

INFLUENCE OF GENDER ON STUDENTS' ATTITUDE TOWARDS BIOLOGY IN ENUGU EAST LOCAL GOVERNMENT AREA OF ENUGU STATE

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Abstract

The consistent reports on gender inequity in biology have lead to a research for its influence on attitude. In this connection, gender has been reported to facilitate meaningful learning of biological (science) concepts. Consequently, the study sought to investigate the influence of gender on students' attitude towards Biology. A survey design was adopted and population of 2226 biology students was composed. The stratified and proportional random sampling techniques were used to sample 414 students from 9 secondary schools. Instrument used for data collection was questionnaire on student's attitude towards Biology (SATB). This was developed by the researcher. The instrument was validated using face validity. The reliability of SATB was determined using Cronbach alpha to be 0.83. The research question was answered using mean and analysis of covariance was used to test the hypothesis. Result showed that gender was found not to exert any significant influence on the attitudes of students towards Biology based on the finding recommendations were made.

Introduction

The question of gender influence on Biology attitude has generated a lot of concern in science Education. Research has clearly shown that this is an important factor which affects both the individual's achievement/performance and preference for science careers (Jacobwitz, 1983). Evidence also abounds of differential performance of males and females relative to learning modes. For example, Osioma (1995) reported that females work better in cooperative settings while males do better work in individualistic settings. This may probably be related to their attitudinal dispositions. Therefore, attitude toward science in general and Biology in particular is linearly related to good achievement in Biology (Oluyemi, 1985). This implies that attitude towards science is very important variable in the teaching and learning of science since it may probably affect Biology achievement. The study therefore sought to explore the influence of gender on student's attitude towards Biology.

There has been report on gender imbalance in (sciences) Biology which has been found to account for the negative attitude of girls in (sciences) Biology and Technology. Lagoke, Jegede and Oyebanji (1995) six factors have been found to be responsible for the gender imbalance and negative attitude towards (science) Biology. These are: individual cognitive, home and family, educational, socio-cultural and attitudinal factors. There is therefore a need for intervention programme to be mounted with a view to

- (i) demasculinize and demystify Biology (science)
- (ii) develop their skills of doing biology (science) and
- (iii) Improve girls' confidence and attitude towards biology (science).

Positive Biology attitude of students has long been recognized as a major factor in the goals of modern science programmes in schools. Attitude to biology has therefore been reported to correlate positively with biology (science) achievement (Odumusi, 1984). Attitudes have generally been regarded as either mental readiness or implicit predispositions that exert some general and consistent influence on a fairly large class of evaluating responses. Blair, Jones and Simpson (1975) described attitude as the feeling of favourableness toward some psychological object. Attitude is a mental and neutral state of readiness organized through experience, exerting a directive and dynamic influence upon the individuals response to all objects and situations with which it is related.

Soyibo (1986) listed some general characteristic of attitude as:

- (a) attitude is a predisposition to respond, that is readiness to behaviour rather than actual behaviour toward an attitude object.
- (b) Attitude is amendable to change that is the alteration of attitude especially that which is strongly held, requires substantial press.
- (c) It produces consistency among its various manifestations, in an individual's behaviour toward an attitude object.
- (d) Attitude has intensity and a directional quality, that is, connotes preference regarding outcomes involving the object, evaluations of the object or positive/negative affections for the object.
- (e) Attitude results from experience and therefore is learned, that is, acquired through experiences that have profound affective component and more than different forms of learning are transmitted through the process of imitation, modeling and identification within the peer group.
- (f) Attitude remains latent until associated signs or objects evoke it to influence the behaviour of the individual towards the stimulus sign or object.

Based on the foregoing attitude can be seen as having three components; affect (emotion), cognition and behaviour (action tendency). The affect involves feelings of like/dislike, love/hate, sympathetic nervous system responses and verbal statements of affect. The cognition involves perceptual responses, beliefs about or factual knowledge of the object and verbal statements of cognition, verbal statements concerning overt actions, action tendencies, verbal statements concerning behaviour (Anyanwu, 1993). These three components are related and hence exert a mutual influence on attitude.

Attitudes affect learning through their influence on perception which leads the child to see tasks to be learned as pleasant and important, or as unpleasant and useless. The way people think is directed by an organic interaction of the cognitive and affective processes and are inter-related

(Onwuka, 1981). In agreement with these positions, Bruner (1960) suggests that positive attitude towards school and biology enables students to achieve superior academic gains, in their school biology subjects.

This section of the review focuses on studies on gender and attitudes of students towards biology. Gender as a factor in biology has for some time now generated a lot of concern for biology teachers. This concern arose from emerging data on differential gender in Biology. A review of the literature on gender differences reveals that there has as yet not been any clear picture concerning this issue. Several factors have been found responsible for the gender imbalance in Biology. Lagoke, Jegede and Oyebanji (1995) reported that these factors could be grouped into six broad categories individual, cognitive, attitudinal, home and family, education and socio-cultural factors. Lagoke, Jegede and Oyebanji (1995) reported that intervention programmes have been mounted in several parts of the world to engage girls and women more in biology and biology related careers aimed at

- (i) demasculizing and demystifying biology
- (ii) improving girls' confidence and self-perception of their ability to do biology.
- (iii) Implementing attitudinal behaviours that actively involved girls in biology (science) lessons; and developing girls' skills of doing science. While two decades of intervention indicate that the gender gap is closing in mathematics attitude, unfortunately the reverse is the case with (science) biology attitude. Vetter (1990) found that in the United States of America (USA) women constitute only sixteen percent of all employed biologists and scientist while thirty percent and twenty one percent of degree awarded at the bachelors and doctorate degrees in natural science and engineering respectively go to women. Similarly, Science Teachers Association of Nigeria (1992) reported that less than ten percent of the total enrolment in Nigerian universities for science and technology based disciplines are females, only six percent of those who enrolled in West African and the senior secondary school certificate examinations are girls and less than five percent of the academic staff in Nigerian universities engaged in biology related disciplines are women. This gender imbalance in Biology attitude is a serious clog in the wheel of progress of every nation including Nigeria especially as females make up about sixty percent of the country's one hundred and forty million inhabitants.

Jacobowitz (1983) investigated the relationship of specific variables to the biology career performances of black eight grade students. One of these variables as the sex of the child on which other variables depend namely: biology self-concept, biology achievement and mathematics achievement. The biology career preference scale was administered on 261 eight grade black students of an inner city junior high school in new assessed using the biology subscale of the self-concept and ability scale, and eight grade mathematics and biology achievement were measured by using grades obtained by students for the third quarter of the

academic year. Means and standard deviation of mathematics and biology achievement, biology self-concept and biology career preferences were obtained for males and females.

A t-test analysis showed that there was no significant difference in the mean scores of the sexes in Mathematics and biology achievement, while significant differences existed between the mean scores of biology self-concept and biology career preferences in favour of males. It was therefore concluded that gender is a better predictor of science career preferences than any of the other variables.

Similarly, Nworgu (1988) investigated the interaction between gender and content area in physics. He made use of 564 final year secondary school physics students from 16 secondary schools. Physics achievement test (PAT) which was made up of 65 multiple choice test items with a reliability coefficient of 0.81 was used to collect relevant data. The result of the 2-way analysis of variance (ANOVA) used for analysis revealed a significant ($P < 0.01$) gender by content area interaction. This led to the conclusion that although males tended to be superior to their female counterparts in physics achievement the superiority was not evident across all content areas in physics.

The pertinent question therefore at this point is: will gender have any significant influence on students' attitude towards Biology (Science).

The purpose of the study was to find out the influence of gender on the SS II students' attitude to Biology.

The scope was limited to find out the influence of gender on Senior Secondary (SS II) students' attitude towards biology in Enugu East Local Government Area of Enugu State. The justification for the choice is based on the fact that the SS I students would not have formed their impression about the subject at that level to be used for the study while SS III class being examination class will be too examination conscious to be ideal for the study.

What is the difference in the mean attitude of SS II male and female students towards Biology of male and female students?

There is no significant difference in the mean attitude of male and female SS II biology students towards Biology.

Methodology

The methodology was approached under the following subheadings: design, area of study, population, sample and sampling techniques, instrument for data collection, validity, reliability and method of data collection and analysis.

The study was a survey design. The design is a study that has to do with gathering of facts, rather than manipulation of variable to provide important and useful information for educational decision making. The study therefore is aimed at gathering information on the influence of gender on attitude in biology without manipulating the subjects.

Influence of Gender on Students' Attitude towards Biology in Enugu East Local

The study was carried out in the secondary schools in Enugu East Local Government Area of Enugu State.

The population of the study comprised all the 2223 senior secondary school three (SS 3) biology students in all the nine secondary schools in the Local Government Area. (See table I below)

The four hundred and fourteen stratified senior secondary schools biology students in the Local Government Area were randomly sampled using stratified and proportionate sampling technique. A sample of 20% of biology students were sampled from each school. The schools were stratified using type variable to ensure appropriate representation. Two of each type was sample using random sampling technique (balloting without replacement) to select a total of six schools. (See table I below)

Table I
The number of students (Population) and sampled students per school.

S/N	Name of School	School Type	No of Students (Population)	No of sampled students per school (sample size)
1.	Community Sec. School Ugwuogo Nike, Enugu	Co-educational	256	51
2.	Girls Sec. Sch. Abakpa Nike, Enugu	Girls	238	48
3.	National Grammar School, Nike, Enugu	Boys	306	61
4.	St. Patrick Sec. Sch, Emene	Boys	273	56
5.	Trans Ekulu Girls' Sec School Abakpa Nike, Enugu	Girls	258	55
6.	Girls Sec School Emene	Girls	285	
7.	Comm. High Sch Emene	Co-educational	194	57
8.	Annunciation Comm. Sec. Sch Nkwo Nike, Enugu	"	183	
9.	New Heaven Boys' Sec. Sch Enugu	Boys	233	47
	Total		2226	414

* Sampled Schools

Student attitude towards Biology (SATB) was used for data collection and was constructed by the researcher. The SATB is made up of 30 items.

The 30 items of SATB was validated using face and construct validity. Out of these 30 items, only 18 items (9 positive and 9 negative statements) survived the validation exercise. The 18 items represented statements about biology on four-point likert type scale with options from strongly agree (SA), Agree (A), disagree (D) and strongly Disagree (SD) on which students indicated their agreement or disagreement levels. The scoring of the items based on the scale are as follows:

Strongly Agree	=	4
Agree	=	3
Disagree	=	2
Strongly Disagree	=	1

The face validity was done by 2 experts in measurement and evaluation as well as 3 experts in biology education of Enugu State University of Science and Technology, Enugu.

The reliability of SATB was determined using the measure of internal consistency. The scores of 414 students used for the trial test were applied in Cronhach alpha formular. The internal consistency coefficient of SATB was computed to be 0.83.

The Cronhach alpha is a modification of K – R 20 formula meant to be used for multiply scored instrument such as attitude scale. The use of Cronbach alpha in this circumstance is thus justified.

The researcher administered the SATB to the 640 SS 2 biology students in the secondary schools in Enugu East Local Government area using three trained assistance researchers.

The research question was answered using mean and standard deviation. Multiple classification analysis of covariance (MANCOVA) as recommended by Gay (1981) was used to test the hypothesis. Computer was used for the analysis of the data.

Results

Research Question

What is the difference in the mean attitude scores of SS II male and female biology students.

Influence of Gender on Students' Attitude towards Biology in Enugu East Local

Table 2

Mean and standard deviation of the student scores on their attitude toward biology.

	No of respondents	Mean	Standard deviation (SD)
Attitude of females	270	58.49	19.81
Attitude of males	207	54.75	23.65
TOTAL Average			

Data in table one above showed that the female attitude of 58.49 and standard deviation of 23.65 seem to have better attitude towards Biology than males with mean of 54.75 and standard deviation of 19.81. This showed that males and females seemed not to demonstrate the same pattern of attitude towards Biology. However the difference between their attitudinal dispositions toward biology appeared to be slight.

Hypothesis

There is no significant different in the mean attitude of SS II male and female students in Biology.

Table 3

Multiple classification of analysis of covariance (MANCOVA) on male and female SS II Student Attitude.

Variables (Gender)	Number	Unadjusted deviation	Adjusted deviation	R ²
Males	426	-42	-24	
Females	213	-52	-29	0.02

Table 2 revealed that there is no significant difference due to gender at 0.05 on attitude of students towards Biology. The observed F-ratio was 0.02 as against the critical F-value of 3.86 with 1 and 139 df at 0.05 level of significance. This meant that gender does not exert any significant influence on the attitude of students toward Biology. Therefore, the researcher failed to reject the null hypothesis.

Discussion of Results

The table one above showed that the male and female SS II students seemed not to demonstrate the same pattern of attitude toward Biology. The difference was found not to be significant and so should probably be ignored. This means that gender is not important factor in determining students' attitude towards Biology in senior secondary schools.

Similarly, study carried out by Jacobwitz (1983) showed that there was no significant difference in the mean scores of the sexes in mathematics and biology achievement. Contrary, Jegede and Oyebanyi (1995) reported that gender imbalance in biology (science) has been found to account for negative attitude of girls in (science) biology and technology. They identified six factors (individual, cognitive, home and family, educational, socio-cultural and attitudinal factors) as responsible for gender imbalance and negative attitude of girls towards (science) biology.

Recommendations

The following recommendations were made based on the results of the study:

1. Professional bodies and government should organize workshops, seminars and short courses whereby well informed science educators will be educated on the need for gender balance in choice of science subjects.
2. Biology teachers should endeavour to boost positive attitude to both male and female students while teaching (science) biology in schools.

References

- Jacobwitz, R. N. (1983). The relationship of sex, achievement and science self concept to the science career preference of black students. *Journal of Research in Science teaching* 20 (7) 211 – 214.
- Osioma, U. I. N (1995). Effects of mode of concept mapping and gender on students' achievement in and attitude toward integrated science. *Unpublished Ph.D thesis in Science Education*. Nsukka University of Nigeria.
- Oluyemi, A. E. (1985). Attitude of secondary school students to the basic science in selected local government areas of Oyo State. *Unpublished Doctoral Dissertation*. Ife: University of Ife.
- Lagoke, B. A, Jegede, O. J. & Oyebanji P. K. (1995). Towards eliminating the gender gulf in science concept attainment through the use of environmental analogs. *A paper presented for the 8th International Gender and Science and Technology Conference (GASAT)* Ahmedabad, Gujarat, India.
- Nworgu, B. G. (1988). Gender and content area interaction in Physics achievement and the discrepancies in gender differences in science achievement. *Institute Journal of studies in Education*. 1 (1), 119 – 122.

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- Soyibo, K. (1982). Relationship between school certificate pupils' attitude and their achievement in Biology. *Journal of Science Teachers' Association of Nigeria (STAN)* 2 (2) 26 – 32.
- Vetter, B. M. (1990). *Women in science and engineering. An illustrated report*, Washington D. C: Commission on professionals in science and technology.
- Science Teachers' Association (1992). Women in science, technology and mathematics: the Nigerian experience. Position paper two, Ibadan: *Science Teachers' Association of Nigeria*.
- Anyanwu, N. A (1993). Effects of students' chemistry project work and students' interaction pattern on their achievement and science process skill acquisition. *Unpublished Ph.D Dissertation*. Nsukka: University of Nigeria.
- Blair, G. M. Jones, A. B & Simpson J. (1975). *Educational psychology* (4th ed). New York: Macmillan.
- Odumusi, T. O.(1984) A study of the attitude of some Nigerian students towards integrated science. *Journal of Research in Curriculum* 3 (1) 3 – 12.