
A COMPARATIVE STUDY OF MALE AND FEMALE ATTENDANCE IN PHYSICS IN SOME SECONDARY AND TERTIARY INSTITUTIONS IN NIGERIA

By

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Abstract

This paper challenges the female and those in authority that as the percentages of women in politics and other financially booming ventures increase rapidly, the effects of the female in Physics and Physics related disciplines do not follow that same trend. Hence, this comparative study of male and female enrolment in Physics in the West African Examination Council/Senior School Certificate Examination (WAEC/SSCE) in secondary schools and undergraduates and post-graduates in Physics in tertiary institutions, and the distribution of male and female academic staff in Physics Department in tertiary institutions. This paper reveals that female enrolment and achievement in Physics need much to be desired when compared with the enrolment and achievement of their male counter parts.

A sound Physics education is necessary for a nation like Nigeria which aspires toward development in technology. To produce female Scientists and Engineers for technological development, much has to be done in the enrolment and distribution of female students and staff in Physics in secondary and tertiary levels.

Gender is socially and culturally constructed concept based on biological differences of sexes primarily male and female. To be sensitive towards any one's sexual or reproductive differential capability (abd) roles while actively trying to remove all types of discriminations and stereotypes that affect the growth of a person particularly female could be called or classified as gender sensitivity.

However, the traditional and socially approved roles of the Nigerian women are "that of child bearing, agriculture and house-keeping". For many years, societal culture, tradition, norms and values restricted the Nigerian women to the aforementioned traditional roles. However, since old prejudices, habits, customs and values die hard, the few educated Nigerian women were for a long time restricted to professions such as teaching, nursing, etc as it was believed that certain professions were exclusively for men. Because of this erroneous belief, women who constitute approximately half of the human race were grossly underutilized.

The plight of women today has attracted the attention of the United Nations (UN) which declared 1976-1985 the Nigeria decade for Women. Since that decade ended, a lot has been achieved at administrative, legislative and networking levels. Is there any significant impact, achievement or improvement by women in Physics in both secondary and tertiary levels? This is where this study is of interest. According to the Final Report of the Forum (1996:16),

Despite the Solemn commitments of world leaders to invest more in educating women and girls, and despite all the research indicating the tremendous benefits to society of such investment, this seems to be the area where least progress has been made. Mr. A Choksi, Vice-President, World Bank asserted that there has been lots of talk and rhetorics on girls education, but not a lot of action. He said that the Bank will be lending 2.5 billion US dollars a year over the next five years to education, and 60 percent will go to girls education. The Forum called for a substantial increase in funds, as well as better use of existing funds for the education of girls and women.

Review of Literature

The findings in previous studies show that some factors are responsible for the poor female attendance in Physics. The major factor is cultural. Nerving (1973) in her work revealed that some girls abandoned the study of Mathematics before they entered the senior classes of secondary school and far fewer girls than boys choose to study physical sciences and mathematics.

Analysis by Hussen (1974) on Secondary School grades revealed that on individual subject basis, boys achieved better results in Physics and other science subjects compared to girls. The reasons given include cultural and societal factors. These factors made the people believe that science subject like Physics, and a profession like engineering, are mostly for males while Art subjects and Social Sciences are incompatible with femininity.

The work of Carey (1958) indicated that society discriminates against female scientists, engineers, etc. According to him, females themselves have adapted by shunning success consciously and unconsciously by having poor performance in the field concerned. Tamir et al, reported significant difference between boys and girls about their attitude towards physics. Girls had indeed less positive attitude towards Physics and Physicists. At the same time they refused much more strongly than boys to adopt the image of Physics as a masculine subject to view girls doing Physics as less feminine.

In addition to this, Corinne (1972) pronounced “boys and men... more proficient at mechanical tasks...” In numerical and mathematical abilities too, boys and men fare better...It is noteworthy that in many countries, creative artists... scientists, thinkers have been and are men. There are, of course exceptions, it is only at literary figures that women have made substantial contributions”.

Smith (1976:8) suggested that women's exclusion from ideological production is sealed by the fact that people only pay real attention to, and treat as significant, what is said or done by men. For instance, Goldberg (1974:16) found that the same essay was rated as "impressive when the readers thought the author a man and "mediocre when they thought the author a female. Men have authority of the institutionalized governing structures.

According to Scott and Jongeward (1979), "female executives are in fact harder on members of their own sex than on males. Also... men do not like women bosses and women do not like women bosses. The latter was also supported by the comment of "Sunday Triumph" of October 27, 1991 on gubernatorial elections in Nigeria, that women, when they find themselves in positions of authority, tend to be very hard, hostile and arrogant to all women they consider below them in status. Labour activists chastised and called women enemies of themselves.

Socio-cultural factors which encourage early marriage, plurality of children, excess dependence on the men for support in the absence of access to education and income-generating activities weigh the women down and constitute a serious handicap to any spirited effort to improve her lot.

Statement of the Problem

The major problems this paper intends to examine include:

1. The performance of students (male and female) in O/L Physics in some secondary schools in Benin City.
2. The enrolment of students in Physics (male and female) in some secondary and tertiary institutions, and
3. The distribution of academic staff (male and female) in Physics departments in some tertiary institutions.

Purpose of the Study

The main purposes of the study are:

1. To find out if there is any significant difference in the students' performance in Ordinary Level (O/L) Physics between male and female in some secondary schools.
2. To find out if there is any significant difference in the enrolment of males and females in Physics in some tertiary schools.
3. To find out if there is any significant difference between the distribution of male and female academic staff in Physics department in some tertiary institutions, and
4. Highlight the contributory factors leading to the differences, if any, and make recommendations.

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Research Questions

The questions this study is interested in finding answers to are:

1. If there is any significant difference between the performance of boys and girls in O/L Physics in 1984 and 1985.

2. If there is any significant difference in the enrolment of males and females in Physics in tertiary institutions.
3. If there is any significant difference between the distribution of male and female academic staff in Physics department in tertiary institutions.
4. What are the major factors responsible for this difference if any?
5. How can the situation be improved upon?

Hypotheses

For the purpose of this study, the following hypotheses are postulated.

1. There is no significant difference between the performances of boys and girls in O/L Physics in 1984 and 1985.
2. There is no significant difference in the enrolment of males and females in tertiary institutions from 1989 – 1994.
3. There is no significant difference between the distribution of male and female academic staff in Physics in tertiary institutions

Population and Sample

The population of this study consists of all the Secondary Schools in Oredo Local Government Areas of Edo State that offered Physics in the Leaving School Certificate O/L at least five (5) years before the time specified here, all Colleges of Education in Nigeria, and all Universities in Nigeria.

However, the sample consists of six (6) Secondary Schools which are randomly selected (two boys' schools, two girls' schools and two co-educational schools), five (5) Colleges of Education, and one (1) University, which would be quite representative of the institutions offering Physics at the different levels.

Instrument Used for Data Collection

Since the study is to compare the academic performance, the enrolment and the distribution of academic staff of both sexes in Physics in secondary and tertiary institutions respectively; the information needed were obtained from each of the schools. Questionnaires were not used.

Data Collection

The researcher collected data from the various institutions. Statistical summary of the grades were obtained in WAEC and NCE Statistical Digest on Colleges of Education in Nigeria.

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Method of Data Analysis

For ease of the analysis and interpretation, percentages were used. Based on the formulated hypotheses, the investigator made use of the t-test for independent samples as the Statistical Method for the analysis.

$$t = \frac{\bar{X} - \bar{Y}}{\sqrt{\left(\frac{\sum X^2 + \sum Y^2}{n_1 + n_2 - 2}\right) \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

where dif. = degree of freedom = $(k_1 - 1) + (k_2 - 1) + (k_3 - 1) + \dots$

P = Level of significance – probability = 0.0

n_1 = No. of occurrence (1)

n_2 = No. of occurrence (2)

\bar{X} = Mean value of item (1)

\bar{Y} = Mean value of item (2)

$\sum X^2$ = Summation of $(X - \bar{X})^2$

$\sum Y^2$ = Summation of $(X - \bar{Y})^2$

Presentation of Results

Table I

Enrolment and Performance in Physics in West African School Certificate (WASC) in some Secondary Schools

Schools	Year	Total Enrolment	Total Physics Enrolment	Total Passes	Total Failures	% Passes	% Fail
ICC, Benin (Boys only)	1984	246	56	52	4	93.2	6.8
	1985	404	108	102	6	94.4	5.6
Adolor College (Boys only)	1984	429	102	55	47	53.9	46.1
	1985	237	23	22	1	95.5	4.5
I.G.G.S. (Girls only)	1984	817	1	0	1	00.0	100.0
	1985	189	9	1	8	11.1	88.9
Baptist High School (Mixed)	1984	431	35	27	8	77.1	22.9
	1985	381	29	25	4	86.2	13.8
Asoro Grammar School (Mixed)	1984	578	74	41	33	55.4	44.6
	1985	337	41	14	27	34.1	65.9

Source: WACE Board Benin and each school

Data in Table I shows students' enrolment and performance in Physics in Senior School Certificate Examination (SSCE) in two Boys' Secondary Schools and two Girls Secondary Schools in 1984 and 1985 in Benin City. From the table the ratio of percentage pass of boys to girls is 84.3% boys, 15.7% girls. The enrolment of girls is also poor.

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Table 2

**National Commission for Colleges of Education, Kaduna
1998/99 Distribution of Students Enrolment in Physics by Institutions, Subject and Sex**

Institution	COE Ekiadolor			COE Gashua			COE Gidanwaya			COE Gindiri			COE Gumel			Total	
	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F
Sex																	
No.	18	4	22	5	1	6	12	4	16	18	2	20	17	4	21	70	15
%	81	18	100	83	16	100	75	25	100	90	10	100	80	19	100	82	17
	.8	.2	.0	.3	.7	.0	.0	.0	.0	.0	.0	.0	.9	.1	.0	.4	.6

Source: Statistical digest on Colleges of Education in Nigeria.

Data in Table 2 shows students' enrolment in Physics in five (5) Colleges of Education in Nigeria in 1998/1999 session. The percentage of male enrolment to female enrolment is 82.4% and 17.6% respectively.

Table 3

**University of Benin, Benin City
Total Students Enrolment in Physics, Sex and Level 1991 – 1994**

Level	Undergraduate						Post Graduate			
	I	II	III	IV	Sub-Total	%	Higher Degree		Total	%
Sex	M	M	M	M	M	M	M	F	M	M
	F	F	F	F	F	F			F	F
91/92	18	18	15	23	74	87	10	0	10	100
	4	3	2	2	11	13			0	0
92/93	12	28	15	23	78	89	8	0	8	100
	4	2	2	2	10	11			0	0
93/94	47	6	13	22	22	88	1		11	92
	5	2	-	4	4	11	1		1	8

Source: Academic Planning – University of Benin

Data in Table 3 further shows the poor enrolment of both undergraduate and post-graduate female students in Physics as compared with their male counterparts for three sessions at the University of Benin. The percentage of male to female is 89% to 11%.

Table 4

**National Commission for Colleges of Education, Kaduna
1998/99 Distribution of Academic Staff in Physics by Institutions, Subject and Sex**

Institution	COE Ekiadolor			COE Gashua			COE Gidanwaya			COE Gindiri			COE Gumel			Total		
	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	
Sex																		
No.	3	0	3	4	0	4	2	0	2	10	0	10	5	0	5	24	0	
%	100	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100	0	
	.0	0	.0	.0	0	.0	.0	0	.0	.0	0	.0	.0	0	.0	.0	0	

Data in Table 4 shows a great gap between male and female Physics Lecturers in five (5) Colleges of Education. The percentage of male to female is 100% to 0%. This is also amplified by Table 5 which analysed the Physics Lecturers in University of Benin in 2000, rank and sex. Male 100% and female 0%.

Table 5

**University of Benin, Benin City
Full-time Academic Staff (in Physics) – Rank and Sex 2000**

Professor		Asst Professor		Senior Lect.		Lecturer		Total		%	
M	F	M	F	M	F	M	F	M	F	M	F
2	0	2	0	1	0	9	0	14	0	100.0	0.0

Source: Bursary Department, University of Benin

Hypothesis (I)

Table 6: t-test Analysis of Percentage Pass of Boys/Girls in Physics in Secondary Schools

Boys (X)	Girls (Y)	$X - \bar{X}$	$(X - \bar{X})^2$	$Y - \bar{Y}$	$(Y - \bar{Y})^2$
93.2	68.2	8.95	80.10	28.58	816.53
94.4	79.2	10.15	103.02	39.58	1566.18
53.9	00.0	-30.35	921.12	-39.63	1570.14
95.5	11.1	11.25	126.56	28.53	813.68
$\bar{X} = 84.25$					
4766.59		$\bar{Y} = 39.63$			1230.80

On null hypothesis, t, by computation of formula $t = 0.09$
Df = 6, $t = 2.45$, at 5%

Hence our value is not significant, that is there is no significant difference between the performances of boys and girls schools in Ordinary Level (O/L), therefore hypothesis (I) is not accepted.

Hypothesis (2)

Table 7: T-test Analysis of Students Distributions in Physics in Colleges of Education and Uniben

Institutions	Male M(X)	Female F(Y)	$X - \bar{X}$	$(X - \bar{X})^2$	$Y - \bar{Y}$	$(Y - \bar{Y})^2$
5 (COE), total	82.5	17.8	-6.9	47.6	7.1	50.4
Undergraduate (Uniben)	88.3	11.7	-1.0	1.0	1.0	1.0
Postgraduate (Uniben)	97.3	2.7	7.9	62.4	-8.0	64.0

$$X=89.3 \quad Y=10.7$$

$$111.0$$

$$115.4$$

On null-hypothesis, t test by computation is 12.8
Degree of freedom (d.f) = 4, t = 2.78 at 5%.

The value is very highly significant. The null hypothesis is therefore not confirmed. The alternative hypothesis implies. That is, there is significant difference between the distribution or the enrolment of males and females in _Physics in tertiary institutions. This also tallies with the percentage comparison.

Hypothesis (3)

Table 8 T-test Analysis of the Distribution of Male and Female Academic Staff in Physics

Male (X)	Female (Y)	$X - \bar{X}$	$(X - \bar{X})^2$	$Y - \bar{Y}$	$(Y - \bar{Y})^2$
3	0	-1.22	1.49	0.0	0.0
4	0	0.22	0.049	0.0	0.0
2	0	-2.22	4.93	0.0	0.0
1	0	5.78	33.38	0.0	0.0
5	0	0.78	0.61	0.0	0.0
2	0	-2.22	4.94	0.0	0.0
2	0	-2.22	4.94	0.0	0.0
1	0	-3.22	10.38	0.0	0.0
9	0	4.78	22.83	0.0	0.0
$\bar{X} = 4.2$	$\bar{Y} = 0$		1230.80	0.0	0.0

t-test computation is 3.92.
d.f = 16, t = 2.12 at 5%.

The t- value is highly significant which implies that there is significant difference between the distribution of male and female academic staff in Physics in tertiary institutions. This also tallies with the percentage comparison. Therefore hypothesis III is not confirmed.

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Conclusion

This study shows that only few female students enroll in Physics in both secondary and tertiary levels. As academic levels get higher, the number of female involvement markedly reduced. Worse still, no female Physics lecturer was employed in Physics department of five (5) Colleges of Education and University of Benin. Despite the progress in expanding primary education during the 1990s, the ALL dimension of the JOMTIEN Vision of Education for ALL still needs greater attention, and despite the rhetoric's in high places, the gender gap is closing very slowly. Unless there is a truly major effort to change this situation, education for ALL will remain an illusive goal well into the 21st century.

Recommendations

The different level of government should make a policy that every boy or girl should be taught Physics, pure and applied; all pupils should be taught Physics to the age of 16. The national, state and local governments, in partnership with a range of local actors and external donors, should work to boost girls' enrolment. An inter-ministerial committee charged with studying the gender gap in education should be established. To reduce drop-out rate, pregnant girls and young mothers should be allowed to continue their studies and special stipends should be given to increase girls' enrolment in Mathematics and Physics. All levels of government should engage in strategies, such as using non-formal education,

introducing flexible school hours, providing nurseries and day-care facilities for the children of young mothers, recruiting more female teachers, improving the health and nutrition for girls so that they are better able to learn, abolishing fees and school uniforms, provision of adequate maternal care and leave for mothers to regain their health, etc. [There should be positive change in societal attitude toward women in management and sciences (Physics).

More funds should be made available for the education of girls and women. Employers of labour could provide crèches, Day-care Centres, in their work areas to enhance productivity of female employees and curtail time wastage.

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