

**CREATIVITY AND INVENTION IN SCIENCE TEACHING: GENDER  
FACTOR ON STUDENTS' ACADEMIC PERFORMANCE IN  
CHEMISTRY, COLLEGE OF EDUCATION AKWANGA, NASARAWA  
STATE.**

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**Abstract**

This study compared the academic performance of male and female students in Chemistry in College of Education, Akwanga. For this study, one research question and one research hypotheses were formulated. The research design used a documentary analysis. The data for the study was generated from examination results obtained from the examination office (of Chemistry Department, College of Education, Akwanga). The analysis of data collected revealed that the differences in the academic performance of male and female students were statistically not significant. Based on this finding, recommendations were made to improve on gender participation and performance in the basic science for national development.

The Nigerian society strives for technological advancement and development as obtainable in other nations of the world now more than any time in history. Since independence, it became obvious that for Nigeria to meet up with global competition in all facets of development there was no alternative to science, being that science has been used by the nations of the world to show military supremacy and evolve workable political systems.

If the society is dynamic and changing, it is because of the application of science and technology. This brings about meaningful growth. Science accelerates the pace of change, provides the foundation for wealth creation and it brings immense improvement on the quality of life. Incidentally, the current security challenges in this country can only be tackled effectively through the application of science and technology. Japan attained its feat as one of the most highly developed and respected

countries in the world because of its positive response to a national challenge decades back when the first set of atomic bomb manufactured by the United States of America was used to destroy Japanese cities of Hiroshima and Nagasaki during the Second World War. Japan decided to review her educational curriculum and made science and technology compulsory for every child (Egunjobi, 2004).

### **Literature Review**

The national policy on education (2004) emphasizes the use of education as a tool par excellence in the transformation of the Nigerian society. It is aimed at ensuring a Nigeria of economic, political, scientific and technological development. Eriba (2005) stated that Nigeria has as one of her foremost aspirations to attain self reliance through science and technology. This was demonstrated many years ago with the creation of the ministry of science and technology in 1985 and the first policy on science and technology in 1988 which is a clear demonstration of government commitment to popularize science in the country (Olawajaju, 2006).

Any other career can hardly be as more worthwhile as science and technology. The place of science and technology in the development of a nation demands that Nigerians young and old must take science and technology as a worthwhile pursuit. Young and old applies to both men and women which brings us to the issue of

gender and development. Improving the participation of women in science education has been identified as one of the most significant developmental challenges in Sub-Saharan Africa (Odaga, 1995 in Sambo & Ishaleku 2010). A look at a theoretical framework will enhance our understanding.

### **The Conservative Approach**

The conservative approach holds that the biological differences between the sexes are the necessary and effective causes of the division of labour in all societies. They believe that women are naturally inferior to the men. This inferiority, according to them is inherited from our primate ancestors. Any society you go to, they argue specific tasks are assigned to men and others to women. Men are always warriors, protecting the groups, while women work in the homes rearing children and performing domestic duties. The central implication of this perspective is that women are not for public life; i.e. the spheres of politics, and as it relates to this study, the area of scientific exploration belongs to men.

Women take domestic and reproductive responsibilities. Developmental strategies tailored according to this paradigm preach women to fit into their biogramme (tiger and Fox 1972) in Gbenda (2003) and not alter the status quo.

Coming away from the above theory, however experience and research evidence points to the fact that women are capable as men in many types of

working including academic and professional undertaking (Ivowi, 2001). For the Nigerian women to enjoy full benefit of contemporary living, they require basic education to contribute meaningfully to the development of the country. It has been observed that countries that have raised the status of their women educationally enjoy a high standard of living. Science and Technology provides people with the knowledge and tools necessary for creative thoughts and imaginations that lead to innovation.

#### **Statement of the Problem**

Poor access to higher education is accompanied by under representation of women in Science and Technology. The gender stereotype has classified different roles for men and women in which some subjects are considered masculine subjects while others feminine subject. Using the parameters of access, equity, quantity and quality to assess happenings in Science, Technology and Mathematics education in Nigeria, it would appear as though there is no gender discrimination in the basic application of any of these, yet there is imbalance in quality of participation and may be in some element of quality of performance. Several other studies have shown that science teachers interact more with boys than with the girls. In addition, teachers were found to direct more attention to boys than to girls, but even when criticism is left out of account, teachers

talk more to boys than to girls (Oke, 1995) in Sambo and Ishaleku 2010).

Adeyegbe (2000) in Ivowi, (2001) indicated that the difference in performance cannot be wholly explained in terms of difference in intelligence and innate ability. Cognitive and affective domain variables are also likely causes. Therefore a test in which STM are couched in content and context in favour of boys produce imbalance in performance.

The result of this research will serve to encourage and enhance the participation of female student in science and technology courses.

The girls compete favorably even though not statistically tested, the result of this study will prove whether or not this applies to the general performance of chemistry students in the College of Education, Akwanga.

#### **Purpose of the Study**

This is to verify whether or not male and female students can achieve equal competence in their academic performance in chemistry.

#### **Research Question**

The research question is as follows:

- i. Is there any significant difference in the academic performance of male and female students in chemistry?

### Research hypothesis

There is no significant difference in the academic performance of male and female students in chemistry.

### Methodology

The research design will be documentary analysis. It will rely exclusively on documented results.

### Sample and Sampling Procedure

A representative sample by simple random sampling from the population which consist of students of Chemistry Department in the School of Science, College of Education, Akwanga. A particular set is selected and the academic performance of male and female students in the core chemistry courses from NCE I to NCE III was studied to discover the relationship between the variables. That is Gender and Academic Performance. The sample is made up of 55 NCE III students, 61 NCE II students, 60 NCE I students making a total of 176 students.

### Source of Data

The source of data is Student Cumulative Record (SCR) from semester examination obtained from the College examination office. The results of these examinations on core chemistry courses two for each level for a particular set admission year forms the data for this study.

The statistical tool for the data analysis will be the t-test

### Data Presentation, Analysis and Interpretation

#### Research Question 1

Is there any significant difference in the academic performance of male and female students in chemistry in College of Education Akwanga?

Here the mean scores results of six courses for both male and female students were analyzed. Two courses each for each level for NCE I to NCE III

**Table 1: The Mean Scores of Male and Female Students in Six Courses**

Course code	Genders	N	X	Diffe	Remark
Chem 112	Male	43	50.77	0.18	Not significant
	Female	17	50.59		
Chem. 122	Male	44	53.68	2.79	Fairly
	Female	19	50.89		
Chem. 212	Male	41	61.54	1.89	Fairly
	Female	20	59.65		
Chem. 222	Male	33	52.15	5.1	Significant
	Female	20	47.05		
Chem. 314	Male	35	47.74	4.16	Significant
	Female	19	43.58		
Chem. 322	Male	37	50.38	3.34	Fairly
	Female	18	53.72		

The table 1 above shows the relative academic performance of male and female students in chemistry. The result of two courses each for each level from NCE I to NCE III. The result of the set of students of the academic year 2004/2005. The mean scores of the male appears higher than the means scores of the female in the five out of the six courses, the test of hypotheses will tell

whether or not the differences in the mean scores is significant.

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### Hypothesis Testing

**H<sub>01</sub>:** There is no significant difference in the academic performance of male and female students in chemistry.

This hypothesis sought to find out whether or not there is any significant difference in the academic performance of the male and female students of the chemistry department of College of Education, Akwanga. In testing this hypothesis, data collected on the academic performance of male and female students of a particular set for six courses from NCE I to NCE III were analyzed using t-test statistics.

**Table 2: t-test on the Academic Performance of Male and Female Students for Six Courses**

Cours	Gend	N	S2	d.f	t-cal	t-	Pro
Chem.	Male	43	281.	58	0.04	1.	0.05
	Femal	17	179.				
Chem.	Male	44	206.	61	0.78	1.	0.05
	Femal	19	153.				
Chem.	Male	41	473.	59	0.04	1.	0.05
	Femal	20	213.				

Chem.	Male	33	196.	51	1.51	1.	0.05
	Femal	19	60.4				
Chem.	Male	37	163.	53	1.07	1.	0.05
	Femal	18	95.1				

From the table 2, the calculated t values for the six courses are 0.04, 0.78, 0.04, 1.51, 0.61 and 1.07. The critical value of t at the appropriate degree of freedom is 1.68. based on this result, the calculated t value is less than the tabulated t value at 95% confidence level, the null hypothesis is therefore upheld.

**Table 3  
The t-test for the Means scores of the Six Courses for both Male and Female Students.**

variable	N	S <sup>2</sup>	Df	t-cal	t-cri	Prob.
Male	6	30.60	10	0.60	1.81	0.05
Female	6	22.6				

In the table above, the value of t obtained is 0.60 whereas the critical value of t is 1.81 at the degree of freedom 10. Seeing the calculated t value is less than the critical value of t at 95% confidence level. We fail to reject H<sub>0</sub> and conclude that achieving equal competence by female student as their male counterpart is possible.

### Discussion on Findings

The result shows that female students do not perform poorly in science as widely held by most people, this agrees with Agber (2007) who observed that both boys and girls perform almost on equal terms with each other.

In table 1 the mean scores for the male and the female students in the six courses examined. The male students appear to have performed slightly better than the female students in five out of the six courses. The overall difference between the two groups cannot be said to be sharp.

The result already analyzed showed that the female did better than male in one out of the six courses; it therefore means achieving equal competence is possible. This goes to confirm the assertion of Sambo and Ishaleku (2010) that there is no doubt that women possess great potential for meaningful sustainable development in science and technology education in Nigeria.

One null hypothesis was tested. Hypothesis one is accepted at 95% confidence level because the calculated t value is less than critical tabulated t value in all the six courses therefore so we fail to reject  $H_0$  and conclude that there is no significant difference in the academic performance of male and female students in chemistry. Furthermore, the t-test on the mean scores of the six courses for both male and female students reveals no significant difference, since t, calculated

was less than the t tabulated. Agber (2010) indicated that girls are not as dull academically as widely held by many people implying that given equal educational opportunities girls will compete favourably and also excel academically as their male counterpart. The female potential in science remains as an untapped labour resource because of several factors militating against her. According to George (1972) in Sambo and Ishaleku (2010) women consider their own sex inferior and persist in relegating their intellectual and professional competence. Some studies undertaken to examine if the academic performance of girls is comparable to that of boys (Lantz and Smith 1981), Skolvick, Longboat and Day (1982), Erickson and Erickson (1984) Stag, Kleingberg Eccles and Becks (1989), Alan & Niss (1985), Campbell, (1986), Linn and Hyde (1989), Girls (2000), Agbulu & Ega (2001), Hamster and Hoffman (2002) in Egbe-Okpenge (2005).

### Conclusion and Recommendations

The finding in this study shows that there is no gender difference in the academic performance of students in chemistry. Given equal educational opportunity the girls can compete favourably and even excel in sciences as their male counterpart. As stated by Olarewanju (2006), women are invaluable in the area of science and technology hence every effort must be put in place to make science learning easier for both males and females hence

gender stereotypes should be reduced to the barest minimum.

The following are the recommendations based on this work:

1. Government should organize programmes that would encourage more female participation in the area of science and technology as a vital tool for national development.
2. Science teachers should adopt teaching strategies with female-friendly approaches and incorporate female standpoint theories in their teaching. This will help eliminate gender stereotyping and discriminatory practices and promote learning and better performance of the female students in science
3. Also think of how to remove the scare of science from the female folk to encourage their enrolment.

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