or unconsciously seen science, technology and mathematics education as well as related fields as "man's field".
- lack of financial resources for women to upgrade themselves educationally.

Obi and Ali [11] note that there are women who are employed in "women's jobs" which are traditionally given to women in the developed countries. These jobs they say include domestic and secretarial work, cooking and sewing. According to Florman [12] some informal studies reveal that female engineering students are three times more likely to be interested in literature and other social issues than their male counterparts. Keller [13] argues that women have been met with the assumption that women are not good at maths'. She observes that in the United States, in the past, universities practised one form of sex discrimination or the other, such as not making sufficient residential places available to female applicants.'

There is gender gap in jobs. Fewer women than men in the engineering field are likely to get up to managerial levels and more women end up in less well-paid jobs. Hence unfavourable conditions would certainly discourage women from going in for the engineering occupation.

It is my considered view that a lot of bias on female participation in the engineering profession exist and can be enumerated as follows:

- Engineering is a scientific and technological profession which requires tough competition among the best brains in the society and should be reserved for men.
- Women who get into such fields as engineering are likely to be proud, unapproachable, dominating and cannot relate or interact with men who are less educated.
- Men think that women should be content with the training of children at home or at the school and should not venture into professional engineering fields.
- Women will not be capable to endure the strain and stress that may result in certain engineering jobs.
- Females are made to appear neat and pretty, soft and tender, and so do not have any business in professions where raw muscle power is necessary.
- Women will not be able to cope with the dangers and hazards in the engineering profession.
- Women are not as serious as men and female engineers may not be as productive as their male counterparts in industry.
- Women are often very fearful and highly emotional and may not last in the face of harsh environmental conditions that go with the engineering profession.
- Female participation in the engineering profession would adversely affect her fertility and health.
- Gender participation in engineering would increase the number of spinsters as some male suitors would be afraid to propose to female engineers.

3.0 THE ENGINEERING PROFESSION IN NIGERIA

This is the profession of the very talented few in the society. The engineering profession is one that uses natural resources for the overall good of the people. A President of the NSE has noted that people deserve engineering – in their health services, in water supply, road construction and maintenance, electricity, telecommunications, environmental maintenance, industry and transportation, agriculture, engineering to take them to their farms, engineering to help them till the soil, engineering to plant and harvest their products, engineering to market and sell them, engineering for one and engineering for all, [2]. There is no aspect of human living today that does not require engineering. The NSE President observed that any people who refuse to use engineering are condemned to a life of poverty, ignorance, perpetual backwardness and backbreaking labour. On a sad note it has been observed that the engineering profession in Nigeria has been bastardized. People who have no engineering training and do not belong to any engineering association use their connections to hunt for engineering contracts which they either sell to obtain a commission or they start to executive the job, only to abandon it after a while.

It is not uncommon today to find people who have no engineering training appointed to head many engineering and technologically based out fits in government ministries. This ought not to be so if we are to improve productivity and the general economic well-being of the nation. In the advanced nations of the world the engineering profession is one of the highly paid occupations. In Nigeria, however, the reverse is the case. The remuneration of an engineer in the public sector or in the private sector is very poor. Uujamhan [2] has identified several dilemma of the Nigerian engineer the greatest of which is the unhealthy engineer to engineer relationship between those in the public and private sectors.

The practice of engineering in Nigeria today is basically service oriented. Our engineers at best operate and service industrial machinery imported from abroad. After 37 years of independence, Nigeria is still depending on foreign equipment. It is true that there are some Nigerian firms based in Nnewi and Aba who are adopting the copy technology but the nation needs to design and manufacture basic machinery. Shonubi [14] recently observed that unless and until Nigerians begin to design and build a high proportion of the processing equipment and machines locally, she cannot break out of the vicious cycle of dependence on foreign manufactured goods and equipment. This will only be possible when the government comes all out to influence the engineering industry by de-emphasizing foreign supplies and construction materials. Government should ensure that only Nigerian engineering companies are awarded important contracts for engineering services unless if this is impossible or not feasible. Such an action will inject the needed boost and confidence to the engineering profession in the nation.

4.0 OPTIONS FOR MAIN STREAMING WOMEN IN THE ENGINEERING PROFESSION

From what had been said earlier, the engineering profession has been and is still dominated by men. Only a few women have dared to stick out their heads in the prestigious profession. There is no reason to think that this state of things will change in the future. There is urgent need now to encourage more females to participate in the glorious profession. The man and the woman are happier when they co-operate and work together. Time has come for men to drop any known or unknown bias against women and to accept them as partners in progress for humanity. Women have been contributing a lot to the national economy. Women have the intelligence and creativity to be part of the technological changes in their own generation. Women have a lot to contribute to engineering and the time has come to openly and sincerely give them the opportunity to contribute to the advancement of the profession. Gender equity in the engineering profession ought to be a goal in the not too distant future. This calls for understanding on the part of the men and hardwork on the part of the women. It is time for women to rise up to the challenge of being the best they can, even in the engineering profession. Who says women cannot be very good and respected engineers? It is my view that the following options are feasible and practicable for main streaming females in the engineering profession.

4.0.1 IMPROVED GIRL CHILD EDUCATION

In the developed world the girl child is sent to the nursery school at a very early age due to the fact that their mothers are working either in the public or private sectors of the economy. It is only in the urban centres of Nigeria that we find working parents sending their very young children to nursery schools. Most women in the rural areas do not send their children to such schools either due to poverty, illiteracy or lack of nursery school facilities where they live. If the females are to compete favourably with their male counterparts, the girl child must be given a good start right from her early years. Parents should be encouraged to send their children to approved nursery schools with science and engineering oriented toys and games. The girl child in this way is exposed to toys such as cars, trains, aeroplane and other battery-operated devices. House building kit toys can enhance imaginative thought of the girl child.

As a matter of urgency, government should

consider and approve the establishment of Bright Girls Schools at both the primary and secondary levels. These schools will be funded by the Federal Government in all respects and will be exclusively for girls. The curricula of such schools will be highly skewed in favour of mathematics, sciences, and introductory technology. Special entrance examinations will be required for admission into the Bright Girls Primary School (BGPS) and the Bright Girls Secondary School (BGSS). In this way only the best brains among girls will attend these schools which will be tuition free. If this programme for girls is implemented and sustained, it will not only result in closing the gender gap is science and engineering courses at the tertiary level but can lead to gender equality in these courses within the next few years.

4.0.2 CREATION OF ENHANCED PUBLIC IMAGE FOR THE FEMALE ENGINEER

There is the need for public awareness of the female engineer. The newspapers and media houses have a role to play here. Publicity should be given to the achievements of girls and women respectively in the technology field. The Radio and Television stations in the country can organise quizzes, essay competitions and other scientific and engineering oriented exhibitions where females would be allowed to participate, and those of them who excel are financially rewarded. Younger girls will be attracted to the engineering profession when they see women in the lime-light at engineering association meetings and conferences. The Nigerian Society of Engineers can also document and highlight women engineers who have excelled in the profession. A female President for the NSE in the not too distant future will definitely make for progress in the profession in Nigeria.

4.0.3. REDUCED TAX FOR ENGINEERING FIRMS

Tax reduction has been a good incentive for increased productivity for both service and manufacturing firms. It is a fact that most Nigerian firms prefer to employ male engineers than their female counterparts. In as much as government should not legislate on the ratio of male to female engineers in corporate firms, government can offer the carrot to companies that are willing to narrow the gender gap. It is hereby suggested that a special percentage tax reduction be offered to engineering firms who have a certain number of female engineers and/or technicians in their employment. Such incentives will definitely open the engineering labour market to the female engineers. This measure if adopted and implemented will prepare the road to gender equality in the engineering profession in the near future.

4.0.4 AWARD OF NATIONAL HONOURS TO BOTH FEMALE AND MALE ENGINEERS

Both the Government and the NSE should institute a national honour's award to highly respected, talented and deserving female and male engineers in Nigeria. Such national awards must carry a substantial financial benefit. If a sports man or woman who wins a medal in the Olympic games can be rewarded with cash amounts running up to a million naira or more, it is desirable that an intelligent engineer who has performed creditably over the years be rewarded with a national honour's award with a cash component that will be comparable to that of footballers and other sports personalities. The awards which could be annually or bi-annually will definitely be a strong motivation for not only the female engineers but also their male counterparts for improved performance in the profesion.

4.0.5 CHANGE OF NAME FOR SOME UNIVERSITIES OF TECHNOLOGY

There are about 4 Federal Universities of Technology in Nigeria, No harm will be done if the names of at least some of these universities are changed to bear a gender component. After all there are some Universities in the country named after some politicians, for example, Ahmadu Bello University, Zaria, Ado Bayero University, Kano, Obafemi Awolowo University, Ile-Ife and Nnamdi Azikiwe University, Awka. It seems to me that the names of female engineers can be projected for posterity if some of the Federal Universities of Technology are renamed after them.For instance, a Federal University of Technology can be renamed after the first female engineer in Nigeria; Olu Maduka University of Technology. This would certainly not be out of place to honour an illustrious, deserving and pioneering female engineer. It is suggested that if this is resisted, a way out is to established a new one with the correct female name to reduce the gender inequality in the names of some Nigerian Universities. This option is cost effective and should be given the appropriate consideration it deserves.

4.0.6 FEMALE ENGINEERING ACCESS PROGRAMME

Every Faculty of Engineering in Nigerian Universities should develop and run a female engineering access programme. This will be a short term programme that can take place during the time when the normal session has ended and the regular students are away. Young girls can enrol for the short term programme which will offer them opportunity to interact with engineers in an engineering environment. Simple courses with engineering and computer applications can be taught to the girls who should be allowed to practice what is taught on do-it –yourself ba-

sis. Such an interaction will go a long way to motive girls to study engineering at the University level.

4.0.7 INTRODUCTION OF QUOTA SYSTEM IN FAVOUR OF FEMALE ENGINEERS IN THE LABOUR MARKET

There is the need to assure female engineers of ready employment after graduation. A situation where there is sex discrimination against qualified female engineers will not attract young women to the profession. For a start the government should introduce a quota system in favour of female engineers in government ministries and parastatals. This policy should stipulate the minimum number of female engineers to be employed in the various ministries of Works, Mines and power, Agriculture, etc. This attitude will help to attract young women to the engineering profession. This sense of a secure job opportunity will motivate girls to take to engineering.

4.0.8 REVERSAL OF PUBLIC MISCONCEPTIONS ON ENGINEERING .

There should be an awareness programme aimed at enlightening the general public on the engineering profession. Such programmes can be done through seminars or workshops to which girls in secondary schools can be invited to attend. During such a forum the notion that engineering is good only for men should be corrected showing that both sexes can equally train to become good engineers. Accomplished female engineers should be invited to speak at such seminars and workshops.

4.0.9 AWARD OF GRANTS AND /OR SCHOLAR SHIPS TO FEMALE ENGINEERING STUDENTS.

A concerted effort should be made by government (Federal, State and Local), Corporate bodies, philantrophists and other foundations to institute grants and scholarships specifically for female students who wish to study any engineering course. Girls from poor homes who are brilliant could be attracted to the profession through this means.

5.0 CONCLUSION

An attempt has been made to discuss gender and the engineering profession in Nigeria. It has been found that there is a lot of misconceptions held by men on gender roles in engineering. The gender gap between boy's and girls' enrolments in engineering courses is still very wide in Nigeria. Adult literacy appears likely to remain a major problem especially for women in developing countries. Nine options for main streaming women in the engineering profession have been suggested. As these options are considered and implemented by the relevant agencies the road to gender equality in engineering will be built.' Men and women were created by God to be partners in both the family and the society. Genesis chapter 1 verse 27 says that God made them "male and female" and everything God made is said to be very good. Let us put in motion policies that will lead to gender balance in the engineering profession. It will be for the good of all.

REFERENCES

1. **Umenyi, A.S.R.** (1989) Growth and Development of Engineering and Technology in Nigeria: Problems and prospects. Paper presented to the Nigerian Society of Engineers, Enugu.

2. **Uujamhan, E.J.S.** (1996) Uujamhan speaks, The Nigerian Engineer, (34) I, 30-38

3. **Agbeyisi, R.U.** (1985) The Labour Market Implications of the Access of Women to Higher Education in Nigeria, In Women in Nigeria Today, London: Zed Books.

4. **Badekole, A.J.** (1991) Correlates of Job Performance Among Technical College Graduates in some Western States of Nigeria, Ph.D. Dissertation, University of Lagos.

5. **Harding, J.** (1980) Sex Differences in Performance in Science Examinations, In Deem, R. (ed) Schooling for Women's Work, London: Routledge & Kegan Paul.

6. **Keil, T. and P. Newton** (1980) Into Work Continuity and chance, In Deem, R.(ed) Schooling for Women's Work, London: Routledge & Kegan Paul.

7. **Whitelegg, L** (1992) Girls in Science Education: of fruit trees, in kirkup, G. and Keller, I.S. (eds) Inventing Women Science, technology and Gender, Polity Press in association with the Open University.

8. **Chodorow, N.** (1978) The Reproduction of Mothering: Psychoanalysis and the Sociology of Gender, Berkeley, CA, University of California Press.

9. **Benston, M.L.**, (1982) Feminism and the Cri tique of Scientific Method, In Moles, A. and Finn, G. (eds) Feminism in Canada, Montreal. Black Rose Books, 47 – 66.

10. **Eboh, B.C.** (1993) Socio-Cultural Barriers to

Effective Participation of Women in Nigeria's Technological Development. Journal of Technical Education Review, (4) 4, 50 – 58.

11. **Obi, C. and A. Ali** (1994) Affective work skills necessary for the success of women in managerial positions, International Journal of Women's Studies, (1) 1, 12 – 22.

12. **Florman, S.C.** (1984) Will women Engineers Make a Difference? Technological Review, (87) 8, 51 – 52.

13. **Keller, L.S.** (1992) Discovering and Doing: Science and Technology, an Introduction, In Kirkup, G. and Keller, L.S., (eds) Inventing Women Science, Technology and Gender, Polity Press in association with The Open University.

14. **Shonubi, F.A.** (1997) Sustainability, Professionalism and Engineering, The Nigerian Engineer, (35)I