

PROMOTING WOMEN'S ACTIVE PARTICIPATION IN SCIENCE, TECHNOLOGY AND MATHEMATICS EDUCATION: A GUIDANCE COUNSELLOR'S PERSPECTIVE.

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Abstract

It is now an established fact that science, technology and mathematics (STM) education sets the pace of the socio-economic and political development of a nation.

Nations all over the world, whether developed, developing or underdeveloped have realized that their industrial and technology development can best be actualized through an effective utilization of their natural and human resources. Women have a lot of roles to play in the development of a nation. It has therefore become necessary in our changing society, to give women education an all round development which also include science and technology development. This paper therefore examined the extent of women participation in science, technology and mathematics education. It analysed factors militating against females active participation in science, technology and mathematics (STM) education in Nigeria. Finally some guidance approaches and recommendations on how to ensure women's active participation in science, technology and mathematics education were proffered.

Introduction

The development of any nation is usually measured in terms of its scientific and technological growth. The widely acclaimed assertion today is that science and technology education is indispensable to the nation's development. Therefore, one of the areas which the country is focusing attention upon today is that of science and technology. That is science and technology has assumed a central position in Nigeria's education system. This is why the National Policy on Education (1981) makes provision for science and technology related subjects at all levels of education. The government in her bid to ensure rapid technological development has taken some giant strides by establishing various Technical Colleges, Polytechnics and many Universities of Technology at both local and national levels. According to Anikweze (1998), the federal government established 118 technical colleges, 11 Colleges of Education (Technical), 39 Colleges of Agriculture, 15 monotchnics, 44 polytechnics, 3 Universities of Agriculture and universities of Technology.

It was observed that women who constitute more than half of the nation's population are up till today found in the "feminine" careers such as teaching, nursing and secretarialship. Nigerian women are continuously shunted into soft courses and careers while the country continues to suffer acute shortage of skilled technical manpower. Despite the encouragement so far given to women through the establishment of females only science and technological colleges by both federal and state governments to motivate them for active participation in areas of science and technology, they still seem to be found wanting in all these areas.

Only few out of the total number of girls enrolled in various schools are pursuing science and technological courses. Many studies have shown that there is obviously very low participation of women in science related fields. Balogun (1993) confirmed that even in advanced countries, females until recently have been playing the role of back benchers as far as mathematics, science and technology education is concerned. Esomonu (1996), Adeloye (1999) and Banjoko (1999) show that there are low participation of females in Mathematics, science and technology programmes in the Universities in 1989 is 21%. In that same year, according to her, the ratio of man to women was 13:1. For pure science the ratio was 3:1 in favour of the male. At the University of Ilorin for example, out of the 715 students enrolled in 1999/2000 session in the Faculty of Sciences, only 246 are female students. In the Faculty of Engineering out of 390 students enrolled in 1999/2000 session, only 45 of them are female students. At the Institute of Technology, Kwara State Polytechnic, Ilorin the situation is the same. The ratio of students enrolled in 1999/2000 session was 8:1 in favour of the male. At Kwara State College of Education (Technical), Lafiagi the ratio of students enrollment for 1999/2000 session was ratio 10:1 in favour of the male.

The women on their part have set up several organizations aimed at boosting women participation in science and technology. These include Nigerian Association of Women Scientists

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(NAWS), Forum for African Women Educationists (FAWE), Nigeria Association of Women in science. Technology and Mathematics, Women in Colleges of Education (WICE) and so on Even though all these steps have apparently prompted women to venture into the field of technology in the various tertiary institutions, the female enrolment in the various technologically oriented courses across the county is still not quite impressive.

All the data above depict a significant disparity between male and female enrolment in Science, technology and mathematics education in Nigeria with the males still dominating the scene. The wide gap requires critical assessment of the situations. This paper therefore focuses attention on how to get the girl-child of today to be actively involved in science, technology and mathematics education so that by the year 2010 or even very soon, we shall have women scientists, technologists and mathematicians, who can rub shoulders with their male counterparts.

Factors Militating against Women's Active Participation in STM Education.

In Nigeria, so many factors tend to militate against women's active participation in science, technology and mathematics education. The Nigerian girl-child suffers child abuse and sexual harassment in many forms. This is evident in teenage and forceful marriages especially in the local areas. The girl-child right from home, performs many roles at the same time: She is the cook and the cleaner of the house, helps in the nursing of younger offspring in the family, assists the mother in her trade which may be by way of street hawking. They are expected at an early age to manage both educational and domestic responsibilities. They therefore have little time for their studies (Banjoko, 1999).

The Nigeria girl-child is discriminated against which results in less parental appreciation and care, poor nutrition and unequal access to education to according to Osakwe's (1995) report. Socially the Nigerian girl-child has to put herself last and considered herself inferior to the male-child These inferiority complexes in turn endanger her survival and empowerment.

The social and occupational stereotype indoctrination which begins from infancy and had subtly shaped the participation and attitudes of the society, is another barrier militating against women's active participation in science and technology. Adeloje (1999) posited that parent always encourage their boys to go into some academically tenses courses like medicine, engineering architecture etc while girls are expected to be confined to the home and family life. Even now that we have gradual shift from the above perception on women education, certain courses are still regarded as being meant for a particular gender For instance, while males dominate engineering. Architecture, pilot, Medical courses and so on, females are encouraged to pursue such courses as secretarial studies. Nursing, Home economics and teaching.

Danso (1998) also noted that so many teachers believe that technical subjects are more appropriate to the education and career needs of boys than girls. He discovered from his research that 40% of male teachers and 30% of female ones believe that boys could be given preference in technical courses.

Ohakwe (1997) observed that parental educational background has a great impact on the education of the children. That highly educated parents allowed their children to study courses they are talented in, more than the illiterate parents or those with low educational background. In the rural areas where illiterates or parents with low levels of education are many, girls competing with boys in areas of science and technology is a complete rubbish and even a taboo. They usually ask these questions: "Can women climb electricity poles to make repairs or lift heavy iron rods?" Is it possible for a women to perform the duties of a mechanic, a welder, a trailer driver'etc?"

The gender discrimination in the labour market is another bottleneck militating against women active participation in STM education. After graduation, the major goal of every student is to work. The prospect of gainful employment is a strong factor in pursuing a particular course. Males can be gainfully employed into almost all areas of technology whereas, the females chances are limited and so the enthusiasm to pursue technological courses is relatively dampened.

Girl-children exhibit inferiority complex which made them not to be sufficiently committed towards technological education. One can associate this to the socio-cultural hang-over effect of the gender syndrome earlier on discussed in this paper.

It was discovered from various researches on gender issues and education that differences in enrolment, participation or performance in STM education is not due to genetic deficiency of

females. The findings of Oradifor (1986) and Banjoko (1999) confirmed that if the girl-child is given the same opportunity, the same incentives, she will perform equally well as her male counterpart. They have all concluded that sex plays no significant role in the performance of students in STM education. The girl-child or women problem with STM education is therefore that of participation or involvement and not of performance.

Lack of women's active participation in STM education has a lot of implications for instance, it may be difficult for the country to achieve her developmental goals if the females or women decided to shun STM education. This will mean under-development of the country's human resources, lack of knowledge and skills required for their daily lives and lack of employment opportunities. This makes the existing gender inequalities to be reinforced.

Neglect of women or girl-children in STM education encourage sex-stereotyping further. This will not only make women to have very few job opportunities than their men counterpart but would also make them find themselves in lower paid and less prestigious occupations. It will also lead to the neglect of the gifted and skilled intellectuals among women. Such neglect in STM education hinders women from being able to adjust to their changing environment and contributing their quota to national development. This also hinders their opportunities to take part in decision making processes.

Guidance Approaches Towards promoting Women's Active Participation in STM Education

The nature of skills required for STM education has a peculiar nature which must be supplemented by cognitive ability with suitable aptitude tests. The psychometricians, teachers and examination bodies can help the counsellor to fish out the females students that are capable of participating in STM education right from the Junior Secondary School level. The counsellor can also make use of appropriate test(s) designed by test experts. Such tests will enable him to know those females who possess appropriate cognition and psychomotor skills to excel in STM education.

There should be a very strong link among various technologically based institutions, agencies and employers of labour. The Guidance and counselling section of the Federal Ministry of Education should initiate such a link which should involve the design of appropriate curriculum and modalities for effective participation of female students in technology. It will be necessary for the NBTE to liaise with the various institutions on STM education so as to be able to organise periodic forum or seminar where important issues related to STM education could be discussed. This type of forum should also involve the employers of labour to make their input on the problems and expectations of STM education. Special co-operative bodies could be organized by counsellors. Summer programmes as well as counselling session for females with STM bias on collaborative basis in the technical education institutions could be organized. This will allow their potentials to be fully challenged towards maximum utilization.

The counsellor should organize vocational guidance programmes which will enhance female orientation towards technological development and choice of career. Such programmes could be in form of a career day or week during which professionals will be invited to enlighten the females on career opportunities and prospects. The counsellor can arrange vocational excursions to industries to enable female students know the activities of workers practically so as to encourage them further. Career education which can sensitize the students' participation towards technological education should be fully integrated into the curriculum of all technological institutions. This will expose the females to their actual and potential abilities, aptitudes, interests and values to enable them take rational and realistic vocational choices (Adeloye, 1999).

Recommendations

Since STM education is the pivot of national development, the teacher who have direct link with the students need to play a major role in ensuring girls' participation in STM education. Both primary and secondary school teachers should use different methods and techniques to develop students' interest and positive attitude towards STM education. Women should be given the opportunity of working in areas that require the application of STM education. All forms of reward showing discrimination in terms of gender should be discouraged.

In this age where there is rapid acceleration of scientific knowledge, it is necessary to equip modern women with powerful tool of STM education in order to help them cope with the

conditions of modern life. For any meaningful, progressive and technological development therefore, active participation by all men and women is imperative (Eboh, 1993). Both sexes can be educated on the relevance of the sciences in the cultivation of desirable habits, attitudes and behaviour such as cooperation with people, careful observation, open-mindedness, honesty and determination as well as the relevance of sciences in terms of career opportunity.

Schools should organise seminars, workshops for teachers on regular basis to sensitize and orientate teachers on the need of promoting STM education among girls and on the need to update their teaching methodology. Role models should be provided for the girl-child to emulate. The various women associations like Forum of African Women Educationists (FAWE), Nigerian Association of Women Scientists (NAWS), Women in Colleges of Education (WICE) and a host of other should jointly organize seminars, conferences on gender issues especially on how to ensure active participation of the girl-child in science and technology. Members of these associations, in their various homes should educate their daughters, nieces, sisters and neighbours on the importance of getting the female students actively involved in STM education. Through the women affairs, communicate arrived at such conferences could be forwarded to the Federal Government. They could award prizes to outstanding female students.

Parents especially mothers should be sensitized to the necessity of encouraging their female children to study science. They should be educated on how to treat children equally at home so that female children do not feel inferior to the male children.

The whole society should change their discriminatory attitudes towards women scientists and technologists and should treat them as equal with their male counterparts. Jobs regarded as exclusively reserved for males must be made available to the female from now onward. More technical colleges for females in the various geographical zones of the country should be established.

Conclusion

Since STM education is a dynamic instrument for change, female children should be given adequate opportunity to acquire science early enough. Women have to live and survive in this rapidly changing society and so they must be transformed mentally, physically and intellectually to be able to develop critical inquiry and scientific mind to deal with everyday problems. Women should not be left out of the effort to create a scientific culture in Nigeria since they are more than half of the nation's population. To boost the morale of women in STM education, the Federal Government should reinforce her campaign strategies most especially in the extreme North where the involvement of women in STM education is a taboo. Special incentives should be given to females who opt for technical courses in form of scholarships, special allowances and so on. Women in a changing world are face with more and more instances of using scientific and technical knowledge in adapting to the changing time. Women should therefore be encouraged to have interest in STM education to be able to participate fully and actively in the technological development of the nation.

References

- Abdullahi, M.D. (1995). Government Policies Relation to Foundation for Technology Development *Journal of Nigerian Association of Teachers of Technology* 1.(1) 5-9.
- Adamu, C. O. (1997). *Women Technology education and Vision* 2010. Proceedings of the 2nd National Conference. Federal College of Education (Technical) Gusau, 81-85.
- Adeloye, J. A. (1999) Towards a Realistic Participation of Women in Technological Education in the 21st century and Beyond. The Guidance Factor. *JOWICE* Vol. 3, 109 - 113.
- Agheyisi, R. V. (1991). The Labour Market, Implications of Women's in Higher Education in Nigerian *Women in Nigeria Today*. Zeed printers London.
- Anikweze, C. M. (1998). *Indigenous Technology: Technology Transfer and Technological Education in Nigeria*. Lead paper presented at the 3rd National Conference, FCE(T) Gusau.

Balogun, T. A. (1993). Gender issues in the Teaching of Science Technology and Mathematics. A Paper Presented at a round table conference on women in science and technology, Ijebu-Ode.

Banjoko; O. O. (1999). Ensuring Active Participation of Girls in Science and Technology; Plans towards the year 2010. *JOWICE*. Vol. 2, 117-119.

Danmole, T.B. (1993). Promoting Involvement of Women in Science and Technological Education in Nigeria. Research Agenda and Proposals.

Eboh, B. C. (1993). Social-Cultural Barriers to Effective Participation of Women in Nigeria's Technological Development. *Journal of Technical Education Review*. 4 (4) 50.

Erinosho, S. Y. (Issues on Women Empowerment in Nigeria. A lecture delivered at a seminar organised by the National Association of Women in Colleges of Education, Tai Solarin College of Education Chapter, Ijebu-Ode.

Esomonu, N. P. M. (1996). Women and self Actualization in Science and Technology Education *Jowice* 1 (1)60-64.

Federal Republic of Nigeria (1981). *National Policy on Education*. Lagos: Federal Ministry of Education.

Isyaku, K. (1997). Technology Education and Vision 2010. Keynote Address proceedings of the 2nd national Conference. Federal College of Education (Technical). FCE (T) Gusau, 4 - 1 0 .

Nwocha, O. F. and Agbi, A. I. (1996). Relevant of Science, Technology Mathematics Education for Enhance National Development A Paper presented at the National Conferences on Vision and Mission of Education in Nigeria Organised by NCEE, Kaduna.

Ohakwe, E. E. (1997). Secondary School Students Mathematics Achievement as a Determinant of Learning Outcomes Among Pre-service Teachers in Zamfara State. Unpublished M. Ed. Thesis.

Oraifor, A (1986). An evaluation of female students Achievement in Secondary School Science. Implication for National Development. Cited in Balogun, T. a (1986) in Interest in Science and Technological Education in *Nigeria Journal of STAN*. Vol. 23. 1&2.

Osakwe, G. The Girl Child: Education and Reproductive Rights. A Paper presented at a post Baijing Conference organised by Justice, Development and Peace commission in Ijebu-Ode.