

# GENDER ISSUES IN EDUCATION AND DEVELOPMENT

A Book of Readings

EDITED BY  
E. N. OKPARA



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# GENDER DIFFERENCES IN SENIOR SECONDARY SCHOOL CHEMISTRY PERFORMANCE IN AKWA IBOM STATE

BY

E.U. JOSEPH

## **Introduction:**

Differences among students are commonly observed in practice and in research. One of the most obvious differences turns on sex; male students appear to predominate in classroom discussions.

Male have been found to initiate more verbal exchanges than females and make more influential contributions in that their opinions are more likely to be yielded to by females than vice versa (*Gall and Gall, 1976*).

These findings have been interpreted to mean that males are "more task oriented" while females are "more socio-emotional" (*Dillon 1982*). These modes tend to play leading roles in the sexes' choice of School Subjects.

Finn (1980), using 2777 English pupils conducted a cross-national study on sex differences in educational out-comes. He also established that, boys outperformed girls in Physics, Chemistry and Practical applications with virtually no differences in biology. However, girls from unisex schools outperformed boys in biology and chemistry.

Studies in Nigeria also confirm males' superiority in Science achievement. Studies by *Ogunyemi (1973)*; *Ato (1986)*; *Oriaifo (1986)* *Inyang (1989)* and *Ausa (1990)* affirm this fact. From Ato's standpoint, girls particularly find science significantly more difficult than boys.

During an evaluation of female students' achievement in Secondary School Science, *Oriaifo (1986)* confirmed males superiority not only in cognitive performance in science but also in the psychomotor performances as well as in the affective behaviours.

On a closer study of his data, *Oriaifo (1986)* discovered that there were many cases in which individual female students performed better than their male counterparts. This finding, thus exposes the aggregarian nature of the problem of female poor performance in science education. This low achievement level of the female group as a whole in science education has been attributed to the overall unfavourable attitude to science by female students.

Despite the afore-mentioned cases, all hope is not lost for girls in science as some other research studies do not seem to agree with these negative findings. As further review revealed, *Afemikche (1982)* is not in complete agreement with the above trend in sex differences with regard to achievement in science. In his

survey, *Afemikche (1982)* observed that science performance by female students in single sex schools was better than those in coeducation institutions. He also showed that girls in single sex schools had better scores in chemistry than boys in unisex (all boys) schools.

A few other studies have revealed a no significant difference verdict on the issue of sex and achievement. Studies by *Nwachukwu (1982)* and *Daramola (1983)* are clear evidence.

Even with these seemingly consoling findings, *Oriaifo (1986)* warns: *Any society that intends to maximise its national productivity must not under rate contributions of females particularly in the areas of science and technology. In Nigeria where the population of women is put at over 60% of the national figure, it will be the limit of wastefulness of human potential and resources to condone female under achievement in science and their under-representation in scientific and technological careers.*

This warning is a thought provoking one as *Kelly (1981)* affirms that statistically data show the under representation of females in science at all levels of education. This situation ought not to be.

In order to ascertain the current situation with regards to gender differences in students performance in Senior Secondary School Chemistry, a Validated Chemistry Achievement Test (VCAT) will be used. Based on this instrument, the following research hypotheses will be addressed.

1. There is no significant difference in the scores of male and female students on the Validated Chemistry Achievement Test (VCAT).
2. There is no significant difference in the scores of male and female students of coeducational institutions on the VCAT.

#### **The Study:**

**Subjects:** A Sample of eighty (80) students who had completed their SS2 Chemistry Programme in three (3) Secondary Schools in Akwa Ibom State were selected for the pilot study.

For the main research all the Chemistry students from twelve schools selected were used. The schools were selected by stratified random sampling on the basis of the Local Government Area they are located. A total of 300 students participated in the study.

**Instrument:** The SSS Chemistry core Curriculum was used by the researcher to construct an eight item Chemistry Achievement Test (CAT) from a pool of one hundred and ten multiple Choice items. To assess achievement based on the six levels of Bloom's taxonomy of educational objectives for the cognitive

domain: the 80 multiple choice items instrument was compiled in the ratio of 30:21:11:7:6:5 for knowledge, comprehensive application, analysis, synthesis and evaluation respectively.

The CAT was administered with the help of the school teachers serving as inviligators. The students responded to the test under strict examination conditions. The students were expected to complete the 80 items with 90 minutes. One point was allotted to each question, thus the highest score of 80 points was expected for the invalidated instrument.

### **Validity and Reliability of Instrument:**

The eighty item (CAT) was scrutinized for content validity by a Chemistry Education Specialist; a Measurement and Evaluation lecturer and two practising secondary school chemistry teachers. On ascertaining the content validity of the instrument, a pilot study was conducted using eighty students from three schools in Akwa Ibom State.

On the basis of the pilot study results, forty multiple choice item were selected to make up the final Validated Chemistry Achievement Test (VCAT). This test was composed of questions with discriminatory indices (D) of 0.4 and above; difficulty indices (p) between 0.30 and 0.73; moreso, a few items with the discriminatory indices between 0.27 and 0.37 were accepted with corrections.

The VCAT was assembled in the ratio of 18:11;5;3:3:1 from each of the six levels (in ascending order) of the cognitive domain as proposed by *Bloom et al, (1956)*.

The VCAT had a reliability coefficient of 0.78 using the test retest method and an internal consistency of 0.78 using the Kuder-Richardson 21' formula.

The VCAT was administered under favourable examination conditions with the aid of resident teachers in the participating schools. A duration of 50 minutes was allowed for the test and one point was allotted to each of the 40 items.

### **Results:**

The researcher proposed a no significant difference in the scores of male and female students on the VCAT in finding statistical basis for the assertion, the researcher studied the means of both sexes in each of the schools involved in the research. The grand means were further subjected to a t-test analysis. The results of the analyses are as shown in Table I.

**Table I**  
**The Mean Scores on VCAT of**  
**Males and Female from the Participating Schools**

School	Males		Females	
	N	X	N	X
A	10	15.10	10	11.80
B	14	16.79	10	12.20
C	10	24.60	20	21.15
D	25	18.56	30	14.90
E	6	14.17	6	13.83
F	-	-	47	22.11
G	53	17.74	2	19.50
H	6	20.80	4	20.25
I	3	20.00	1	18.00
J	10	23.40	9	20.14
K	6	22.30	8	13.75
L	4	12.25	6	12.83

The table indicates that School F is a girls' school while school G is predominantly a male school. On inspection of the mean scores given in the table above, male students are seen to have done generally better in all schools except in school G. But on subjecting the data to a more detailed statistical analysis, by using the student t-test procedure, the following result were obtained.

**Table II**  
**A t-test Analysis on the Difference in the Scores**  
**of Male and Female Students on the VCAT**

	N	X	SD	total
Males	147	18.52	5.44	0.884
Females	153	17.92	6.37	(ns)

$$P > 0.05$$

A calculated t-value of 0.884 at df of 298 with 1.96 as the critical value indicated that there is a no significant difference in the scores of the male and female students who took part in the study. But on further investigation, the researcher deleted the scores of students from schools F (an all girls' school)

and scores of subjects from school G (a predominantly male school) involved in the study. The result obtained showed a drastic turn in the tide, indicating they, there is a significant difference in the scores of male and female students on the VCAT. This verdict is substantiated by the 3.64 calculated t-value at  $df = 196$  when allowing for only a 5% chance error. See Table III for detailed results.

**Table III**  
**A t-test Analysis on the Difference in the Scores**  
**of Male and Female Students on the VCAT**

	N	X	SD	t
Males	94	18.97	5.75	3.64
Females	104	15.99	5.77	

$$P < 0.05$$

So far, it has been established that the scores of both sexes had no difference as a result of the effect of the unisex school (school F) and the predominantly male school (School G). If there is therefore a high significant difference in the scores of both sexes, without schools G and F, as shown on Table III; the researcher does not hesitate to reject the null hypothesis of no significant difference in scores of male and female students in coeducational institution on the VCAT.

**Discussion:**

Based on the statistical results obtained, there has been an established significant difference in the performance of male and female student in coeducational institutions on the VCAT. From the Statistical analysis, a calculated t of 3.64 at  $p = 0.05$  with a  $df = 196$  was obtained. Boys were found to perform better on the test than their female counterparts in coeducational institutions. Evidence abound in literature from other studies to confirm this finding. Works by *Cornelinus and Cockburn (1978)*; *Finn (1980)*; and within Nigeria; research findings by *Ogunyemi (1973)*; *Ato (1986)*; *Oraifo (1986)*; *Inyang (1988)* and *Ansa (1990)* had similar conclusions. This trend has often been attributed to the fact that females regard science subject as masculine, hard, intellectually complex and task oriented *Kelly (1981)*.

From *Kaminski (1982)* stand point, girls are discouraged from physical sciences because of the abstract nature of the subject and the stereotyping of the physical sciences as a male preserve. He further pointed out that, girls in coeducational institutions tend to feel odd in physical science classes, a view *Kelly's (1981)* survey is in full support of. From *Kelly's (1981)* surveys female

students indicated that, they felt ignored and isolated in science classes. These reasons probably explain why the males tended to do better than female in coeducational institutions.

With the established ratio of 60:40 intake into the Nigerian Universities in favour of science based courses, there is a threat of a declining intake of female students into our higher institutions of learning. This will further engender lower training opportunities for the female folks; and an increased marginalization of this group of humans.

With this obvious danger, there is the need to foster a greater awareness among the girls and a possible improvement in their attitude towards the study of science and science based courses.

### **Conclusion and Recommendations:**

Females have been found to be lagging behind in science achievement. The obvious situation may be apparent to this group of individuals. It therefore becomes necessary for there to be some enlightenment and encouragement to help improve on girls participation in the sciences.

Teachers involved in science teaching should help the girls improve on their attitudes towards the science by encouraging their little efforts and giving them more attention. Government agencies; philanthropic organisations and women groups should float some Scholarship opportunities for girls interested in science courses as their could act as an impetus for them.

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