

THE CHALLENGES OF PHYSICS EDUCATION OF THE GIRL CHILD.

Aregbede Oloyede Solomon; Ometan Olufunmilayo

Physics Dept, Lagos State University

Ojo.

Abstract

This paper discussed the challenges of giving physics education to the girl child. The challenges was appraised through the criteria- what is it like? the problems and affirmative actions. The admission list of students into physics department of two universities over the last ten years was analyzed. It was found out that the number of female students admitted continued to lag behind their male counter parts. Cultural stereotyping and tradition roles assigned to women, masculine nature of curriculum classroom practices such as student teacher interaction were pointed at as responsible for low participation of women in physics. Changing the individualistic teaching-learning situation, to enhance problems- solving skills, collaborative experiences, hands-on-learning, Sisters in science project (SISP) are among the several efforts found geared towards increasing female participation in physics. It is recommended that education circular and materials should be revised to connect physics with medicine, biology, technology, the environment to show diverse physics career paths and jobs prospect. And publicizing physics role models who counteract the stereotype and whose stories are examples of career success and leadership position.

Background.

Women in all walks of life tend to earn less than men and tend to be underrepresented in higher echelon of the society. The situation is more pronounced in science and technology, and even more so in physics and chemistry ([http:// physics web. org](http://physicsweb.org) ,2002; Acker and Oathley, 1993).

The problem starts in schools. The number of girls studying physics in the 16-19 age group are rarely higher than one in three. The curriculum for girls according to Nwana, (1993) mission in school stress domestic science, sewing, and of course religious instructions. At school certificate level she noted, girls were counseled to opt for courses that were regarded as "soft" and "less challenging" intellectually, for example liberal arts, social science, general science, commercial subjects, biology e.t.c.

Bola ring (2005) analysis of the female enrolment at tertiary level of education also shows less participation of female in science related subjects. She analyzed the 2003/ 2004 student enrolment of Adeniran Ogunsanya College of Education and found out that the total percentage of female students in the school of the sciences was as low as 14.63% of the total no female admitted in the whole college

Nwana (1993) also analyzed the employment situation at the university of Nigeria Nsuka and found out that the science based faculties are male dominated. One female lecturer is found out of every 5 male counter part during 1989/90 academic session. Ige (2003) citing Okebukola (2002) noted that the percentages of female lecturers are often less as compared to that of their male counter parts. He noted that out of the lecturers in the Nigeria universities in the 2001/2002 academic session, 15.7% are females (3,174) and 84.3% (17,040) are males.

Having briefly worked at the global view of female environment in sciences in our schools, one is often tempted to ask whether there will be any thing to talk about female environment in physics in our school. This paper is thus set to find out the female participation in education in physics in our schools. Three fundamental questions were asked and answer sought for :

What is the trend in the enrolment of girl child for education in physics?

What are problems facing the girl child in education in physics?

What are the efforts geared towards improving female participation in education in physics?

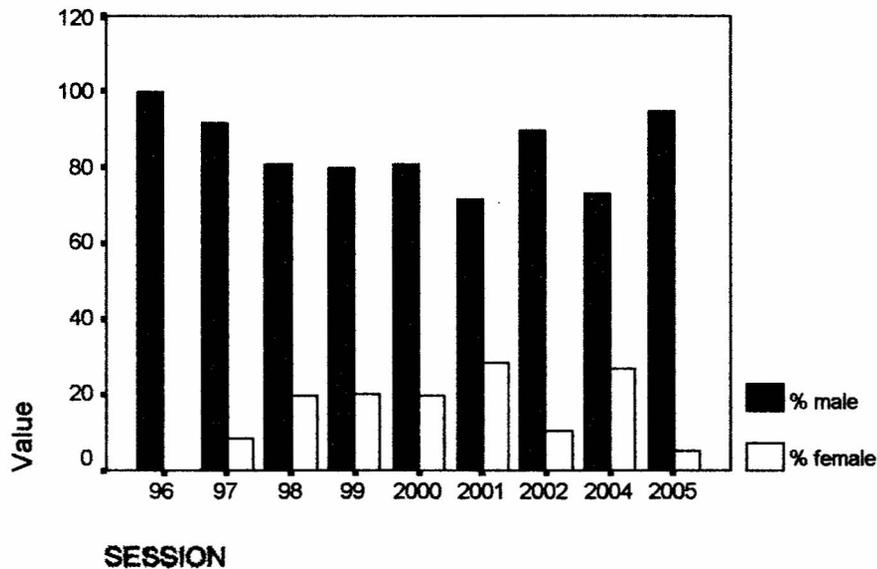
Methodology

Two universities were purposefully selected. Ten-year enrolment figures were sought for. An average of nine years enrollment figures were obtained and analyzed. The statistical data used was simple percentages and simple bar chart. Percentages was used because the core of this paper was to discuss the trend in the enrolment of girl child and the problems facing the education in physics of the girl child

Result

Figure 1 show the enrolment figure of student in physics department Lagos State University Ojo between the years 1996-2005

fig.1 Enrolment figure of student in Physics
Dept Lagos State University (1996-2005)

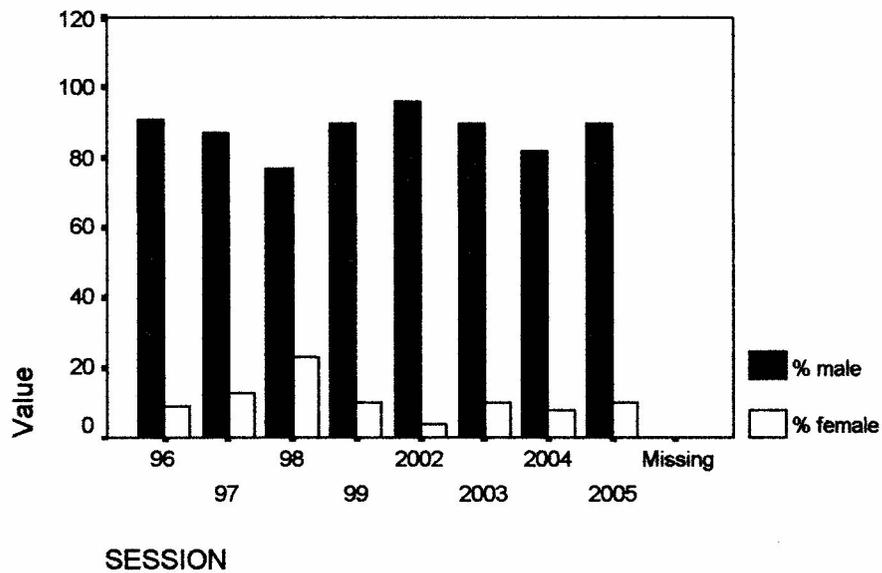


The average percentage for the male is 85 while that of the female is 15, showing that for every six male student, a female student is enrolled.

Figure 2 also show the enrolment figure for students in Physics department of the University of Ibadan for the year 1996-2005

fig.2 Enrolment figure of student in Physics

Dept University of Ibadan(1996-2005)

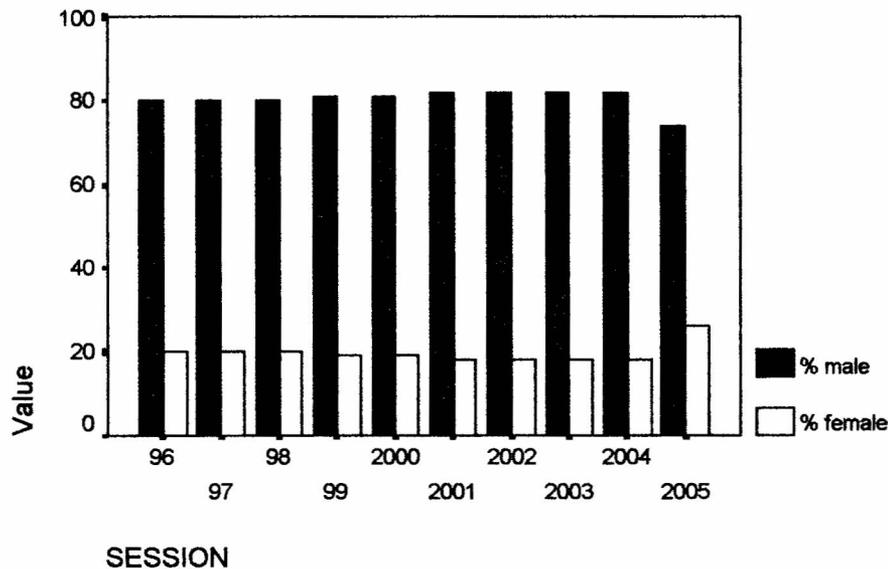


The average percentage of the male student is 88 while that of the female 10 showing that for every 9 male, 1 female student is enrolled.

Figure 3 shows the staff strength of the physics department of University of Ibadan for the year 1996-2005

fig.3 Staff strength of Physics department

University of Ibadan(1996-2005)



The average percentage of male teaching staff is 80 while that of the female counterpart is 20, showing that for every 4 male staff, there is one female.

Discussion

It is evident from the results obtained fig. (1-2), which shows that the girl child enrolment for education in physics had not improved. An average of one one female per every six male students enrolled for physics, which almost agree with the editorial comment on [http:// physics web.org](http://physicsweb.org), (2002).

The participation of female teaching staff also shows that for every four male lecturers there is just one female teaching staff. This also almost agree with Nwana (1993) who found out that schools of engineering and vetinary medicines of the Universities of Nigeria Nsukka were male dominated during 1989/90 session, where in for every five male lecturers, there is only one female counterpart.

If we are to progress technologically, physics being the foundation for all science and technology take off concerted efforts must be geared towards the teaching of physics in our schools. Bearing in mind that for every female child that is taught it is almost certain that the entire family is taught. Women have a great influence, most times on the education of their

children. In Africa children, apart from number of hours spent in schools, the larger portion of their time is spent with their mothers, which can encourage early interest in sciences and particularly in physics. This agrees with the finding that most women who were interviewed reported that they developed interest in physics as a career before or during their secondary school ages(Ivie et a, 2001). Imagine if an average household has at least a female person educated in physics, the multiplier effect in the society will be great.

Lacks of adequate number of female teachers are also not in favour of increasing in participation of female students in education in physics, this result is because there are no female role models. Teachers have a role in the teaching of the subject matter, the excitement of the field and the building of confidence in the subjects.

Both parents and teachers play great role in building self esteem in the child, a strong belief in her intellectual ability, which serves as a source of strength during the rigors of education in Physics, which are often lack, as most teaching staff are male dominated. These male dominated society have a stereotyped idea of who should have a particular education, negating the idea of equal opportunity for both gender

Several reasons have been attributed to lagging behind of female folks in Science, Mathematics, particularly Physics education. Among first issue this study addressed was to review literature and find out if females are intellectually deficient to learn and achieve in Science, mathematics education (Physics is both science and mathematics combined). May be to justify the reasons for the girl child lagging behind in participation in physics. It was found out that the female is not intellectual inferior to her male counterpart. What has been found from the Scio-psychological approaches include:

- the choice of the student to enroll in Science and mathematics which is dependent upon a result of her expectancies for successful performance and the subjective value of the tasks for the individual (Eccles, 1984)
- science and mathematics are not seen as congruent with females-sex-role identity (Hamm rich, 1995)
- lower self –confidence, thinking of lack of ability and over estimating the difficulty of unfamiliar tasks.

Other findings include

- The classroom practices such as teachers-student interactions, teacher expectations of students performances (Bennett, 1996; Duffy, Warren & Walsh, 2001; Orukota, 2003), all contribute to lagging behind in and participation of women in education in physics. It was found out that male student play active role in classroom teaching and learning situation than their female counter part, thereby engaging the attention of teachers. Bennett, (1996) reported that male teachers have certain expectation of the of the girl child in the classroom, thus limiting the level of interaction between the teachers and the female learner that may contribute in less participation in science and mathematics.

The cultural stereotyping and traditional roles assigned to women (early marriages, homely sex-role, and less competitive, strong role models) hinders effective, and equal participation of girl child in the education in physics (Cole and Griffin, 1987; Collis, 1991; Felter, 1985; Nwana, 1993; Bolarin, 1993, 2005}. Government policies have not helped matters either, particularly the masculine nature of the curricular. Textual materials are yet to be gender sensitive {Nwana, 1993; Bolarin, 1993, 2005}. The curricular is competitive and individualistic which runcounter to female learning styles, which are more co-operative and inter dependent in nature {Hamm rich, 1995]

Research effort by National Science Foundation (NSF), 1990, and Tasks Force on Women, Minorities and Handicapped in Science and Technology {1989} have shown that the little have been realized in narrowing the gap. Sisters In Science Project {SISP}, (1995) have been an effort to extend the frontiers and possibilities for incasing female participation and achievement in science and mathematics. The objective of this performance was to offer a multi-level intervention centered around the constructivist learning model, in this project cooperative exploratory hand-on-science and mathematics education along with self reflection were employed to facilitate learning. In doing this the SISP, hoped to demasculine and demystify science and mathematics and at the same time, promote woman role models and carrier information, allowing for active involvement. It is beliefs that while girls do science and mathematics, their self-confidence and self-perception of their abilities to do science and mathematics will be enhanced.

International Union of Pure and Applied Physics {I U P A P}, have held intentional

conferences on women in physics, particularly the March 7-9 2002 conference. And several issues on attracting girl into physics from child hood to the university were discussed and recommendations made.

The recommendations made by I U P A P international conference on woman in physics, are:

- Revise educational curriculum and material to connect physics with medicine, biology, technology, the environment e.t.c. To show diverse physics career paths, and job prospect. Ensure physics courses, mathematics courses textbook, equipment and funding for girls education are as good as for boys' education, and feature women physicist as role models.
- Strengthen the training of science/ physics teachers and include opportunity for them to do research and interact with working scientist. Training teachers and counselors about gender issues {girl friendly classroom atmosphere, examples of interest to girls}. Attract qualify schoolteachers with fair play, respect and working conditions.
- Publicize physics role models who contract the stereotypes and whose stories are examples of career success and leadership position.
- Educate parents about opportunity for daughters and how to encourage them.
- Help smart girls network {clubs, enrichment opportunities and encouragement}
- Attract more girls to compete in prestigious physics competitions.
- Raise boys to share family responsibilities and to expect women to have professions.
- Get international help and funding for schools in developing countries
- Involve universities, research institutes and industries to help schools and strengthen teaching training.

THE CHALLENGE

Our opinion is that a pragmatic effort must be geared toward girl child in education in physic. The affirmative programme of the federal government towards equal participation of women in political issues in this political dispensation can be carried over to into educational sector, particularly science and mathematics education and will be of immense benefit to the nation, though not today but tomorrow.

The teaching- learning environment must be improved upon. Particularly is the teaching –student interaction. The teaching learning must foster self-nurturing environment, promoting

problem solving skills, create collaborative experiences, hand-on-learning and allowing for opening discussion about gender stereotype. This method of teaching and learning an off-shoot of constructivism, an epistemological perspective of knowledge construction, allow for interaction of human and environment and promote learning about the world.

Success stories of women in physics must be put at the front burner and stressing them as role models to dispel the fear of inability to succeed, lack of self-confidence of the female folks, and thus encourage more female's participation in education in physics.

Attitudes though difficult to change, (Pratt, 1985; Riddle, 1992; Whyte, 1986) must be refocused. Sex role stereotyping for females must be challenged using high achieving female scientist and role models in leadership positions.

The challenge is for the Nigeria Institute of Physics {NIP} is to elect a female folks as the next president of the institute. We are of the opinion that each female folk present at this conference must make every effort to produce at least another female potential lecturer in her department. Though this is not a lead paper for this conference it is hope that the issued put forward in this paper will serve as a kernel for discussion in this conference particularly on women in physics and energy education

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