

# GENDER ISSUES IN EDUCATION AND DEVELOPMENT

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## A Book of Readings

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# GENDER DIFFERENCES AMONG UNDERGRADUATE STUDENT ENROLMENT AND ACADEMIC PERFORMANCE IN SCIENCE

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## Introduction:

Compared with education of boys, traditionally, education of girls was considered, in the past, as not being rewarding and so not necessary. This misgiving emanated from the fact that girls were expected to stay at home to help in domestic work that included the responsibility to sit their siblings. In the southern part of the country, girls were mainly prepared for marriage and to assume motherly responsibility. In the North, Western education was considered as contradicting Islamic faith and ethics, as the religion favours seclusion of women (Purdah).

The situation, however improved slightly with the establishment of girls' schools at Katsina, Kano and Sokoto in 1930 and earlier at Lagos and Ijebu Ode in 1925 (Nduka, 1965:60). It was when free education was introduced in the West in 1955, particularly, that female education was promoted. Significant number of female children were sensitized into western education (Nduka, 1965; Fafunwa, 1977). The proportion of boys to girls in Western region then rose from 3:1 in 1954 to 2:1 in 1953. Since then, there has been an improvement in the enrolment of female students at all levels of education. Women enrolment in Nigerian Universities, for instance, rose from 12% in 1980 to 25% in 1986, according to sources from the National Universities commission, as quoted by Modo (1994:189).

The increasing involvement of women in western education probably emanates from the changing role of women in the society. Through various organs and associations, women are portraying themselves as having the same potentials as men.

## Women in Science:

The late participation of women in western education probably explains their late involvement in science. Okeke, Nwana and Alonge (1992) have discovered that the proportion of women in science compared with men, is too low worldwide. For instance, in the United States where women are found to form 50% of the work force only 9% are employed as scientists and engineers. Even in the

teaching profession where United State women form 71% of the total number of teachers, only 24% are science teachers (Okeke, Nwana and Alonge 1992).

The situation is not better in Nigeria. In 1982 record (STAN position paper 2:36, 37) shows that only 18.3% of women out of 7,368 science students were enrolled in science in Nigerian Universities. In 1985 out of 640 students registered for physical sciences, in the University of Nigeria Nsukka, only 16.09% were women. In the same year, University of Jos registered 471 students for Natural Sciences and only 21.6% were women. This seems to be the situation in most Nigerian Universities.

Considering the crucial role of women in nation building, and considering the fact that many women professional bodies have emphasized and encouraged girls to go into science and science-related professions, over the years, it is pertinent to carry out a recent survey to see whether or not these attempts are yielding the required fruits. Moreover, it is also necessary to find out whether the gap hitherto existing between men and women enrolment in science has been because of the poor performance of girls in science.

Relevant organisations aimed at raising the level of participation of women in science include: Girls and Science and Technology (GASAT); Girls in Science and Technology (GIST) - England; Women in Science and Enquiry Network (WISNET) - Australia; and Nigeria Association of Women in Science, Technology and Mathematics (NAWSTEM) found in 1987.

## Purpose of Study:

The study aims at investigating gender differences with respect to enrolment and performance among undergraduate students in science. Specifically the study intends to:

1. Show whether or not the efforts of improving female enrolment in science have yielded the required fruits.
  2. Whether gender differences exist in students' performance in science.
- Since previous studies have not included the University of Uyo, the present study is focussed on the University.

The enrolment of students in physical Sciences; Biological Sciences; Mathematics, Statistics and Computer Science, as well as Agricultural Science from the year 1983 through 1995, is considered. The performance of students in physical Sciences, Biological Sciences as well as Mathematics, Statistics and Computer Science is considered from the year 1987 through 1993.

### Research Questions:

Attempts are made to answer the following questions in the study:

1. Is the number of female students enrolled in science significantly different from that of male students?
2. Is there any steady improvement in the enrolment of female students in science in the University of Uyo?
3. Is academic performance of female science students significantly different from their male counterparts?

### Research Hypotheses:

The study considers the following null hypotheses:

H<sub>01</sub>: There is no significant difference between the number of female students enrolled in science and their male counterparts.

H<sub>02</sub>: There exists no significant difference between the academic performances of female and male undergraduate students in science.

### Methodology:

The research focuses on the University of Uyo which started as the University of Cross River State in 1983. Enrolment of students is investigated from 1983 to 1995 in physical sciences (Physics, Chemistry, Biochemistry); Mathematics, Statistics and Computer Science; Biological Sciences (Zoology, Fisheries, Botany, Horticulture and Microbiology); Agricultural Science; and Brewing Science. Admission register in the records office was used as the main instrument for assessing the enrolment of students.

In comparing the academic performances of male and female science students, convocation booklets were used. The advantage of this instrument is that it takes into consideration the performances of students throughout the years spent in the University. This assessment is considered a fairer measure than to consider performance at any particular year of study.

The enrolment of students was analysed using percentages and chi square while t-test difference of means was used in comparing the academic performances of male and female students. Under this analysis, a candidate who had first class was scored 5, second class upper, 4, second class lower, 3, third class, 2, and a pass degree, 1. For each year, mean grade points were calculated for male and female students in each programme. The grand means of male and female students in all programmes combined were then compared in each year.

### Results:

The results obtained from analyses of data are shown in Tables 1 and 2

Table 1: Enrolment of Undergraduate Science Students in the University of Uyo by gender (1983 - 1995)

| Discipline                                      | Gender | 1983  | 1984  | 1985  | 1986  | 1987  | 1988  | 1989  | 1990  | 1991  | 1992  | 1993   | 1994  | 1995  | Total |
|---|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|-------|-------|
|   |        | M     | F     | M     | F     | M     | F     | M     | F     | M     | F     | M      | F     | M     |       |
| 1. Physical Science                             | M      | 8     | 37    | 38    | 43    | 57    | 120   | 60    | 53    | 61    | 77    | 200    | 86    | 842   | 68.45 |
|   | F      | -     | 16    | 17    | 25    | 36    | 68    | 47    | 26    | 30    | 28    | 60     | 35    | 388   | 31.54 |
| 2. Mathematics, Statistics and Computer Science | M      | 06    | 05    | 02    | 05    | 07    | 45    | 13    | 79    | 115   | 106   | 161    | 75    | 619   | 72.57 |
|   | F      | -     | -     | 03    | 03    | -     | 08    | 03    | 09    | 43    | 43    | 71     | -     | 234   | 27.33 |
| 3. Biological Sciences                          | M      | 07    | 08    | 12    | 21    | 15    | 63    | 56    | 53    | 18    | 45    | 74     | 26    | 398   | 51.09 |
|   | F      | 06    | 03    | 10    | 11    | 18    | 41    | 62    | 55    | 29    | 44    | 73     | 27    | 381   | 48.91 |
| 4. Agricultural Science                         | M      | -     | 12    | 22    | 32    | 47    | 58    | 29    | 99    | 52    | 163   | 148    | 54    | 716   | 66.36 |
|   | F      | -     | -     | 06    | 04    | 05    | 30    | 20    | 45    | 36    | 106   | 96     | -     | 363   | 33.64 |
| 5. Brewing Science                              | M      | -     | 06    | 10    | 16    | 09    | 10    | 08    | 10    | 08    | 06    | 32     | -     | 122   | 76.25 |
|   | F      | -     | 05    | 10    | 01    | 06    | 01    | 02    | -     | 03    | 01    | 08     | 01    | 38    | 23.75 |
| Total   | M      | 21    | 68    | 84    | 117   | 135   | 296   | 166   | 296   | 254   | 397   | 615    | 248   | 2597  | 65.76 |
|   | F      | 06    | 26    | 46    | 44    | 65    | 148   | 134   | 135   | 141   | 222   | 308    | 128   | 1408  | 34.24 |
| %   | M      | 77.78 | 72.34 | 64.62 | 72.67 | 67.50 | 66.67 | 55.33 | 68.68 | 64.30 | 64.14 | 66.63  | 65.78 | 65.76 | -     |
|   | F      | 22.22 | 27.66 | 35.38 | 27.33 | 32.50 | 33.33 | 44.67 | 31.32 | 35.70 | 35.86 | 33.37  | 34.22 | 34.24 | -     |
| χ <sup>2</sup>                                  | M      | 8.34  | 18.76 | 11.10 | 33.10 | 24.50 | 49.33 | 3.41  | 60.14 | 32.33 | 49.47 | 102.11 | 97.56 | -     | -     |
|   | F      | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -      | -     | -     | -     |
| P < 05  | M      | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -      | -     | -     | -     |
|   | F      | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -      | -     | -     | -     |

As shown in Table 1, the number of male students enrolled in the sciences considered in the study is significantly greater than the number of female students enrolled. This observation was same from 1983 though 1995 without any exception, the calculated  $X^2$  values being greater than the critical value. Table 1 also shows that out of 1230 physical science students enrolled between 1993 and 1995, only 31.54% were female students. During the same period the percentage of female students in different discipline of sciences were, 27.33% for Mathematics, Statistics and Computer Science; 33.6% for Agricultural Science; 48:91% for Biological Sciences and 23.75% in Brewing Science. This indicates the highest female enrolment in Biological Science with the lowest in Brewing Science. Considering all the Sciences combined, the lowest percentage (22.22%) enrolment of female students occurred in 1983 while the highest (44.67%) was obtained in 1989.

While the lowest percentage in 1983 could be explained from the fact that it was the year the University started, the highest percentage in 1989 cannot be readily explained.

| Subjects                               | N | 1987  | 1988  | 1989   | 1990   | 1991   | 1992    | 1993   |
|--|---|-------|-------|--------|--------|--------|---------|--------|
| Physical Sciences                      | M | 25/8  | 67/22 | 60/21  | 71/25  | 130/45 | 116/38  | 114/39 |
|  | F | -     | 29/10 | 52/17  | 64/21  | 150/51 | 100/34  | 93/31  |
| Maths, Statistics and Computer Science | M | 11/5  | 08/3  | 03/1   | 05/2   | 13/4   | 49/18   | 118/39 |
|  | F | -     | -     | 04/2   | 02/1   | -      | 11/4    | 70/23  |
| Biological Sciences                    | M | 25/10 | 24/8  | 38/15  | 35/12  | 49/15  | 105/50  | 32/11  |
|  | F | 12/3  | 36/12 | 56/25  | 43/14  | 47/16  | 58/32   | 27/9   |
| Total                                  | M | 61/23 | 99/33 | 101/37 | 111/39 | 192/64 | 270/106 | 264/89 |
|  | F | 12/3  | 65/22 | 112/44 | 109/36 | 197/67 | 169/70  | 190/63 |
| Mean, X                                | M | 2.61  | 2.9   | 2.80   | 2.67   | 3.14   | 2.62    | 2.95   |
|  | F | 4.00  | 2.95  | 2.43   | 2.71   | 2.94   | 2.50    | 3.10   |
| S <sup>2</sup>                         | M | 2.45  | 0.04  | 0.06   | 0.13   | 0.05   | 0.23    | 0.07   |
|  | F | 0.00  | 0.01  | 0.31   | 0.37   | 0.00   | 0.37    | 0.02   |
| t-value                                |   | 1.52  | 0.87  | 3.74   | 0.34   | 6.40   | 1.59    | 1.56   |
| Critical t-value                       |   | 2.06  | 2.00  | 1.9    | 1.98   | 1.96   | 1.96    | 1.96   |

Table 2 shows that except for 1989 and 1991, there was no significant difference between the performances of male and female students in science. This implies that academic performance of female students in science compares favourably with their male counterparts for most years considered. The reason behind the better performance of male students in 1989 and 1991 is not readily known.

The result obtained in Table 2 tends to suggest that the low enrolment of females in science as shown in Table 1 is not necessarily due to their poor performance in science. There must be some stronger reasons.

#### Discussion:

Table 1 shows a steady growth in males' enrolment from 1983 through 1988 and from 1992 through 1993. The figures for the years 1989 (166), and 1991 (254) were respectively less than that in 1988 (296). The steady growth between 1983 and 1988 could be attributed to the fact that since the University started in 1983 (as the University of Cross River State), there was, as it were, a need to build up the enrolment. This gradual build up is also reflected in females' enrolment from 1983 through 1985. The steady increase may have also resulted from the one-year pre-degree programme that started along side the degree programme in the University.

The fall in students enrolment in the years 1989 - 1991 compared with 1988 figure is common to both males and females. This was probably due to the financial distress the University was passing through during the period. A cut in students enrolment may have been an administrative strategy to cope with the stress. After gaining the Federal Status in 1991, Table 1 shows that students enrolment went up steadily between 1991 - 1993. This could be explained from the point of view of the financial relief the University experienced by reason of its new status.

The observed significant difference in enrolment between male and female students from 1983 through 1995 could be attributed to the fact that there were more male than female applicants. The problem is probably rooted in the socio-cultural influence of the society.

Comparing the academic performance of male and female students, Table 2 shows that no significant difference exists between them, except for the years 1989 and 1991. The lack of significant difference results probably from the fact that women are as capable to study science as their male counterparts.

#### Conclusion:

The purpose of the study was to compare the enrolment and performance of male and female undergraduate students in Science in the University of Uyo

from 1983 to 1995 and 1987 to 1993, respectively. The results showed a significant difference in the enrolment. More male students got enrolled than the female in all the 12 years considered in the study. The study however showed a comparable academic performance of male and female students in science. Significant difference only existed in favour of male, in the years 1989 and 1991. It is therefore concluded that although there exist an improvement in the enrolment of women in science, there is still a significant difference between male and female enrolment. Government, educators and various women scientific organisation should continue to enlighten and encourage women to participate in science. The strong reason is that women's performance in science is not significantly different from that of men.

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