Gender Issues, Mathematics Related Disciplines and National Development

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Abstract
Gender is a sensitive issue in many societies. It is not uncommon to hear about gender discrimination among people of every work of life which is equally found being practiced in many religious organizations. It is generally believed that men and women are not equal when it comes to physical strength and intelligence, whereas, there is hardly any labour force where both men and women are not found making their contributions to the society. Both men and women are essential in building the nation at every work place through their existence, intellects, skills, talents and efforts. This paper therefore discusses Gender Issues in terms of Gender disparities in the light of cultural beliefs, religion, vocations and general outlooks. It also focuses on the implications of gender on work force and National Development. Suggestions were given on how to encourage women to contribute their quota to National Development in order to make the nation a better place.

Keywords: Gender, mathematics discipline, national development

Introduction

Gender is a generally accepted grouping of differentiating men from women, boys from girls, male from female based on attributes exhibited by the two main sexes. Many societies view the female gender as weak, non-aggressive and patience which is directly opposite to their male counterparts. Gender is a natural and physiological characteristic that differentiate a male from a female based on the distinct roles exhibited by each sex (Adeniji, 2018). Hornby (2010) defined gender as the fact of being male or female. This socio-cultural concept seeks to create social identity for male and female in terms of roles played by them. In some communities, it is a taboo to give females a voice simply because it is assumed that females are less intelligent and cannot contribute reasonably, sensibly and responsibly to such communities. Things are however different now compared with the past when women have come to be accepted as role models especially at the family unit and from them many great people, both male and female, have been birthed and nurtured

to be responsible individuals in the society (Fasina, 2017). Looking at the global societies today, it is natural to say that it is an understatement to assume that females cannot make any reasonable contributions to the development of the society.

Considering the rate at which the world is changing, women's roles in all spheres of life cannot be swept under the carpet easily, since the gender of a person does not dictate one's performance on a job and one cannot accurately predict whether employing a male worker would actually yield more productivity at work than having a female worker on that same job. In any case, everyone employed must work with the use of a skill in mathematics of one form or the other to get the job done. Gender stereotype is a major factor that constitutes disparities to women placement at work. It is interesting to note that the population of women out numbers that of the men in many societies. According to UN statistics as at June 2019, when this paper was being compiled, the population of Nigeria was 200,962,417 (200,484,853) which is equivalent to 2.60% of the total world population of 7,714,576,923 (Worldometers, 2019). The ratio of working ages of Nigerian population who are economically active between 15 years to 64 years old of women to men is about 4 to 6 which indicates gender imbalance and deprivation on women of their rights to contribute their quota to national development. This was also highlighted in Onyejeli (2010) that Nigeria is one of the countries that exhibit high levels of gender inequality with the lowest rates of unemployed women of about 67% of women being employed compared with about 99.2% of men who are gainfully employed.

Why Gender Disparities in Mathematics Related Disciplines?
Many factors contribute to the disparity of women in mathematics related disciplines. Some of these factors are hereby discussed:

Culture: Some cultures do not approve women to be in the position of prominence nor taking major roles in the society. Also, there are cultures where jobs are categorized based on gender or sex and as a result, some jobs that are mathematics related are meant for men and not for women to practice. This is common in some cultural practices in Nigeria due to reasons that are not tenable to the civilized societies. In the same vein, girl-child in many homes in the past were not opportune to enjoy formal education simply because their fathers believed that whatever training they acquired would be benefited to another man when they get married.

Religion: Religious practices in some societies forbid women to practice or do jobs that are dominated by men. Some even go to the extent of not allowing their women to work in other establishment outside the home talk less of working where men work. Some of these practices are common in the Northern part of Nigeria as well as in societies where they upheld religious practices in high esteem above other concerns.

Child bearing: It is generally believed that the most productive stage of women life is equally their active stage in terms of work life productivity. Most societies expect women

to be in charge of home keeps and children raising and in so doing it is assumed that women would not be able to combine their roles in the home with career. This is a general notion which is equally applicable to the field that is dominated by the male gender.

Non Aggressive nature of women: Women are generally less aggressive and are not able to take risk like their male counterparts. This is a factor which could make women to dodge disciplines that are mathematics inclined and the related jobs in line with it and in so doing, many women go for less strenuous jobs other than those that are mathematically tasking.

Inability to withstand stress: Women are naturally not as strong as the men especially from their reproductive ages all through life. Example is when women are experiencing their usual cycle of which many of them could be experiencing health challenges on monthly basis. This could account for why many women prefer jobs that will not expose their weaknesses to easier ones other than the mathematics inclined jobs since there is no room for gender indication when it comes to job performance.

Psychological mismatch with male colleagues: The society as well as some women believed that they are less intelligent than the men and as a result, they assume that anything mathematics or quantitative discipline is made for men and not for women. Equally, some men don't just feel comfortable working with women in some disciplines. They assume that women could slow down the pace at which they would have love to work and that could make them to be canter productive due to the way they have been programmed psychologically.

Peer influence: Peer influence is a social factor which cuts across all human groups. Everyone is a member of one peer group or the other directly or indirectly. Women interested in mathematics related disciplines could be pressured to feel not making the right choice by other members in the peer group especially if such women are not strong-willed or easily manipulated. When such influences prevailed against one's interests, there is a tendency that one will not be able to pursue one's ambition in mathematics related discipline as a woman.

Inferiority Complex: Mathematics disciplines being male-dominated fields could create inferiority complex to any woman who finds herself among many men or guys and to feel not belonging and unwelcomed. Also, a woman in this type of forum dominated by men could feel lonely more so if none of the other male colleagues understands her and in some instances, one or more of the men could even be interested in dating her.

Prejudice: This is a situation of exhibiting biasness in one's opinion in advance. In an instance when an employer or a head of an organization which is mathematics inclined has already concluded on not believing in women's inputs before given them trials on the job which is categorized as arid-zone for women, it could be difficult to convince such a helms-man that women are equally as intelligent as the men and could even be better on

the job. Some organizations might accommodate women to work with them but would delay their promotions simply because they assume women do not do as much as men on a task. Other establishments could feel threatened to put women in charge of decision making cadre in order to make them secondary in decision makings.

Gender and Mathematics related Disciplines

One of the goals of the United Nations (UN) is on the issue of gender equality and women empowerment. Looking through the agenda of both the Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs), these two development goals both stated gender equality as a point that needed to be attended to in order to attain global development. The following are the highlights of the agenda of the Millennium Development Goals (MDGs):

- Eradication of extreme poverty and hunger
- Achievement of universal primary education
- Promotion of gender equality and women empowerment
- Reduction of child mortality
- Improvement in maternal health
- Combating HIV/AIDS, malaria and other diseases
- Ensuring environmental sustainability
- Developing a global partnership for development (World Health Organization (WHO), 2019).

The eight (8) point agenda of the Millennium Development Goals (MDGs) clearly spelt out the promotion of gender equality and women empowerment as one of the highlighted points in its agenda which was initially meant to be fully attained in the year 2015. This global agenda was reviewed further into seventeen (17) point agenda of the Sustainable Development Goals (SDGs) instead of the initial eight (8) point agenda outlined in the Millennium Development Goals (MDGs). This is to allow member nations to be able to work towards its realizations by the end of year 2030 due to the fact that not all the member nations of the UN has been able to attain it at the end of 2015 which was originally targeted. The Sustainable Development Goals (SDGs) are stated as follows:

- No poverty
- Zero hunger
- Good health and well-being
- Quality education
- Gender equality
- Clean water and sanitation
- Affordable and clean energy
- Decent work and economic growth
- Industry, innovation and infrastructures
- Reduced inequalities
- Sustainable cities and communities

- Responsible consumption and production
- Climate action
- Life below water
- Life on land
- Peace justice and strong institutions
- Partnerships for the goals (United Nations Department of Public Information, 2019).

Despite the highlights on gender equality which has been spelt out with the blue print, it is amazing to note that in some societies, gender disparities are still in practice due to gender stereotypes inherited from the societies of one's existence. This is depicted in the indirect influences of the society on individuals' choice of vocations, such as grouping some jobs or vocations as masculine or feminine in nature. Examples are revealed in boys' preferences for science, mathematics and technical inclined vocations, while the girls are more attracted to vocations that are more of socials, humanities, artistic and creative in nature. This is due to the way many societies especially in the developing nations categorized men and women abilities in terms of vocations such that, boys and men are believed to be stronger than girls and women in terms of physical strengths and vigor and as a result, a limitation on the jobs that befit male and female are pegged on the way the society views it (Hu, 2016).

According to Munoz-Boudet (2017), mathematics and science related disciplines still have gender imbalances such that the percentage of women who graduated in mathematics and science related disciplines were about 35% compared to their male counterparts who occupied 65% of the quota in the U.S as at 2017. In a related report by the U.S Department for Commerce, 6 out of 7 engineers are males (New Scientist Job, 2016). Coming to Nigeria, Onapajo (2016) reported that the dominance of male gender over female in Science, Technology, Engineering and Mathematics (STEM) is very conspicuous in Nigeria as it is in many other African societies. Stating further that Nigerian society is structured to discourage women from pursuing courses that are mathematics and science related. Likewise, the dominance of men in these fields above the women could be as a result of its complexity and thoroughness requiring more brain tasking activities and perseverance to get results that can withstand keen competitiveness among other colleagues of opposite gender.

National Development

In Gboyega (2003) development was viewed as an idea that embodies all attempts to improve the conditions of human existence in all ramifications. The gap between the developed and the developing countries is not static or narrow but is continually widening. A large majority of the world's population in developing world lives in a state of poverty. The problem of urban population, rural stagnation, unemployment and growing inequalities continue to face less developed countries, which Nigeria belongs.

Lawal and Oluwatoyin (2011) expressed that the pride of any government is the attainment of higher value level of development in such a way that its citizens would derive natural attachment to governance and for a nation to be in a phase of development there must be some pre-requisites, which include socio-political and economic stability. Societal development encompasses growth which means that it is synonymous to increase, advancement and moving from one level to another. It is not only economic growth but it includes equity in provision of basic education, good and affordable health care, good roads for rural dwellers for easy transportation of agricultural products to urban centers, housing and other essential services with a view to improve quality of life for individuals and collectively.

National development therefore can be described as the overall development or a collective socio-economic, political as well as religious advancement of a country or a nation. It is a term that is dynamic and revolutionary due to the changes exhibited in the society. It is both qualitative and quantitative, according to Kingdom and Orji (2013) submission that, national development emphasizes the basic needs of life in transforming the individuals in the society to self-actualization. Any development model that does not reflect these tenets needs a paradigm shift. National development is also characterized by growths in every sector of the economy of a nation. It embraces improvement in material and social wellbeing of all citizens, which is not limited to the most powerful and rich ones alone. In another view, national development is the ability of a county or countries to improve the social welfare of the people such as quality education, provision of social amenities like, potable water, regular electricity supply, accessible roads, affordable transportation, health care facilities, infrastructure, market, and other things that can better the lives of the citizens. These lead to face lift experiences from one level to another for positive changes in standards of living of citizens of the nation.

Mathematics and National Development

Life is generally incomplete in many areas without the direct or indirect application of mathematics to structure and maintain daily activities of both human and organizations to a level of managing and assessing one's productivities. This cuts across the home front, work place, recreation centers and everywhere life exists and human beings are found. The knowledge of mathematics is applied to all facets of life such that one can hardly mention or identify an activity or a phenomenon that is independent of mathematics. Mathematics is a valuable subject which is applicable to all other subjects, disciplines and careers found among humans. The place of mathematics in many fields of work especially those vocations that are scientific in nature and are quantitative inclined cannot be over emphasized. Obi, Uzor, Onah and Agbo (2018) highlighted the general goals of mathematics teaching and learning at the secondary school level as follows:

i. to generate interest in mathematics and to lay a solid foundation for everyday living;
ii. to promote the acquisition of mathematical skills and processes necessary for further education in mathematics and related skills;

iii. to develop computational skills;
iv. to foster the desire and the ability to be accurate to a degree relevant to the problem at hand;
v. to develop ability to recognize a problem and to solve the problem with latent mathematics knowledge;
vi. to develop precise, logical and abstract thinking; and
vii. to stimulate and encourage creativity in learners.

The above stated goals captured the main purpose of acquiring the knowledge of mathematics at the school levels. It can be deduced from these highlights that mathematics is needed by everyone for personal development. Daily applications of its knowledge help to be able to get things done and basis for future learning in related fields. It is worth noting that every bit of knowledge acquired can be utilized for dual purposes which are, for personal advantages and for others as well as for the society of one's existence.

Gender and National Development

There is no way one can contribute to the society without making contributions to one's life on a personal note. It is when one has made conscious effort towards personal development that one can actually contribute to the society which of course the nation is inclusive. This means that national development can be realized through individual developments and the contributions made to the society which can be summed up and be reflected in the nation. The attainment of national development comes along with the developments that come from each member of the society and from each discipline or works or vocations people do on daily basis for self-sustenance and for up keeps. These has nothing to do with gender disparity, since both men and women, boys and girls, male and female make up the nation and each person has a role to play in making the society a place that is worthwhile for living and for productivities. Though, the contributions of women to the economy are generally not recognized, since most women work in the market places and on the farms (Ogundipe & Ogundipe, 2018). In the submission of Ntiwunka (2013), factors such as inadequate funds, mobility, manpower, enabling environment, failure to domesticate some policies in the state, and harmful traditional practices limited the effective implementation of these programmes. Consequently, women in African societies were not sufficiently empowered to achieve gender balance and improved their socio-economic standards. Females have been assumed to be weaker vessels in all aspects of life. In many situations even at the secondary school levels in co-educational schools, this assumption does not always hold. In some cases, teachers have also been found to be potential contributors to gender differences in students' learning outcomes and achievements which could endanger future participations in higher learning. For example, some teachers have been found to hold gender-stereotyped expectations of boys and girls (Onapajo, 2016). In most cases, gender is not often indicative of individual performance. The optimum work group composition should be a

combination of women and men highest contributions to knowledge. Mostly, girls face discriminatory attitudes and beliefs within the communities they live in and in their school environment. They give up easily and quickly on discoveries, and they are always filled with fear of failure in taking risk on matters. In many African contexts, girls and boys are socialized to assume different behaviours, roles, and responsibilities which gender stereotypes have made impact on their experiences of the world and understandings of themselves (Hu, 2016).

Mathematics Related Discipline

Discipline can be defined as a type of work or career a person feels like doing which he or she would be totally and voluntarily devoted to accomplish in life. It can also be regarded as occupation. Examples of disciplines in the sciences are medical and health, biological, chemical, physical and others. In the Engineering sector, we consider civil, electrical, mechanical, chemical, metallurgical, computer, petroleum and other. Education sector has the likes of Mathematics, Physics, Chemistry, Biology Curriculum and other teaching subjects. Some of these disciplines are gender-related. That is, some disciplines are easier to embark on by one type of gender than the other. For example, in Nigeria hospitals, clinics and health centres like public, private and non-government oriented, female staffs always outnumber the male counterpart in both professional and non-professional staff.

Attempts to explain the performing difficulties exhibited by female gender in mathematics related disciplines traditionally resort to give a cognitive explanation on why it is so which is mainly related to a person's capacity for knowledge. However, a subject's difficulty, the effort required in acquiring the knowledge about the subject and the cumulative nature of such difficulties do not suffice to explain the attitude towards such subject, let alone the students' rejection of the subject.

Examples of Women Who Dared Intimidations in Mathematics Related Disciplines in Nigeria

Irrespective of the factors listed above on why women are not commonly found in mathematics related disciplines, there is a record of crop of notable women who have made remarkable impacts in mathematics related disciplines, which is a good account to take note from. These set of women achievers have some lessons our girls and women can learn from such as daring the bars of obstructions in male-dominated careers in making headways. Their courage and doggedness can be looked into to spur younger generations of women to break the wall of limitations in terms of gender in pursuing their dreams in mathematics inclined disciplines. Among these are: Professor Grace Alele-Williams, the very first Nigerian woman to bag a PhD in mathematics, a former Vice Chancellor of University of Benin, and the first female VC in Nigeria among other first achievements of hers; Professor Francisca Nneka Okeke, a physicist at University of Nigeria Nnsukka; Professor Deborah Enilo Ajakaiye, a Geophysicist at Ahmadu Bello University, Zaria, who equally made a career link to the University of Jos, Nigeria; Professor Olabisi Ugbebor, a mathematician at the University of Ibadan and the first president of Nigerian

Women in Mathematics; Professor Ayoka Olufunmilayo Adebambo,an animal scientist who specializes in animal breeding and genetics at the Federal University of Agriculture Abeokuta, Nigeria; Professor Adenike Oyinlola Osofisan, a computer scientist and the first female professor of computer science in Nigeria and in Africa; Professor Folasade Ogunsola, a medical scientist; Professor Chinedum Peace Babalola, a first female pharmacist in Nigeria at Obafemi Awolowo University, Ile-Ife, Nigeria; Professor Olubola Babalola, a quantity Surveyor at OAU; Professor Medinat Folorunsho Salman, a Mathematics educationist at the University of Ilorin; and Professor Esther Ore Omosewo, a Physics Educationist at the University of Ilorin.

In the list also is Professor Modupe Ogunlesi, a professor of chemistry at the University of Lagos; Prof Arinola Olasumbo Sanya, the first female professor of physiotheraphy at the University of Ibadan; Professor Philomena Kanwulia Igbokwe, the first female professor of chemical engineering, Nnamdi Azikwe university, Nigeria; Professor Tomilayo Olufolake Adekanye, the first female professor of agriculture and agricultural economics in Nigeria and in Africa at Obafemi Awolowo University who also has a career link to the University of Ibadan; Professor Oyebiodun Grace Longe, an Animal scientist, at the University of Ibadan, Nigeria (Nigerian Finder, 2019). It is hereby registered that the list of women in the mathematics related sphere is not exhaustive in this piece, but the listed women scholars are brought up to encourage the female gender that they can equally imprint their contributions in the mathematics related disciplines of their choice against any restriction related factors in Nigeria and beyond. This will go a long way in encouraging both girls and women to imbibe mathematics related disciplines in order to make their own contributions to national development.

Bridging Gender Gap in Mathematics Related Disciplines and National Development

National development is a task which all and sundry need to participate in making it a reality. Nigeria for example is listed among the developing nations and there are still a lot of grounds to be covered in terms of mathematics, science and technology in this 21st century. Much of the needed technological developments are hinged of the pivotal of mathematics. National Development can be made possible and easier if our nation can imbibe the contributions of all and sundry (that is, male and female) in playing their roles making sure that the issues of gender stereotypes are debunked in order to give room for the female gender to exercise their skills without intimidation and blackmailing all for the good of our dear nation.

Generally, not many people are in disciplines that are related to mathematics. Even with this, people who are supposed to complement the efforts of the few people in mathematics disciplines are not giving the right encouragements and environment to also make their own contributions in making the nation to attain the expected height in the global community. Female gender are not less humans and can also make impacts if given the right environment and the necessary tools to exhibit their skills and abilities. After all, it is

not that the disciplines in the mathematics environment have sex detector that will indicate whether the practitioners in such fields are men or women. In fairness to the Federal Government of Nigeria, a clear statement on bridging gender discrimination was stated in one of her policies in order to allow the women and the girls to equally have a voice in issues on education, health, politics, jobs and wealth distributions among Nigerians (FGN, 2010). Knowing well that it takes all to build a society of one's dreams, every sector of the society needs the knowledge of mathematics for its operations and activities. Every member of Nigerian society should make it a point of duty to allow the women folks to display their skills and exercise their expertise for the benefit of our nation and in our effort to attain the more aspired development.

Conclusion

In closing this write-up, it is of a note that, mathematics is needed for development especially in this age of science and technology. Also, for Nigeria to attain the much aspired development in the global world in the 21st century, it is necessary to encourage all gender to contribute to the development. Cultural, religious, gender bias and prejudice should be put aside for women and girls to display their skills in the mathematical world in order to complement men's efforts and hasten the needed development through the mathematics related fields.

Suggestions

The following recommendations are highlighted based on the discussion in this piece:

1. Nigerian societies should revisit cultural practices that forbid women's participations in disciplines that are mathematics inclined so that more people can be recruited to disciplines that are mathematics inclined;
2. Religious leaders should clear off the age long line of demarcations on mathematics as male-gender associated career for their female members to be able to work in mathematics fields;
3. Nigeria government should put up a policy that will put the females of reproductive ages in considerations so that the females will not shy away from doing those careers that are mathematics related in nature nor see mathematics as arid-zones for women and girls;
4. Every woman should try and work on herself and put up more courage for fitness on mathematics related jobs and a member of the society whose contribution also counts in building the nation through mathematics careers;
5. Women and girls should work in pursuit of their dreams in mathematics related fields and not allow their peers to influence them on any suggestion outside their ambitions in attaining their choice of careers;
6. Male members in mathematics related fields should encourage females to find fulfillments by giving them the opportunity to make contributions to these fields thereby complementing their efforts in the field; and
7. Organizational heads should give women and girls a trial on the job with their

performance and do all in their power to see that they improve progressively for the benefit of the organization and our national development from the mathematical perspectives.

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