WOMEN AND SCIENCE EDUCATION IN NIGERIA: AN AGENDA FOR ACTION

Bolanle T. Danmole, (Mrs.), University of Ilorin, Nigeria
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BOLANLE T. DANKOLE (MRS.)
Institute of Education,
University of Ilorin,
Ilorin.

ABSTRACT

The campaign for women involvement in science and technology Education which is now an area of concern in Nigeria is not a new phenomenon. The situation is identical in most developing countries of the world. In many developed countries similar campaigns and strategies for arresting the trend have been worked out by the various countries concerned. This paper discusses enrolment and provides empirical evidence of the performances of boys and girls in secondary schools in Nigeria. The possible causes of the disparity in enrolment and achievement of boys and girls has been traced to such factors as parental and societal attitudes towards girls and women.

Furthermore, the need for assistance by Government and the school to encourage girls through provision of incentives such as scholarship awards has been enumerated.

Introduction

Science and technology has become a part of the culture of modern development and civilisation. Besides, the impact of science and technology is felt in every sphere of human life so much that it is intricately linked with a nation's development. However, the process of acquiring science and technological skills requires scientific knowledge of which formal education plays a crucial role. In other words, science and technology education is a function of access to schools. Hence, many developing countries in their quest for technological advancement have come to realise the importance of education.
sequently, education of the citizenry has received renewed attention in recent times in many developing countries. A great deal of awareness has been created through various programmes such as the Mass Literacy Campaign, Adult and Non-formal Education, Nomadic Education and others. As a result, education of children has now become the pre-occupation of most parents, especially educated ones.

While there is an increasing trend in the involvement of girls and women in science education worldwide, the figures are comparatively lower than those of boys and men. This is reflected in the low rate of enrolment of girls compared to boys at all levels of the educational system.

In this paper, enrolment of boys and girls and their performance in science have been discussed. Areas where opportunities can be provided for girls in order to increase the enrolment figures to redress the imbalance in the involvement of boys and girls in science and technology education has been highlighted.

Science and Technology Education for Girls and Women

The scientific profession and the society at large are yet to internalise this reality (Agholor, 1989). Agbeyisi (1991) observed that:

"Nigerian society stands to lose if women are continuously shunted into 'soft' courses and careers while the country continues to suffer acute shortage of skilled and technical manpower." P.156.

The Commonwealth Africa Regional workshop on Gender Stereotyping in Science, Technology and Mathematics (STM) Education which was held in 1989 in Accra, Ghana also emphasised the need for identifying specific strategies to redress the imbalance in the participation of boys and girls in science, technology and mathematics education. Furthermore, the quest by some individuals and women organisations for the formation of a body to be known as Nigeria Association of Women Scientists in Science and Technology (NAWS) to be charged with the responsibility of promoting Science Technology and Mathematics (STM) education among girls and women is yet another pointer to the importance attached to the issue. The claim about inequalities in educational opportunities between boys and girls is justified and the campaign for the involvement of women in science receiving attention now in Nigeria is most welcome.

Although the insignificant number of women in advanced science and technological courses and careers is incontestable, the causes for its occurrence can be argued. A considerable number of people attribute the problem to the society that discriminates against women, others attribute it to biological or inbuilt difference between men and women, while others insist that it is due to culture. In discussing factors contributing to the dearth of girls and women in science and technology courses and careers, Kahle (1983), stressed the following factors: Social factors (role models, and sex stereotyping patterns), educational factors (parent, teacher expectations, classroom and extra-curricular activities) and personal factors (spatial situation). Duncan (1989) proposed a conceptual model which attempts to show how gender typing contributes to performance in science.

In the past, researchers have examined sociological, cultural, biological and educational factors in isolation. However, the pervasive nature of the problem and the complexity of the interrelatedness of the underlying causes defy simple solutions.
Enrolment in Science and Technology Related Courses

The incidence of low participation of girls and women in science, technology and mathematics education is a universal phenomenon, with respect to interest in science, technology and mathematics. Orisasey, (1977), and Balogun (1985) found that there were sex-related differences in the attitude and interest of students identical to those reported by Ormerod and Duckworth (1975) and Kahle (1983). Falayajo (1984), found that a majority of some third-form students considered that mathematics was a subject for males rather than females. These studies reveal that more boys than girls tended to enrol for basic sciences such as physics, chemistry and biology at the school certificate level. In general, biology is more popular with both sexes sometimes girls outnumber boys in biology classes.

In another study Balogun (1984) observed that with technical subjects more boys than girls showed preference for subjects in the following order: electronics, auto-mechanics, technical drawing with local handicraft, woodwork and typing occupying the lowest rank order. Osibodu (1987) corroborated the findings of these studies with university students in Nigeria. Ormerod (1981) in another study estimated the 'gender' of each subject by calculating the differences between boys and girls' preferences. Physics, chemistry and mathematics were most preferred by boys, while religion, English and French were most preferred by girls.

Wilder, Mackie and Cooper (1985), applied the method of asking United States school children whether an activity is masculine, feminine or neutral. They reported that science was perceived as masculine, mathematics and computer use as slightly masculine, and writing as feminine. In a college sample however, the same authors found that computer use was viewed as slightly feminine. More evidences for gender stereotyping of school subjects are studies of Houston, Stein and Smithhells 1969; McCauley, Slits and Segal, 1980; Wein-Haste, 1981 and Tranken, 1983. More recent studies such as those of Wilder, Mackie and Cooper (1985) and Archer and Macrae (1991) confirmed the existence of gender stereotyping of school subjects but reported that it is however, on the decrease.

Achievement of Boys and Girls in Science

A number of studies have been conducted in the area of achievement in science. Bajah (1979) reported a significant difference in the performance of male and female students in his study on family correlates and achievement in chemistry. Similarly, in a different investigation carried out at the International Centre for Education Evaluation (ICEE, 1985), University of Ibadan, revealed that male pupils consistently did better than females at the primary school level. Although, the reasons for such disparity in performance was not investigated, the researchers suggested the use of more robust statistics in future in order to infer reasons for the observed patterns.

Furthermore, Danmole (1993), also reported a significant difference in the mean scores of boys and girls (23.3 and 21.68 respectively) in a study carried out on Junior Secondary one entrants. She noted that although boys as a group performed better than the girls. Indeed, there were many cases in which individual female pupils performed better than male pupils. Fennema and Sherma (1977) study documented a significant difference in the performance of boys and girls in an earlier study on sex-related differences such as spatial visualisation in mathematics achievement.
Several other studies with contrary findings are also available. For instance, Orai for (1986) focussed on evaluating female students' achievement in science by under taking a comparative analysis of performance of male and female secondary school students in a cognitive achievement test in science. The performance of male and female students revealed a wide variability in performance. There were however, differences in the psychomotor performances in science laboratory as well as in the affective behaviours of male and female students.

Inomiesa (1988), recorded no significant difference in the mean performance of primary six pupils in a standardised achievement test administered to primary school pupils in Anambra, Bendel and Benue States at the time of the study.

Findings revealed that at the primary school level, sex of the child is not a determinant of achievement in primary science. More evidence of disparity in the achievement of male and female students from the literature reviewed includes research reports of Gyuse (1982); Daramola (1983) Iwobi (1983) Eaton (1983); Kelly (1982a), Harding (1983); Kelly, Whyte and Smith (1987). It is noteworthy, that in most of the studies surveyed there is a consensus of opinion among the researchers on the reasons preferred for the low enrolment and poor performance of girls in science. The reasons stemming from cultural elements and social attitude to girls and women were predominant, (Kale 1983; Matteo, 1986). Research has also established that female students are highly handicapped in psychomotor activities in science, Eaton, 1986). Evidence pointed to insufficient exposure of girls to the practice of science.

From the foregoing, it is obvious that there are major constraints other than sex on girls and women as a group on their choice and achievement in science and technology education. This paper has addressed the possibility of gradually encouraging the participation of girls and women in science through such avenues as the Government, the home, the school and women organisations.

Government:

Government policies have been known to be effective if implemented. For instance, the need for primary school education to be free has now become more apparent. This would reduce the financial burden on parents and give girls an opportunity of formal education especially in poor homes.

The campaigns on the importance of education for girls and its advantages must continue to be emphasized. Science instruction at the primary school level requires special attention. Therefore, training of teachers to teach primary science has become inevitable. Government should also provide all single-sexed schools with well-equipped laboratories and facilities. Research findings have confirmed discrimination in favour of all boys schools, (Orai for, 1986).

The Government must ensure that mathematics and integrated science remain compulsory at the primary and junior secondary school levels. Furthermore, positive discrimination in favour of girls by way of scholarship awards to girls who excel in the senior secondary school examination in science subjects is necessary. Girls must continue to enjoy bursary awards especially those who enrol in the university for science and technology education in related careers.
A special award for textbooks is also desirable as another incentive. Girls and women who have distinguished themselves in their chosen careers in science, technology, and mathematics should be recognised by giving them national awards.

Home Environment

Since the home is the first socialising medium for a child, parents must make conscious and deliberate efforts to avoid discrimination against their female children as much as possible. Girls must not be debarred from expressing themselves. Exploratory behaviours and logical thinking must be supported especially among adolescent girls.

Social and physical restrictions of girls during childhood and the period of adolescence must be reduced to the minimum. Girls in secondary and tertiary institutions must be properly counselled on sex-education or family life education. The fear of girls getting pregnant is the main reason for the excessive restrictions of girls by parents.

The effect of subtle discouraging remarks and comments by parents and guests to girls often dampen their enthusiasm for science. Married daughters who desire to pursue post-graduate courses in science must not be discouraged by parents and in-laws.

Parents must endeavour to educate all their children, both boys and girls, and must allow their daughters to choose science subjects and participate in science competitions if they possess the ability for such subjects.

The School

Apart from the syllabus, factors such as the school administration, science teachers' behaviours, teaching styles and methods, and the teachers' personality also have a great deal of influence on the learners. It is important that teaching styles and behaviour that discriminate against girls are to be discouraged. Science teachers must ensure that girls are exposed to practical laboratory experiences and given the opportunity to handle and work with science apparatus and other instructional aids. Challenging assignments must not be given to the boys only in the science class. Girls must also be made group leaders, especially in group practical work to instill confidence in them. Clashes in the time table should be avoided. Women mathematicians and physical science teachers have greater challenges, especially those teaching in all-girls schools. Consequently, their successful role models would be an incentive to girls towards non-typical sex choice in the school, extra-curricular activities such as JET Club, Mathematics Improvement Programme (MIP) should be made compulsory for all science students. Girls must be allowed to attend quizzes competitions and workshops that should be organized by bodies such as Science Teachers' Association of Nigeria (STAN) and National Association of Women in Science Technology and Mathematics (NAWSTEM).

Women Organisation

The need for women associations to begin to identify with research especially as it affects girls and women in science, technology, and mathematics education cannot be overstressed. Such bodies should set aside an award for women who have distinguished themselves in their fields or careers and in addition set aside a special award for those in science and technology related careers. Women organisations must interact with each other and borrow ideas from developed countries initiatives towards solving the problem. For example, Girls into Science...
and Technology (GIST) project in U.K., (Kelly, Whyte, and Smail, 1987).

Specific women organisations must identify and sponsor girls from poor homes who have displayed ability for science subjects in secondary schools up to the university level. Women organisations must fund or seek avenues for funding research on women. The Nigerian Association of Women scientists should be formed as soon as possible.

Conclusion

Research has established the existence of some gender stereotyping of school subjects but that is on the decrease, Archer, 1991). This paper has also shown that there is no conclusive evidence that gender plays any significant role in achievement of students in science. It seems that the effect of sex/role stereotyping of physical science courses and careers as 'masculine' debars the entrance into and retention of adolescent girls in science and technology education.

The most critical difference in the science education of boys and girls takes place within the classrooms and laboratories. Therefore, teaching methods and styles, teacher behaviours, classroom management, and other instruction related factors which do not discriminate against girls must be practised in schools. Furthermore, it is of paramount importance to ensure that boys and girls grow up in a home environment devoid of discrimination.

Besides, if women are found in science and technology oriented disciplines as models to look up to, more girls would aspire to emulate them, and strive to reach such levels of educational attainment. Finally, discriminatory stereotyped and degrading images of women in the media must be prohibited.

Reference


