



## **Counselling and the Selection of Science Courses by Girls in Senior Secondary Schools in Benue State**

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### **ABSTRACT**

The study investigated the factors in the selection of science courses by girls in senior secondary schools in Benue State. The design of the study is survey. The sample consisted of 528 SS3 female students from eleven single-sex and eleven co-educational schools. The research instrument: Selection of Science Course Inventory (SSCI) with reliability coefficient of 0.79 and stability coefficient of 0.826 was used for data collection. The data was analyzed using Frequency counts, percentages and chi-square statistics. The results showed that school type, sex of teachers, are among the factors that have significant effect on girls' choice of science subjects. It is therefore recommended that all involved with the female students' choice of career especially the guidance counsellors should help to arouse their interest, motivate and encourage them to choose science courses.

**Keywords:** Counselling, Selection, Science courses, Girls, Senior Secondary Schools

### **INTRODUCTION**

The statistics reveal very low female enrolment in the sciences, because only 3% of the 36.59% females registered are in the Faculty of Science. Studies have shown Nigeria's effort at encouraging women in the field of science (Aminu,1987; Williams,1989 & Iliya, 1999 ), yet fewer girls select science courses and there is a yawning gap between their selection and that of the boys ( Ega, Agbulu & Amuta, 2001; Awotunde,2002 & Eriba,2001, 2002, 2003). All students in the senior secondary (SS) classes offer Biology which is a science subject as a core subject along with other core subjects such as Mathematics, English Language, Geography and Agricultural Science or any other vocational subject such as Food and Nutrition, Typewriting or Commerce . So the girls who select elective subjects such as Chemistry, Physics, Further Mathematics, Technical Drawing, Wood work and/or Metal work are those in the sciences who are likely to offer science related courses in the higher institutions of learning.

The 1991 provisional results of the population census in Nigeria revealed that women comprise about half of the country's population of 88.5 million people (Mang, 2001 & Eriba, 2003). The accuracy of these figures is not the emphasis, but the point is that if females make up about half of the nation's population, they should play an equal role in national development. However, research indicates that only about 9% of women are employed as Scientists and Engineers (Mang, 2001). Williams (1989) and Bajah and Bozimo (1989) observed that women are poorly represented in scientific careers. The last ten to fifteen years have witnessed a lot of concerns nationally and internationally about the low participation rate of women in scientific and technological employment, and of girls and young women in education and training in these fields ( Ega, Agbulu & Amuta ,2001). In order to address this issue, a Common Wealth African Regional Workshop on Gender Stereotyping in Science, Technology and Mathematics (STM) was held in Accra, Ghana in February 1987, and it was established that there is need to motivate girls into science, technology, and Mathematics due to low participation of the female in these fields (Aminu, 1987

& Williams, 1989). Coulthard (1990) opined that from a very early age girls appear to prefer biology to physical sciences or technology. This could be due to the fact that female students dread mathematics, which is the foundation of hardcore physical sciences and technology. Kahle (1983) in Ega, Agbulu and Amuta (2001) asserts that female achievement in mathematics is usually a critical indication of the choice of courses to be taken in science and science related courses. Hence, it is not surprising that the highest participation is seen in areas of science with little mathematics, such as in the biological, agricultural, medical and paramedical sciences. Sheriff and Svenne (1993) also expressed concerns about the inadequacy of personnel particularly females with careers dependent on science expertise, since these fields are clearly linked to national – level growth and change and serve to drive and dominate social and economic trends.

There are fewer females in scientific fields despite a lot of efforts directed at encouraging women participation in the field of science and technology both at the national and international levels as revealed by Okeke (1987), Iliya (1989), Williams (1989), Friedman (1998), Awotunde (2002) and Eriba (2002 , 2003).

It is against this background that the researcher investigated the selection of science courses by girls in Benue State Senior Secondary Schools in order to discover the factors influencing their selection, so as to discuss the counselling implications towards improving the situation.

### **Objective of the Study**

The purpose of this research is to investigate the factors responsible for girls' choice of science courses in senior secondary schools in Benue State.

### **Research Questions:**

The research seeks to provide answers to the following questions.

1. What is the effect of type of school on girls' choice of science courses?
2. What is the effect of sex of teachers on girls' selection of science courses?
3. What is the effect of the academic performance of girls on their choice of science courses?
4. Where do parents or siblings of girls who select science courses work?
5. What is the effect of socio-economic background on girls' choice of science courses?
6. What is the effect of site of school on girls' selection of science courses?

### **Research Hypotheses:**

The following hypotheses were formulated to guide the study:

1. School type has no significant effect on girls' choice of science subjects.
2. The sex of teachers has no significant effect on girls' selection of science courses
3. Socio-economic background has no significant effect on girls' choice of science subjects.
4. The girls' academic performance has no significant effect on their choice of science courses.
5. The site of school has no significant effect on girls' selection of science subjects

## **RESEARCH METHOD**

The research design for this study is survey. The target population for this study was the entire SS3 female students in Benue state secondary schools. These are students between the ages of 15 and 20 years who have already selected their subjects and are in the Arts, Commercial (social sciences) or Science classes. The sample for this study was made up of 528 SS3 female students aged between 15 and 20 years, who have selected their subjects. The girls were selected from eleven single-sex and eleven co-educational schools. The total number of schools in the state offering science subjects in SS3 is 167 out of which 22 were selected to study the female students' selection of science subjects. The schools comprised 11 single-sex (girls only) and 11

co-educational schools from environments corresponding to that of the girls' schools for favourable comparison. The researcher developed an instrument named Selection of Science Course Inventory (SSCI) with reliability coefficient of 0.79 and stability coefficient of 0.826 for carrying out the investigation. The 40-item questionnaire has four options ranging from Strongly Agree (SA) to Strongly Disagree (SD). The items indicate positive responses which are given scores from 4 to 1. The instrument is made up of two sections. Section one is about general information, for example the name of school, age, et cetera, while section two deals with other items concerned with the rating of respondents' opinions for identifying the factors influencing selection of science courses by the girls. The instrument was used for data collection. The data was analyzed using frequency counts, percentages and chi-square statistic. Research questions one to six were answered using the frequency counts and percentages were worked out using the frequency. Chi-square statistics were used in analyzing hypotheses one to five at 0.05 level of significance.

## RESULTS

Research questions one to six were answered using the frequency counts and percentages were worked out using the frequency. Chi-square statistics were used in testing hypotheses one to five.

The results are presented as follows:

The responses of the female students in co-educational schools when compared to those from single sex schools shows that more female students from single sex schools select science subjects than those from co-educational schools.

The responses of the 528 SS3 female students to items relating to sex of their science teachers shows that girls who are taught by female science teachers when compared to girls who selected science courses are quite few.

The responses of the 528 female students to items in Section A on performance in some core subjects in JSCE, and their responses relating to items on their intellectual ability reveals that most students who selected science courses did so on the basis of their academic ability. This goes to answer the question on the influence of academic performance on their selection of science courses.

Research question four was answered by the responses of the female students to items 3, 5, 6, 8, 9 and 10 in Section B. The result shows that girls whose parents or siblings work in science related occupations do not select science courses more often than those whose parents and siblings do not work in such places.

The analysis of the responses of the 528 female students in SS3 who were offering science subjects shows that their socio-economic background was above average and high in some cases. The summary of post-primary institutions in Benue State by Zones shows that out of 246 schools in the state only 167 are offering science. Out of these 246 schools, 14 are girls' schools and only 11 of them offer science. The girls' schools that do not offer science are mostly rural ones, hence more girls from urban schools tend to offer science subjects more than those from the rural schools.

**Hypothesis One (HO<sub>1</sub>)**

- School type has no significant effect on girls’ choice of science courses.

**Table 1: Chi-square test analysis of the effect of school type on girls’ choice of science courses**

	Observed N	Expected N	X <sup>2</sup>
No	44	132	
Yes	484	396	410.97
Total	528		343.303

The results of the X<sup>2</sup> test ( X<sup>2</sup> = 410.97; df = 3; p < .000 and the minimum expected cell frequency is 132.0 ), shows school type has a significant effect on choice of science courses by the girls. Therefore, the null hypothesis was rejected at p < .000 level of significance ( see Table 1 ).

**Hypothesis Two (HO<sub>2</sub>)**

- The sex of teachers has no significant effect on girls’ selection of science subjects.

**Table 2: Chi-square test analysis for effect of sex of teacher on girls’ selection of science subjects.**

	Observed N	Expected N	X <sup>2</sup>
No	247	105.0	
Yes	278	420.0	458.038
Total	525		

The result of the chi-square test analysis is shown in Table 2 which shows sex of teacher has significant effect on girls’ selection of science courses. The null hypothesis is therefore rejected at p < .000 level of significance.

**Hypothesis Three (HO<sub>3</sub>)**

- The girls’ academic performance has no significant effect on their choice of science courses. The result shows X = 343.303; df = 4 p<0  
Therefore the null hypothesis is rejected at .000 level of significance showing that the girls’ academic performance has a significant effect on the choice of science subjects (see Table 3).

**Table 3: chi – square test analysis on the effect of academic performance on girls’ choice of science items.**

	Observed N	Expected N	X <sup>2</sup>
No	11	103.8	
Yes	408	415.2	
Total	519		343.303

**Hypothesis Four (H0<sub>4</sub>)**

- Socio economic background has no significant effect on girls’ choice of science courses. The results of the chi-square tests shows that  $X^2 = 74.490$ ;  $df = 3$ ;  $p < .000$ . Therefore, the null hypothesis is rejected at 0.000 level of significance. This shows that socio-economic background has a significant effect on the selection of science courses by the girls (Table 4).

**Table 4: Chi-square test analysis of effect of socio-economic background on girls’ choice of science courses:**

	No	Yes	Total	X <sup>2</sup>
No	164	130.5	154	
Yes	458	391.5	525	
Total	522			74.490

All the five hypotheses formulated for the study, were rejected in their null forms. This shows that there are five major factors, which have influence on girls’ choice of science subjects. Therefore, it is recommended that all involved with the female students’ choice of career especially the guidance counsellors should help to arouse their interest, motivate and encourage them to choose science courses.

**DISCUSSION**

Results from the study have shown that there are many factors responsible for the selection of sciences courses by the girls. This is because results from research question one shows more girls from girls’ colleges will choose science subjects more than those from co-educational colleges. The responses of the female students in co-educational schools when compared to those from single sex schools shows that more female students from single sex schools select science subjects than those from co-educational schools. This finding is in line with the findings of Whyte (1986), Akpan (1987) and Coulthard (1990) who all point out that the type of school can influence students’ selection of science subjects. The counselling implication of this finding is that, the more girls’ colleges we have the more girls there would be that select science courses.

Research question two sought to determine the bearing of female teachers with girls' selection of science courses. The results show that 88.7% of the girls chose science subjects because they feel they can make it as a science student. The counselling implication of this finding is that, there are other factors that influence girls' choice of science subjects more than sex of their teachers do.

Research question three sought to find out whether girls selection of science courses depends on their view of their academic ability. The response of the 528 female students to items in Section A on performance in some core subjects in JSCE, and their responses relating to items on their intellectual ability reveals that most students who selected science courses did so on the basis of their academic ability. This goes to answer the question on the influence of academic performance on their selection of science courses. One's academic ability can influence one's self-concept, since the way a girl sees herself (self-image) and the value she puts on herself (self-esteem) are crucial determinants of the goals she sets for herself, the attitudes she holds, the behaviour she initiates and the responses to others. Hence, a girl who views herself to be good will want to or venture to choose science subjects. This is consistent with that of GIRLS (2000); Agbulu and Ega (2001), Ega, Agbulu and Amuta (2001) who also showed that the high academic performance of girls is an important factor that highly motivated them to enhance their self-concept. The counselling implication of this finding is that, girls should be given time to adequately prepare for their tests and examinations for good performance. Parents should also be engaged in their children's schooling to improve their academic achievement.

Research questions four and five sought to find out whether girls whose parents work in science related occupations select science courses more than those whose parents do not work in such places. The result shows that girls whose parents and siblings work in science related occupations do not select science courses more than those whose parents and siblings do not work in such places. This finding, however, is contrary to the finding of Yalams and Aliyu, 2000 that all pointed out that, many parents exert influence on the course and occupations, which their children select.

Research question six was to find out if girls selection of science courses depend on their view of their socio-economic background. The view of one's parents' ability to sponsor one's education especial in the sciences can be a motivating factor since science is viewed to be an expensive course. Hence, it has been observed that girls who venture into reading courses like sciences, technology and engineering which are male dominated are those whose parents are well off economically or have government support through scholarships. This is consistent with Akinboye (1996) who noted that socio-economic factors influence self-concept, which is relevant in the selection of science courses by girls. The counselling implication of this finding is that the government should not relent in her efforts at encouraging girls' selection of science by granting them automatic scholarships and immediate employment. The school guidance counsellors should also watch out for gifted and talented girls in the areas of science and recommend them for sponsorship.

Research question seven sought to establish girls from urban schools choose science courses more than those from rural schools. The girls' schools that do not offer science are mostly rural ones that is, those outside the state and local government headquarters, hence more girls from urban schools tend to offer science subjects more than those from the rural schools.

The findings are consistent with the findings of Ali and Aigbomian, 1999; Iroaganachi, 1999 and Kolo, 2001 who reported that location of school affects the pupils' achievements and approach to studying. The counselling implication for this is the need to locate girls' colleges in the urban centres, which have access roads, social amenities, laboratories and even qualified teachers.

Five null hypotheses which were tested to see if girls' choice of science courses depend on school type, sex of teachers, female students' socio-economic background, academic performance and school location; were all rejected. Therefore, school type, sex of teachers, female students' socio-economic background, academic performance and school location all have effect on girls' selection of science courses, for the Chi-square test statistics were significant at  $P < .05$  for all the five hypotheses.

The finding about the bearing of school type on girls' choice of science courses, agrees with the findings by Coulthard (1990) who discovered that in a mixed school boys help to reinforce girls' negative attitude towards choosing science courses by showing confidence and thereby dominating in all class activities. This is in line with the finding of Whyte (1986) who reported that subject choice is more polarized in mixed (co-educational) schools, and girls are more likely to continue with the study of physical sciences in all girls' schools. He (Whyte) further showed that girls are more likely to choose physics or chemistry and boys to take Biology in single-sex schools. Akpan (1987) found that girls have better attitude to science in single-sex than in co-education schools. The finding about the reference of the sex of teachers attests to the findings of Lorenzana (2003) that of female role models is significant in the continuing interest and participation of young women in Science, Mathematics and Engineering. The result of the bearing of academic performance of girls on their choice of science subjects is in line with the finding Girls,2000; Agbulu & Ega, 2001; Ega, Agbulu & Arnuta, 2001 & Haussler & Hoffman, 2002). The significant bearing of academic performance on girls' choice of science courses shows that high academic is an important factor that highly motivated them as this help to enhance their self-concept, so, the importance of the girls ability intellectually cannot be under played as regards selection of science courses.

The issue of socio-economic background on girls' choice of science subjects agrees with the findings Akinboye (1996) and Cobb (2001) who noted that socio-economic factors influence self-concept which is relevant in the selection of science courses by girls.

The bearing of location of school on the selection of science courses is in consonance with findings of Nwana (1987) who asserts that students in urban schools are more likely to choose science subjects for study because these schools stand a better chance of attracting teachers. The findings of Kolo (2001) also have implication for school location. He found that the role of the environment affected students 'approach to studying.

## **RECOMMENDATIONS**

1. The Ministry of Education in Benue state should try to increase the number of girls colleges in the state. The only Government Girls' College in the state capital should be restored to its former status. Or another model girls' college could be established since the capital can have least two.
2. There should be at least a girls' college in each local government area headquarter
3. Girls studying sciences should be given automatic scholarship by providing their textbooks et cetera and upon graduation be given immediate employment..
4. Guidance Counsellors could be posted to all primary schools since it has been found that girls' alienation from science and technology subjects begins early even from the age of five.
5. Women science graduates and undergraduates can be employed and sponsored to work in nursery, primary as well as secondary to help out, for example on science projects thereby serving as mentors and role models.
6. The possibility of giving incentive packages to female science teachers especially those in the rural schools be explored to encourage them work in such places; to provide girls in such areas with female role models.

## CONCLUSION

The study discovered factors responsible for selection of science courses by the girls in Benue state. Many of the factors are outside the control of the female students themselves. So the students need the help of others such as the parents and family, teachers and the government, that is, the society at large to help in improving their selection of science courses. Parents, teachers and female scientists should embark on organizations like NGOs, that will go to schools to encourage girls to study science. Guidance and Counselling has the major role to play in arousing girls' interest in science subjects, motivating and encouraging them. This can be done by sensitizing all those concerned in the career choice of the female students.

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