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Enhancing Female Participation in Engineering and Technology

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ABSTRACT

This paper examines the important role of engineering and technology in National development and posited that it is too important to be gender stereotyped. The education of female child must start with solid foundation, be large enough to allow them to have open mind, acquiring of skills, creative and practically oriented enough to make them efficient in their job. Engineering and technologies are indeed available that can conserve natural resources, soils and reduce pollution. Female participation in Engineering and technology will ensure an equitable, safer, more prosperous and environmentally friendly world.

Keywords:. Females, Engineering, Participation, Technology, National Developmet

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1. INTRODUCTION

National development is the process of nation building which brings about national unity and enhances the quality of the people who live in it. The place of females participation in engineering and technology in the life of any nation is unavoidably linked with the pace of development in the nation. Females Participation in Engineering and technology can be used as reliable indices of the potentials of national development. It is in recognition of the FPET that developed nations devote a good part of the resources of finances to develop these areas.

Females play very important role in national development. The role relates to a complete range of socio-economic activities. They (females) are not only users of basic services, bearers and socializes of children and keepers of the home they also tapped. Records (STAM, 92), have shown that females form half the population of this country, with these the development of this country cannot be realized if half the people (females) are left behind. When the participation for females in engineering and technology fall behind that of men there are more dangers to the females and the society, for it leads to inequality between males and females. This situation makes females take less part in decision making in their families and the societies. Not only does the failure to include them in the process of development run counter to the spirit of development, it invariably hinders the process itself.

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Undoubtedly, the participation of women in development is very vital because development will proceed most rapidly only if all the people are provided with the means to participate fully in the development process. Having discovered the role of females in Engineering and technology in nation building, the developed countries have made concerted efforts to encourage females in engineering and technology programme. But alas, in Nigeria very little is happening in this direction. There are no substantial reports on the status of female participation in engineering and technology. Recent works by some researchers indicate that the phenomenon exists but have not received appropriate attention (Alele, 87 and Erinosho, 94).

1.1 Meaning of Engineering

There is no doubt that engineering is one of the oldest and foremost profession. There are several definitions of engineering coming from various individuals and engineering professional bodies all over the world. The major objective of engineering according to Adeboye et al., (1995) is to utilize the available resources of nature to restore the dignity of man by improving the comfort, time lines of operation and removing drudgery usually with the performance of labour intensive, time consuming activities of mankind. It is therefore, the sum total of all nations we take to put technology to work. Encyclopedia Britannica has also defined engineering "as a professional art of applying science to the optimum conversion of the resources of nature to the use of mankind.

Engineering is the application of science, technology, art and economics to the definition and solution of real socio-economic and ecological problems. This is why one of the most comprehensive descriptions of the engineering profession is the one that describes it as the profession in which the knowledge of physical, natural, biological and management sciences, humanities and arts gained through studying experiences are applied with good judgment to develop ways of utilizing economically the materials and forces of nature for benefit of mankind Oluka et al., (1999).

All these definition shows that engineering is a profession or art that utilizes the knowledge of science in the optimum design and construction of physical systems and services such as machines, devices, structures, buildings e.t.c from the available natural resources and the maintenance of these infrastructures. Because the needs or problems of man are diverse, the application of knowledge to solve the problems could involve conception, design, development, manufacture, selection, testing, adoption, operation, maintenance which are aimed principally for improving the infrastructure, technological, economic and complete mechanization of the activities of man. The professionals who practices engineering are called engineers.

1.2 Meaning of Technology

The word technology originated from the Greek word “technique” meaning art or skill and “logia” which means science or study. This means that technology is the practical use of knowledge since the origin of man he has been discovering his environment and trying to use some techniques or knowledge to solve the problems facing him. For example, the early man discovered that there are a lot of an animal surrounding him and he has to device a means of killing them for food. After some times he also realized that he is not satisfied with eating raw meat as food and he has to invent or discover fire for cooking or roasting the meat.

Technology in its simplest form can therefore be defined as the technique of doing thing or as methods by which man solve the problem in his environment. However, the word Technology "means different thing to different scholars depending on their circumstance or areas of specialization. Spier (1968) claimed "technology embraces the means by which men controls or modifies his natural environment" Toffler (1970) believes that technology is "that great growing engine of change". Lenski et al (1974) defines technology as the information techniques and tools with which people utilize the material resources of their environment to satisfy their various needs and desires".

Pytlik et al., (1985), which state "technology is a study of the technical means under taken in all cultures which involves the systematic application of organized knowledge and tangibles (tools and materials) for the extension of human facilities that are restricted as a result of evolutionary process". From all these definition, it is very clear that technology is the body of organized knowledge, tools and materials used by man to manipulate his environment to satisfy his basic need. Nearly every form of wealth creation requires technology and its associated research and development programmes. Wealth can be created faster by technology. Technology by itself cannot achieve practical goals, it is only when is matched by an appropriate engineering background that useful practical goals and services are produced (Duka et al., 1999).

1.3 Engineering And Technology Graduates

The graduates is this field should be adequately prepared to practice it, since they are well taught in the various institutions before they are mobilize for National Youth service corpse (NYSC). Therefore, school must offer accredited engineering and technological programmes. The quality of the students, faculty, facilities as well as curriculum are assessed by the appropriate evaluation team e.g. the NBTE (National Board for Technical Education) to ensure compliance with set standards in order to meet specified goals.

Basically, the curriculum includes:-

a General engineering and technology education courses
b. Mathematics and basic sciences, and
c. Engineering science and design

The curriculum must incorporate a major design experience that employs realistic constraints from the following lists: economic, environmental, sustainability. Manufacturability, ethical, health/safety, social and political.

1.4 Expectations As An Engineering Graduate

A graduate of engineering should have acquired the following skills.

a. Ability to apply knowledge of mathematics, science and engineering economics.
b. Ability to design and conduct experiments, as well as to analyze and interpret data.
c. Ability to design a system, component or process to meet desired needs.
d. Ability to function on multidisciplinary teams.
e. Ability to identify, formulate and solve engineering problems.
f. An understanding of professional and ethical responsibility.
g. Ability to communicate effectively.

h. The broad education necessary to understand the impact of engineering and technological solution in a global societal context.
i. A recognition of the need for, and an ability to engage in life-long learning.
j. A knowledge of contemporary issues.
k. An ability to use techniques, skills and modern engineering tools necessary for engineering practice.

2. STRATEGIES FOR ENHANCING THE SUCCESS OF FEMALE PARTICIPATION IN ENGINEERING AND TECHNOLOGY

1. Adequate funding

The success of every programme largely depends on funding. If the fund provided for the mobilization of this programme (female participation in engineering and technology) is grossly inadequate. Then, it will be totally difficult to implement the programme successfully. Education is expensive (FRN, 2004) states that education requires adequate financial provision from all tiers of government for successful implementation of the educational programmes. The fund provided will be use for buying and maintaining facilities, as well as providing quality staff for instruction.

2. Evaluation of learning process

Evaluation is a powerful instrument for improving learning process in the school system. Hence the human and material resources involved in any educational programme calls for effective monitoring and evaluation exercise. There is need to monitor and evaluate each stage of the implementation process of any educational programme so as to ensure that the project is being implemented according to plan. Evaluation should be seen as a central focus around which the wheel of education activities revolves.

3. Provision of infrastructure, facilities and equipments.

There are very few schools in Nigeria that would genuinely claim adequate provision of facilities for teaching and learning processes. Often times, teaching materials arc neither sufficient nor adequate in the schools. It is worth mentioning that, the greatest handicap to the improvement of teaching in any programme is lack of facilities. Such facilities include chairs, blackboards, tables, staff room, laboratory, libraries, equipments for carrying out practical's, technology textbooks etc. At present it is not a surprise to see schools with dilapidated physical building, out-dated libraries ill-equipped laboratories and dilapidated class room environments among others.

4. Recruitment of trained Teachers/Instructors/Lecturers

The successful implementation of Engineering and technological programme would require the recruitment of qualified teachers Okeke, (2004) argued that "the status of teaching profession is enhanced by the possession of high minimum academic and professional entry qualification". Thus, the quality of teachers recruited determines the quality of the educational system.

3. CAUSES OF LOW PARTICIPATION

Researchers have shown that women participation in engineering and technology is low compared to men, Okcke (2004). This can be attributed to a number of factors among which are:

Masculine Subject Versus Femine Subjects

In the past and at present it was wrongly assumed that science is a masculine subject and should be studied by boys (male) while females were to do liberal arts and humanities. Because of this males were encouraged to do science both in the home and school. They were allowed to climb trees, chase insects, play with mechanical toys, build models and make kits. These are science traits. Female were not allowed to engage in risk-prone activities, rather they were engaged in cooking, taking care of the house and going to farms because they will soon get married. The majority of earlier females secondary schools in Nigeria did not offered hygiene, home management or domestic science. Males also offer a wide range of science and technical courses. Female science teachers were very few and this may deny girls the benefit of exposure to appropriate examples and role models.

Socio-Cultural Factors

There are certain cultural and religious practices which adversely affect the access or out rightly prevent females from obtaining formal education. This automatically eliminates the feminine gender from the chances of studying engineering and technology at schools. The practices reflect the second-class status traditionally ascribed to female. In line with this a assertion, Okeke (2004) opined that marriage customs of many Nigeria communities reduce the chance of females having access to western education which invariably causes low participation of female in engineering and technology. In Yoruba custom a baby girl could be betrothed at birth, Ibo custom permits a little girl in the primary school to be given to her future husband and in the Hausa custom, girls are given away in marriage at a very tender age. Allele Williams (1987) asserted that men contribute to female rate of participation in engineering and technology programme. Same men frown at female pursing careers in engineering and technology even some times refusing to marry them out right. Male teachers often discourage female in the class room from taking engineering and technological courses by actively and openly saying that engineering and technology is not meant for female. All these negative tendencies to lead low rate participation of females in the field.

3.1 Concession To Female

Records have revealed the low participation rate of female in the physical and other science in schools and this calls for their encouragement in these areas, Stam (1992). To encourage them and to move to towards equity between male and female in engineering and technology, concession should be given to female. The concession to be considered should be such that would increase their number in engineering and technology in particular. Such concession have been the target of government at least in the last decade or so. They take the form of free education and special science schools for females.

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In promoting engineering and technology among female in Nigeria, the blue print on female education recommends that:

a) Pre-service and in-service training of female teachers should be encouraged
b) Government should make effort to ensure that the newly prescribed education programmes based on the NPE (1981) with reference to engineering and technology be implemented at all schools level.
c) Scholarships should be provided for female who show great potential for the discipline of engineering and technology.
d) At secondary schools level, female should be encouraged to offer science courses during career guidance and counseling.
e) There should be mass literacy campaign specifically oriented towards female participation in engineering and technology.

4. ROLE OF NONE GOVERNMENTAL ORGANIZATION (NGOS) AND WOMEN ORGANIZATION

Engineering and technology is too important in national development to be gender sterecotyped. To fore stall this undesirable situation women should stand up for the ideals by helping to dismantle some age long myths built on false hood rather than biological innate qualities. To do this, it is essential that relevant non-governmental bodies formed to promote engineering and technology among females in Nigerian. A few of such bodies are already in existence, these arc:

a) Nigeria association of woman societies (NAWS)
b) Nigeria association of woman in societies, engineering Technology (NAWSTEM)
c) Forum of Africa woman education (FAWE) the role of these association include among others:

1) To set up endowment to give scholarship to female pursing courses in engineering and technology up to university level.
2) To organize formal workshops from time to time. During such meeting, rural children could be taught engineering and technology related to rural environment.
3) To promote engineering and technology programme among female that can give meaning to the NPE which recognizes equal opportunity for all regardless of sex.

These are laudable goal which many of the women NGOs are unable to single handedly pursue with the limited resource available to them. It is expected that government and relevant governmental agencies and parastatals, international (donor) agencies and women umbrella organization would come to the aid of the women in engineering and technology. The National Agency for Science and Engineering Infrastructure (NASENI) has expressed commitment to encourage more female participation in Nigeria's engineering sector. Its Executive Vice Chairman (EVC), Khalil Halilu, said this on Friday at the launch of Developing Engineering Leaders Through Her (DELT-Her), in Abuja. Halilu described the initiative as an opportunity platform through which girls and young women could pitch and present their exciting and ground breaking ideas for funding. He disclosed that the agency would fund the project through its Presidential Implementation Committee on Technology Transfer (PICTT).

"What we seek to do is to close the gender gap in engineering, inspire the next generation, provide financial support for new ideas and projects, as well as strengthen the entire engineering ecosystem." He noted that global average for female representation in engineering was 28 per cent, which was very little. "In Nigeria, it's only five per cent, only one in 20 Nigerian engineers is a woman. "It is this imbalance that DELT-Her seeks to correct, by focusing attention and funding on young women. "Very importantly, creating and cultivating public awareness around the need to train and mentor more women, " he said. Halilu said that through DELT-Her, the agency intended to double the number of female engineers in Nigeria over the next five years. According to him, NASENI will contribute to the economic growth and development of Nigeria through job creation and technical skills development.

In his remarks, Dr Muhammad Dahiru, Chairman, Presidential Implementation Committee on Technology Transfer (PICTT), said the initiative was a call for proposals towards the implementation of DELT-Her initiative. "It is no coincidence that the launch is scheduled to be held on the anniversary celebration of the International Women's Day. "It is to underscore the esteem attributed to the contributions of women as well as their potentials in our society," Dahiru said. He said that the committee threw its weight of support behind women through the DELT-Her project. He said that the project focused on encouraging more female participation in Nigeria's engineering sector. Dahiru noted statistics revealed the dire need for deliberate actions to be targeted at the existing gender imbalance in the engineering sector, to inspire inclusion while contributing to the nation's GDP. He maintained that the committee through NASENI's support, was determined to fund innovative and commercially viable ideas in engineering and technology proposals by women.

He said to actualise the birth of multiple start-up companies from ideas selected under the project, each successful applicant would be matched with female mentors who are industry giants both in engineering and business. According to him, the submission portal for proposals will go live from March 9 and proposals will be accepted till May 20, when submissions close. Also, Mrs. Margaret Oguntola, President, Nigerian Society of Engineers (NSE), said the initiative was a pivotal moment in the collective efforts to foster gender inclusion and empower women in the field of engineering. She said women remained significantly under-represented in the engineering workforce, facing barriers and challenges that hindered their full participation and advancement in the field. Similarly, the Chairman, Senate Committee on NASENI, Sen. Ezenwa Onyewuchi, lauded the project as lofty and germane. "We must ensure cultural balance that women take their rightful places in the area of science and technology (Salisu, 2024).

5. THE WAY FORWARD

Certain remedies in form of government policy formulation and programme implementation, NGOs intervention and woman organization participation are most desirable at this stage of our national development. Engineering and technology is highly connected with the pace of development of nation. It is used as reliable indices of the potential for development (Alele Williams, 87). Participation of woman in national development is very important, for development will proceed rapidly if all the nation human resources are tapped in the development process.

Government through her legal instrument should not only provide for equal rights but should create conducive environment that provides for equal possibilities of choice for male and female as regards occupation and way of life.

6. CONCLUSION

The empowerment of female in Nigeria through engineering and technology program can be premised on several well reasoned arguments. That education particularly in Engineering and technology is seen as the best antidote to superstitions, taboos and ignorance that are more prevalent among females in Nigeria (Alele Williams, 87). The minds of the citizen are free from shackle of ignorance through science programmes. The unenlightened mind is thus able to contribute more meaningfully to self and national development. Secondly, the Nigeria female is traditionally relegated to the background relative to the male in socio-political and economic affairs. This phenomenon was ascribed to societal role expectation. This role expectation derives from a long history of deprivation of females from school and the resultant illiteracy level in engineering and technology. The illiterate females is assumed to lack mental aptitude, knowledge and skills to participate meaningfully in discussions and decision making, hence the relegation to the back ground/engineering and technology therefore, would empower female to assume their rightful place in the society and ensure their emancipation.

Lastly, this argument links the education of female in Engineering and technology with later age of marriage, lower infant and child mortality, improve family health and better nutrition for the children and family at large. On the whole, engineering and technology makes female better mothers for they are able to appreciate the importance of pro-natal and new neo natal care. A mother empowerment through engineering and technology programmes and numeracy skills enhances her social status and income earning potentials in the society.

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