



# Women In Technology: Innovation And Empowerment Through Mathematical Knowledge And Skills In Nigeria

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## ABSTRACT

For any Country or Nation to develop meaningfully, the citizens of such a country need to be adequately educated more especially women. Education enables women to improve their social, cultural and Economic development. Educated women are capable of bringing socio-economic changes, development and prosperity. Women should acquire relevant mathematics knowledge and skills through sound Education that would gear meaningful development in the country. The paper discussed the concept of mathematics, Women in technology, innovation and empowerment, mathematical knowledge and skills needed. Challenges, and possible solutions of women education to the development of the Nigerian nation are highlighted. Conclusion and Recommendations were also made out of which Mathematics curriculum should be re-structured so as to allow for the inclusion of vocational and technical applications for grooming students mostly women with the necessary skills, to tackle the problem of technology in the country for National Development through women empowerment on technology.

**Keywords:** Mathematics, Women in Technology, Innovation and Empowerment, Mathematical Knowledge and Skills.

## INTRODUCTION

Mathematics the world over plays a pivotal role in student lives including girl child who later became full woman, it is a bridge to science, technology and engineering in any formal educational system including that of Nigeria. The development of any country depends on women level of education in technology. Mathematics as a subject has been made a core such that all students regardless of discipline, gender or ability most pass it at credit level especially in secondary schools; National policy on Education(FRN, 2013). Mathematics is a body of knowledge that is essential for achievement in any endeavor of man (Anaduaka& Okafor, 2013). The world today is witnessing a rapid growth in the development of science and technology with the advent of computer and other information and communication technology. It is believed that hardly can a country survive the pressure of the recent information and communication technology popularly known as IT without mathematics (Azuka, 2014). A recent study conducted by Belhu (2017) confirmed that a mathematics subject is a foundation for Science, Engineering, and Technological studies. Mathematics skills and competence are critical determinants for post-school and career options available to the young generation (Kurniawan et al. 2020).

"Women in technology" refers to the involvement, contributions, and representation of women in the field of technology. This includes various areas such as software development, engineering, data science, artificial intelligence, cybersecurity, and other tech-related professions. Women in technology are often recognized for their work in breaking barriers, innovating, and driving advancements within the tech industry, which has historically been male-dominated. There is need to make more sound mathematical knowledge and skills right from the grass root education, efforts to increase the participation and visibility of women in tech careers, such as promoting gender diversity, addressing disparities in representation, and tackling challenges like the gender pay gap and unconscious bias. Increasing the presence of women in technology is not only a matter of equity but also enhances innovation and creativity, as diverse teams bring varied perspectives and solutions. Mathematical knowledge and skills are crucial for the scientific and technological development and economic success of societies, for world countries (Russo 2020).

This is because mathematics skills are very widely essential in understanding other disciplines including social sciences, engineering, sciences, arts, and outspread to all areas of science, technology as well as business enterprises and hence mathematics has been became a key in all sciences (Rogers 2017) . Poor mathematical skills in students depressed them from a large number of professions because mathematical background knowledge is the pre requisite for entrance in any profession (Hwang 2021). Those with low mathematics abilities are likely to have a more negative attitude towards mathematics and will not have the tendency to amend their mathematics skill.

Over the last decades, an extensive body of research from different settings and contexts have investigated variables that influence students' attitude towards Science, Technology Engineering and, Mathematics (STEM) (e.g., Aiken, 1970; Gardner, 1975; Kempa and McGough, 1977).

Women Empowerment and Technology Innovation in Nigeria is an increasingly important topic as it intersects with gender equality, economic growth, and technological advancement in the country. Technology innovation in Nigeria, combined with efforts to empower women, presents a pathway for enhancing their roles in the workforce, entrepreneurship, and society at large.

### **Women Empowerment and Technology Innovation in Nigeria**

Access to Technology Education for women. One of the main challenges for women in Nigeria is limited access to quality education and training in technology-related fields. However, there has been an increasing focus on bridging this gap through:

**Digital Literacy Programs:** Initiatives like Girls Who Code Nigeria and other coding boot camps are designed to increase the participation of young women in software development, digital marketing, and other technology-driven sectors.

**STEM Education for Girls:** Programs targeting young girls to pursue Science, Technology, Engineering, and Mathematics (STEM) education have grown in recent years, as part of efforts to increase female representation in tech fields.

**Online Platforms for Learning:** With the growth of online learning platforms, many Nigerian women can now access free or affordable resources to improve their tech skills, such as coding, web development, or artificial intelligence.

#### **❖ Tech Entrepreneurship and Innovation**

Technology is a major driver of entrepreneurship, and Nigerian women are increasingly leveraging this to build successful businesses:

**Women-led Startups:** More Nigerian women are launching tech startups, especially in sectors such as fintech, healthtech, edtech, and agritech. These businesses are not only empowering women but also contributing to Nigeria's broader economic development.

**Networking and Mentorship Programs:** Organizations like She Leads Africa, Women in Tech Nigeria, and The African Women in Technology Conference provide mentorship, funding, and networking opportunities for women entrepreneurs in the tech space. These platforms encourage women to scale their businesses and connect with investors.

**Innovative Solutions:** Nigerian women in tech are using technology to solve local challenges, such as developing apps for healthcare access, mobile payment solutions, or platforms to support local farmers.

❖ **Government and Policy Initiatives**

The Nigerian government and various international organizations are taking steps to empower women through technology:

**National Policy on Gender and Technology:** The Nigerian government has made efforts to improve gender parity in the tech sector through policies and initiatives that encourage female participation in technology.

**Digital Inclusion Programs:** There are programs aimed at providing affordable internet access, digital training, and tools for Nigerian women, particularly in rural areas, to bridge the digital divide.

**The National Information Technology Development Agency (NITDA):** NITDA has programs to support women in tech, including training and funding opportunities for women-led technology startups.

❖ **Empowering Women through Technology**

**Digital Platforms for Social Change:** Many Nigerian women use digital platforms to advocate for gender equality, social justice, and political representation. Social media has become a tool for activism, with women using it to organize protests, raise awareness, and demand policy changes.

**Tech-Based Solutions for Women's Health:** Technology is also being used to empower women in areas such as reproductive health, family planning, and maternal care. For example, healthtech startups founded by Nigerian women are using mobile apps to provide medical advice, schedule appointments, and track pregnancies.

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### **Impact of Women Empowerment and Technology Innovation on Nigeria**

**Economic Growth:** By increasing women's participation in the tech industry, Nigeria can accelerate its economic growth. Female entrepreneurs and workers in technology contribute to job creation, innovation, and the development of the digital economy.

**Gender Equality:** Technology has the potential to level the playing field for women, providing them with tools to build their careers, create businesses, and increase their social and political influence.

**Social Development:** Empowering women with technology skills also helps address societal issues like health disparities, education gaps, and poverty by creating tech solutions that benefit communities.

### **Mathematical Skills**

Mathematics and Mathematical Skills occupies a crucial and unique role in the human societies and represents a strategic key in the development of the whole mankind. Thus, Mathematical Skills plays important role in making the living standard high and providing new technological techniques for national development.

#### **Basic Skills in Mathematics**

According to the National Council of Teachers of Mathematics (NCTM) (2011), basic skills of mathematics must not be limited to routine computation at the expense of understanding, application and problem solving. The Council reiterated that the identification of basic skills in mathematics is a dynamic process and should be continually updated to reflect new and changing needs. According to Odili (1986), Harvey (2008) and National Council of Teachers of Mathematics, (2011), ten basic skills areas were developed by National Council of Mathematics Supervisors (NCMS). These are:

**Problem solving:** The principal reason for studying mathematics; posing questions, analyzing, translating and illustrating results, drawing diagrams, using trials and error, applying rules of logic, recognizing relevant facts and subjecting conclusion to scrutiny.

**Apply-mathematics to everyday situation:** Inter-related with all computational activities. Use everyday situations, translate them into mathematics expressions, solve and interpret results in the light of initial situation.

**Alertness to reasonableness of result:** Due to the arithmetic errors or other mistakes, results Of mathematical work is sometimes wrong. Students should learn to inspect all results and to check for reasonableness in terms of the original problem. As a result calculating devices in society makes this skill essential.

**Estimation and approximation:** To estimate means to find something close to the correct answer. In other words you are approximating. It is a technique for estimating quantity, length, distance, weight, etc; in various circumstances both in mathematics and in real life to know when result is précised enough for purpose at hand. Example if 2.5 children nobody can have half a kid .we can estimate this to three children.

**Appreciate computational skills:** Addition, subtraction, multiplication and division with the whole numbers, decimals and simple fractions; complicated computations will usually be done with a calculator. Knowledge of simple digit number facts and mental arithmetic; use of percent should be developed and maintained.

**Geometry:** This is the concepts of points, line plane, parallel, perpendicular, basic properties of simple geometric figure with emphasis on measurement on problem solving; recognize similarities and differences among objects.

**Measurement:** minimally; measure distance, weight, time capacity, temperature and angles; calculate simple areas, volumes; use both metric and customary system with appropriate tools.

**Reading, interpreting and constructing tables, charts and graphs:** Considering information into manageable/meaningful terms and use conclusion with simple tables, maps, charts and graphs.

**Using mathematics to predict:** Elementary notions of probability to determine likelihood of future events and identify immediate past experience that does not affect the likelihood of future events: use mathematics to help make predictions.

**Computer literacy:** As the knowledge and ability to use computers and related technology efficiently with skills. Understanding what computer can/cannot do. They might also involve more complex task like connecting machines to network and also efficiently use computer programs and applications.

### **CONCLUSION**

Mathematics is regarded as the language of science and science leads to technology. With the current increase in scientific knowledge the world over, demand more and more technology especially for women to empower them through innovations and mathematical skills. The empowerment of women through technology innovation in Nigeria is a key factor in driving economic growth and gender equality in the country. By improving access to education, funding, and mentorship, and by supporting women-led tech initiatives, Nigeria can unlock the full potential of its female population and create a more inclusive and innovative tech ecosystem. While there are challenges, the ongoing efforts to promote women in technology are laying the foundation for a more equitable and prosperous future for Nigeria.

As such women should acquire sound, relevant knowledge of mathematics and skills for attainment of technology and empowerment that would gear meaningful development in the country.

### **RECOMMENDATIONS**

- .1 There should be effective and functional mathematics education at all levels so as to transform skills realized for mathematics to develop nationally women inclusive.
- 2 Mathematics curriculum should be re-structured so as to allow for the inclusion of vocational and technical applications for grooming students mostly women with the necessary skills, to tackle the problem of technology in the country.
3. Use of immediate environment should be a mandate in schools to encourage creativity using the available resources around which will be part of technology.
4. There should be more women empowerment by government and non-governmental organizations with collaborations to uplift their wellbeing in terms of education, health and ICT.

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