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## Factors That Promote Gender Imbalance in the Teaching of Science/Mathematics: The Views of Practicing Teachers

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### Abstract

*This research was carried out to investigate factors that promote gender imbalance in the teaching of science/mathematics. Fifty (50) Public Secondary and Primary Schools were selected randomly for the study. A total of one thousand (1000) teachers were used for the study comprising 400 males and 600 females. A twenty (20) item- questionnaire was used which consisted of statements that promote/inhibit gender imbalance in the teaching of science and mathematics. Data collected from respondent were subjected to t-test, weighted mean ( $\bar{x}$ ) and standard deviation (SD) statistical analysis. It was discovered that there is significant difference between male and female teachers in their views concerning factors that promote gender imbalance in the teaching of science/mathematics in favour of male teachers. Recommendations were given which include that Government should provide good working environment to teachers and equip the laboratories for effective teaching and learning of science and mathematics.*

### Introduction

The issue of gender imbalance in the teaching of science/mathematics takes its root from secondary schools where students are enrolled to do either Science or Arts subjects. During our secondary school days, girls preferred Arts subjects while majority of boys preferred Science subjects. Science had been defined as the general body of knowledge, which has been accumulated and organized by systematic study. It has been argued that two characteristics

distinguish it from all other bodies of knowledge or understanding. First, it must be objective, and secondly, it must be possible to prove or disprove it (Okonkwo et al, 2002). Education is thus an important means of socialization. It helps an individual to understand himself/herself, his or her society and shapes his or her behaviour. Furthermore, science may be seen as a way of finding out more about things that occur in one's environment. The Ibibio women at the early part of this century scarcely had access to education yet by tradition they were expected to encourage their young ones to acquire education. This dilemma explains the existing gap in girls education generally and in the science and technology in particular (Ekpo, 2004).

During the science education reforms of the 1980's, it became evident that both the pedagogical practice and the presentation of science in many classroom reflected social and cultural stereotypes which were masculine, resulting in curriculum better suited to boys only (Ogunleye, 2002). Research studies therefore became concerned with how well the needs, learning styles and values of girls were considered in the science classrooms and to find ways and means by which curriculum and pedagogy could cater more effectively for these needs and learning styles. Today, understanding of gender equity had grown and diversified as the framework used for thinking about the issues have changed. The new science education reforms interpret gender equity in terms of the ways in which science is used in society and in school to privileged member of dominant cultural and social groupings including gender.

Despite the efforts aimed at improving science, technology and mathematics (STM) education in Nigeria, the benefits have not been the same for male and female students in the learning of science/mathematics. In fact girls underachieve and are under-represented in science/mathematics (Ogunleye, 2001).

The heavy dependence on mathematics also makes it a subject that is dreaded by nearly all students especially girls at the secondary school level. Because of this physics enjoys the least popularity among the three science subjects, thereby resulting in the dearth of girls pursuing physics. This has often resulted in girls low enrolment in physics at the various institutions of higher learning, which in fact has brought about few female teachers teaching physics in our secondary schools. This fact has been earlier confirmed by Ogunleye (1999) who showed that enrolment in science thins out as one

moves up the educational ladder. Furthermore, girls' underachievement in physics could be seen from the performance in externally conducted examinations (Adeyegbe et al, 1998). Ogunleye (1999) have variously confirmed the underachievement of girls in science.

Many factors have been identified to be influencing low enrolment in secondary school physics. These include lack of mathematical skills possessed by students, lack of students in physics; influence of others, home background of students; perceiving physics as difficult subject, low popularity index and rating among other school subjects (Ogunleye 2001). Ogunleye (1999) also identified low parental expectation, encouragement, fewer opportunities to work with science materials and instruments and also low participation of girls in extra curricula science activities as some of the factors contributing to girls low achievement level. All the above mentioned factors are also applicable to chemistry.

According to Besong (2002), other important factors that militate against STM literacy are gender discriminatory barriers in African societies that operate against equitable participation of boys and girls in STM Education. She further stated that curricula, pedagogic practices and classroom organization, further hinder the access and retention of girls in STM education.

The issue of parity and disparity in the performance of male and female students in mathematics has formed an important focus of research for some years now. The issue of gender disparity in mathematics performance of secondary school students was clearly detected by Alio and Harbor-Peter (2000). Umoinyang and Ekwueme (2005) quoted Burton as saying that gender difference in mathematics achievements is attributed to environmental and psychological factors. They further identified psychological, biological and cultural factors as sources of gender differences in science, technology and mathematics (STM) achievement and possible decline in performance of girls. Many studies found out a very low percentage of females in sciences, mathematics and engineering. They conclude that males do better than females on mathematical problems involving, story problems, and spatial relations problems.

### **Influence of the traditional practices on girls education**

There are numerous research studies published and unpublicized reports, which confirm the issue of gender differentials in education. It is noted that in all countries men receive more education than women and the differential

is worst in areas where most of the populace do not have educational exposure (Ekpo, 2004)

Years of research in gender and mathematics has identified inequities, socio-cultural variables, and some approaches to addressing the inequities, but the problem seems to be much more complex. However, girls are still under-represented in graduate mathematics programmes and mathematics related careers. The contrast between the increase in the number of women entering professions such as law and medicine, for example, and the relatively modest gains among women pursuing advanced degrees in mathematics and physical science, is quite striking.

Ekpo (2004) and Ituen (2002) observed that though there has been considerable progress in facilitating women access to education lately, there is still gender disparity in enrolment, performance and completion of science and technology based programmes as offered by the three existing tertiary institutions in Akwa Ibom State, namely the University of Uyo, Polytechnic and College of Education. This situation is very typical of the Nigerian populace and specifically the Akwa Ibom people. There are many forces militating against the Ibibio women in the efforts to improve their lot in the society and specifically in the areas of science, technology and mathematics.

Ekpo (2004) identified the following factors as affecting girls' education:

- Poor education background of parents.
- Competency at househore and physical beauty were attractions that men could not resist and girls had no will power to say no. as a result girls were withdrawn from formal school system to be married out.
- Teenage pregnancy and societal ridicule if the girls got pregnant half-way through their education.
- Societal expectation that a woman should be feminine in looks and behaviours and was expected to be protected. To the elders, western education exposes the girls adversely.

### **Influences of the traditional practices on science and technology**

The observed levels in science achievement in secondary school pupils are associated with gender and environment influences. Women have been generally considered to have a weaker capacity to achieve well in sciences. It has been observed that female teachers are viewed as inefficient by students

as they tend to work less in school due to pregnancy, child bearing and rearing. Generally in many areas of the Nigerian society, it is believed that a woman's place is and should be in the kitchen. Many parents, especially fathers still frown at the birth of a baby girl. From birth, a girl is therefore made to feel inferior to and weaker than a boy.

As regards their performances in science and technology, the traditional elders further noted that traditional Ibibio girls could not offer science based courses because the early schools established had no facilities for education in the sciences. The few who were science inclined got into the so-called feminine profession like nursing, domestic science and teaching (Ekpo, 2004). The item on domestication of girls has the highest mean weight. This clearly indicates that domestication has a considerable influence on girls exposure to learning experiences in science and technology. While domestication of girls and other society restrictions are still hindering many of the young girls in offering science and technology, a crop of young girls are daring into the supposedly male dominated area. During an open group discussion session with some seventy (70) high school girls from the Federal Science and Technical College, Uyo to assess the current trend of girls in science and technology, their curriculum consists of general science education courses. The girls were found to be fulfilled and confident in their various areas of studies. Their academic performances were found to be quite good. They remarked that, their counterparts in other conventional secondary schools and non-science areas are envious of the opportunity they have and some appreciate their endeavours in science and technology. Few others felt that, the girls in Federal Science and Technical College (FSTC) were taking a risk to enter into male careers and as such discouraged them. The researcher opines that this negative attitude is a result of the influences from the Ibibio social environment and cultural beliefs on gender roles.

### **Teachers' perception of the teaching profession**

The teachers are the builders of the builders; that is because it takes the teacher to make the doctor, lawyer, engineer, accountant, architect and all the rest of the professionals that could be regarded as nation builders (Duguryil, Timothy and Duguryil, 2005). It is generally agreed that the quality of education in any country is reflected by, and related to the quality of men and women who serve as teacher in her school systems.

Furthermore, the central importance of teachers in the education process has been recognized in various documents. In the Second Development Plan

(1970); and the third Development Plan and in the National Policy on Education (2004 Revised Edition), the Federal Government observed that “the quality of teaching staff is probably the most important determinant of educational standard at all levels”.

The study carried out by Dugunji, Timothy and Dugunji (2005) revealed that most primary and secondary school teachers will not choose teaching profession again if they had the privilege of choosing a profession all over again. They further stated that a good number of the tertiary institution teachers will like to teach again if asked to choose a profession all over. This may be related to the fact that their salary package is much higher than that of their secondary and primary school counterparts. Also teachers at the college of education level are accorded higher esteem by the society.

### **Status of resource materials in science teaching in secondary schools**

Environmental factors play a significant role on the performance of a child. Educational resources and facilities available in a given school environment influence teaching, learning and achievement. Udousoro (2010) observed that students in schools located in urban areas that are properly equipped in terms of classroom, library, laboratory and adequate staffing stand to benefit much more than those students in school located in rural area, that are ill or poorly equipped. Science classes in schools that are poorly equipped and staffed are taught theoretically and students are passive listeners. She observed that science concepts are difficult to teach in schools because of the acute shortage of regular teaching aids and equipments. Consequently, this shortage may lead to little students practice and misguided teaching method. The importance of resource materials was also stressed by Ezeife (1993) who contended that adequate learning facilities must be available for the teaching of curriculum content so that the curriculum objectives may be achieved. Such facilities as good and functional laboratory equipment, current textbooks and adequate space are essential for proper and effective teaching and learning to occur.

It is against the factors mentioned above that this paper surveys the views of the practicing teachers on gender imbalance in the teaching of science/mathematics.

### **Research methodology**

The design adopted for this study was a survey design and some structured interview

A total of one thousand (1000) teachers (400 males and 600 females) randomly selected from fifty (50) secondary and primary schools, took part in the study. The break down shows that four hundred and fifty (450) are teaching in the primary school, three hundred (300) in the secondary schools and two hundred and fifty (250) are undergraduate student teachers.

### **Purpose of Study**

The study was undertaken to identify factors that promote gender imbalance in the teaching of science/mathematics as viewed by practicing teachers. Specifically the study would achieve the following:

- (1) Identify perceived and experienced barriers experienced by teachers in the classroom.
- (2) Explores the attitudes of male/female undergraduates to teaching as a possible career.

### **Research Questions**

The following questions were posed to guide the study:

- (1) What are the views of practicing teachers towards teaching as a career?
- (2) What views do male/female undergraduates portray towards teaching as a possible career?
- (3) To what extent do male teachers differ from their female counterpart in their views?

### **Instrumentation**

The instrument used for gathering data was a four point rating scale questionnaire on gender imbalance in the teaching of science and mathematics together with structured interview. Items with weighted mean of 2.50 and above were regarded as exerting sufficient barrier and those with mean weights of less than 2.50 were regarded as posing less influence on gender imbalance.

### **Results and discussion**

Data gathered from the study was analyzed using weighted means, standard deviation and t-test, and the results are presented according to the research questions posed.

### **Research Question 1**

- (1) What are the views of practicing teachers towards teaching as a career?

The answer to this question is given on table 1

From the above Table 1, the mean rating of each statement is 2.50. The mean score in each statement below 2.50 is not significant meaning that these statements do not affect male and female teachers in their views concerning the factors that promote gender imbalance in the teaching of science/mathematics. These include statement Nos. 4, 5, 6, 7, 8, 10, 12, 14.

The mean score above 2.50 is significant, meaning that these statements contribute to factors that promote gender imbalance in the teaching of science/mathematics. These statements include No. 1, 2, 3, 9, 11, 13, 15, 16, 17, 18, 19, 20.

A cross –section of the teachers were interviewed and the following statements were gathered:

- Practicing teachers in primary schools identified a number of positive features of teaching, including the opportunities provide for varied and autonomous work and contributing to the social and academic development of children and young people.
- They also identified fun as an intrinsic part of working with children. Another positive features of teaching the variety of the job, holidays and pension - arrangements compared to other jobs in the private sector, and the working hours were very good for people with caring responsibilities.
- Like their colleagues in the primary schools, secondary teachers also spoke of the values they placed on their relative autonomy in the classroom and the pleasure of working with young people. Some also referred to the advantages of teaching compared with other professions.
- Negative features identified by secondary school teachers included the number of students seen on a daily basis and the amount of paper work from assignments. Male teachers in the secondary schools emphasized the low pay and lack of promotion opportunities

in teaching. However this was a more salient factor for men than women.

### **Research Questions 2**

What views do male/female undergraduates portray towards teaching as a possible career?

In connection with the above views by practicing teachers, it is worth noting that there were no significant differences between male and female undergraduates in their views of the importance of salary as a factor in career choice.

### **Research Question 3**

To what extent do male teachers differ from their female counterpart in their views?

The answer to this question is given on Table 2.

The data gathered from the study was analyzed using uncorrelated t-test, mean ( $\bar{x}$ ) and standard deviation (SD). The calculated t-test (2.19) was found to be greater than the critical value of t (2.10) at the degree of freedom (df) of 998. From the result, the null hypothesis is rejected, which implies that there exists a significant difference between the mean scores of male and female teachers in their views concerning factors that promote gender imbalance in the teaching of science/mathematics. Specifically, the result is in favour of male teachers, which means that the factors that promote gender imbalance favoured male teachers than their female counterparts in the teaching of science/mathematics.

Judging from the result of the t-test on Table 2 which shows the significant difference between male and female teachers in their views concerning science/mathematics teaching, these views are confirmed by Ogunleye (2002), (2001), (1999), Besong (2002), Umoinyang and Ekwueme (2005), Ekpo (2004). They pointed out gender discriminatory barriers, gender disparity, environmental, psychological, biological and cultural factors contribute to gender imbalance in science and teaching. Falua (1994) also pointed out that female teachers cannot put in their best due to pregnancy, child bearing and caring.

The result of the weighted mean and standard deviation in Table 2 shows the following as the major factors that promote gender imbalance in the teaching of science/mathematics: teachers are not respected by the society, teachers'

effort are not commensurate with reward, students don't consider teaching as worthwhile, rude behaviour of students, students attitude to learning, poor working environment.

### **Conclusion and recommendation**

This study identified the views of male and female teachers toward the teaching of science/mathematics. They like teaching because they love teaching, teaching refreshes their memory through reading and that teaching is challenging and rewarding. They frown at lack of incentives to teachers, the poor attitudes of students to learning, poor working environment, and lack of respect to teachers by the society.

Based on the findings of this research work, the following recommendations were made:

- Secondary school teachers must be respected by the society to boost their morale.
- Government should give incentives to the science teachers.
- Adequate instrumental material should be provided to schools.
- Female science teachers should be encouraged by the government as well as by the entire society.
- Teachers should be provided with good working environment like good offices and well-equipped laboratories.

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**Table 1: Views of Practicing Teachers on Gender Imbalance**

S/N	ITEMS	mean (X)	S.D
1	Female teachers cannot put in their best due to pregnancy, child bearing and caring.	2.70	1.03
2	I experienced job satisfaction when I am in the class	2.70	0.66
3	The way students behave sometimes make me to think of leaving the job for a better one.	2.65	0.67
4	I enjoy the teaching job because immediately after 2.00pm, I will go home to attending to other things.	2.40	0.88
5	I feel bored when I am at home that is why I always like to be in school to keep myself busy.	2.15	0.59
6	I enjoys teaching for the practical aspect of it.	1.75	0.44
7	gender stereotyping has encouraged me to be a science teacher	2.30	0.73
8	I like teaching because the salary of teachers is very good	1.45	0.51
9	I hate teaching because the working environment is poor	3.55	0.88
10	Teaching is enjoyable because of the incentives government gives to the teachers.	1.80	0.95
11	Teaching affords opportunity for further studies	3.55	0.51
12	Good facilities and well-equipped laboratories in our school really encouraged me to teach science.	3.55	0.51
13	Teaching is challenging and rewarding.	3.15	0.36
14	In like this teaching job because of the regular promotion and leave grant that government gives to the teachers.	2.40	0.68
15	Teachers are not respected by the society.	3.35	0.48
16	Teachers effort is not commensurate with reward.	3.70	0.47
17	Students don't consider teaching as worthwhile.	3.50	0.48
18	Students attitude to learning do not encourage teachers to put in their best.	3.35	0.48
19	naturally, I love teaching	3.05	0.51
20	teaching refreshes my memory through reading	3.05	0.60

**Table 2: t-test comparison of the views of male and female teachers on gender imbalance**

Group	N	X̄	SD	DF	t-cal	t-crit	P
Male	400	56.5	2.63	998	3.19	2.10	*
Female	600	43.5	3.44				

\* = significant at  $p < .05$