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Effects of Gender on Assessment Supported Instructional Model (ASIM) On Students' Achievement and Interest In Secondary School Mathematics In Delta Central Senatorial District

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Abstract
This study focused on effects of gender on Assessment Supported Instructional Model (ASIM) on students' achievement and interest in secondary school mathematics in Delta Central Senatorial District. The study adopted quasi-experimental design. A sample size of 200 Senior School 2 students was drawn from population of 7,452 Senior School 2 Mathematics students in Delta Central Senatorial District offering mathematics. Instruments used for this study were Mathematic Achievement Test on Indices and Logarithms (MATIL) and Mathematics Interest Inventory on Indices and Logarithms (MIIIL). MATIL and MIIIL had 0.74 and 0.72 reliability coefficients respectively. The researcher used descriptive and inferential statistics as tool for data analysis. The finding of the study indicate that there was a significant difference in the mean achievement scores of male and female mathematics students taught using ASIM. The study also found that there was a significant difference in the mean interest scores of male and female mathematics students taught using ASIM. The study recommended that teachers should expose the students irrespective of sex to ASIM so as to promote effective and active learning among students

Keywords: *Achievement, Assessment, Gender, Instructional, Mathematics.*

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I. Introduction

Gender is a socio-culturally assigned characteristic that distinguishes feminine from masculine behavior (Imoko, 2004). Gender refers to qualities of men and women that are naturally, culturally, and socially determined, whereas sex refers to biologically based features. In a given setting, gender determines what is expected, allowed, and valued in a woman or man. Men are assigned special responsibilities, they are made to undertake special activities, they are made to have access to and control over resources, and they are made to have decision-making opportunities in most societies where there are differences and inequalities between men and women. In most societies, men are assigned special responsibilities, they are made to undertake special activities, they are made to have access to and control over resources, and they are made to have decision-making opportunities. Gender is one of the characteristics that interacts with mathematics achievement.

Mathematics is the cornerstone of science and technology, and its functional role in science and technology is so diverse that it can be applied to any field of science, technology, or business activity (Okereke, 2013). The study of quantity, space, structure, and change is known as mathematics. Mathematicians look for patterns and generate new hypotheses. Mathematical proofs, which are reasons adequate to persuade other mathematicians of the truth or falsehood of conjectures, are used by mathematicians to resolve the truth or falsity of conjectures. Mathematics, according to Ukeje (2010), is the mirror of civilization in all the years of laborious calculation, as well as the most basic discipline for anyone who want to be really educated in any science and many other endeavors. Mathematics appears to be a challenging subject to learn, particularly for female students (Isahak-Haron, 2001). Female students are afraid and have negative thought about Mathematics, because it is difficult to understand and master (Ngean 1992; Nwaiwu and Audu 2005). Similarly, Nwagbo (2002), reported that female science student appreciates role of science as much as their male counterparts but lagging behind in knowledge, application and communication in science. Ogunboyede (2003) and Nwosu (2001), also, affirmed that boys are not better than girls in terms of educational achievement in his study of sex difference and students' achievement at the primary school level

However, studies on how it actually influences achievement have till now reported conflicting results, implying contradicting evidences in academic achievement of students due to gender. Some researchers like Joseph (1996), Mari (2002) and Ifeakor (2005), reported that male students have a higher achievement in Mathematics than females. While on the other hand, Aiyedum, (2000); Danmole and Adeoye, (2004); found no significant difference in the achievement of students due to gender. Instead, they opined that achievement of both males and females can be affected by teaching method. Against this background, this study sought to find out effects of gender on ASIM on students' achievement and interest in secondary school mathematics through the following questions:

1. What is the difference in the mean achievement scores of male and female mathematics students taught using ASIM?
2. What is the difference in the mean interest scores of male and female mathematics students taught using ASIM?

Hypotheses

Two null hypotheses were formulated and tested to generate data for this study;

$Ho_{1:}$ There is no significant difference in the mean achievement scores of male and female mathematics students taught using ASIM.

$Ho_{2:}$ There is no significant difference in the mean interest scores of male and female mathematics students taught using Assessment Supported Instructional Model (ASIM).

II. Method

The design of the study was quasi-experimental. In specific terms, the study employed pre-test post-test control group design. Intact classes were used in the study. The intact classes were randomly assigned to experimental and control groups, respectively. The use of intact classes became necessary, in order, not to disrupt the normal class periods. The population for this study comprised 7,452 male and female Senior School 2 Mathematics students in Delta Central Senatorial District offering mathematics. The sample size of the study consisted of 200 Senior School I students. Instruments used for this study were Mathematic Achievement Test on Indices and Logarithms (MATIL) and Mathematics Interest Inventory on Indices and Logarithms (MIIIL) which were developed by the researcher. The instruments were duly validated and their reliabilities established MATIL and MIIIL had reliability coefficients of 0.74 and 0.72, respectively. The research questions were analysed using mean and standard deviation. Testing of hypotheses involved the use of t-test and Analysis of Covariance (ANCOVA). Hypotheses testing were done at 0.05 level of significance on a two tailed test. The decision was that whenever, the probability value (p) was less than 0.05, the null hypothesis was rejected, but if it was greater than 0.05, the null hypothesis was retained

III. Results

Research Question 1: What is the difference in the mean achievement scores of male and female mathematics students taught using ASIM?

Table 1: Mean and Standard Deviation pre-est and post-test scores of male and female Mathematics Students Exposed to ASIM.

Variable	**N**	Pre-Test		Post-Test		Mean Achievement Gain
		Mean	SD	Mean	SD	
Male	56	12.19	2.26	17.22	4.11	5.03
Female	67	11.97	3.80	18.39	4.00	6.42

Table 1 presents the Mathematics achievement test scores of male and female students at the pre-test and post test levels, respectively. It showed that the pre-test mean and standard deviation of male students were 12.19 and 2.26, respectively while those of female students were 11.97 and 3.80, respectively. It, also, showed that the post-test mean achievement test scores and standard deviation of male students exposed to ASIM were 17.22 and 4.11, respectively. Also the mean and standard deviation of the female students at the post test were 18.39 and 4.00, respectively. The mean achievement gains for male and female students were reported to be 5.03 and 6.42, respectively. From the above analysis, female mathematics students achieved, significantly, better than the male students in the ASIM teaching strategy.

Hypothesis 1 (HO_3): There is no significant difference in the mean achievement scores of male and female mathematics students taught using ASIM.

Table 2: Summary of t-test of Differences between the post-test mean Achievement Test Score of Male and Female Mathematics Students Exposed to ASIM

Variable	N	Mean	SD	df	t-cal	t-crit
Male	56	17.22	4.11	121	2.91	1.96
Female	67	18.39	4.00			

$P < 0.05$

Table 2 shows the t-test comparison of post-test mean achievement scores of male and female students exposed to ASIM. The t-calculated value of 2.91 is greater than the t-critical value of 1.96. Based on this, hypothesis (HO_3) is hereby rejected. This indicates that there is a significant difference in the mean achievement scores of male and female mathematics students exposed to ASIM. This implies that female Mathematics students with the mean score of 18.39 achieved, significantly, better than the male Mathematics students with a mean score of 17.22 in the group taught with ASIM.

Research Question 2: What is the difference in the mean interest scores of male and female mathematics students taught using ASIM?

Table 3: Mean and Standard Deviation interest pre-test and post-test score of Male and Female Mathematics Students Exposed to ASIM

Variable		Pre-Test		Post-Test		Mean Achievement Gain
	N	**Mean**	**SD**	**Mean**	**SD**	
Male	56	14.23	1.88	18.46	1.77	4.24
Female	67	10.58	1.23	11.77	2.41	1.39

Table 3 shows the mean interest comparison of the post-test scores of male and female mathematics students exposed to ASIM. The pre-test mean achievement score and standard deviation of male students were 14.23 and 1.88, respectively. For the females, however, the pre-test mean was 10.58 and a standard deviation of 1.23. Relative to the post-test, it was shown that male students had a mean and standard deviation of 18.46 and 1.77, respectively, while those of the female were 11.77 and 2.41, respectively. From the above analysis, male Mathematics students had better interest than the female students when exposed to ASIM.

Hypothesis two (HO_4): There is no significant difference in the mean interest of male and female mathematics students taught using ASIM.

Table 4: Summary of t-test of Differences between the post-test mean Interest Scores of Male and Female Students Exposed to ASIM

Variable	N	Mean	SD	df	t-cal	t-critical
Male	56	18.46	1.77			
				121	2.419	1.96
Female	67	11.77	2.41			

$P > 0.05$

Table 4 shows the t-test comparison of post-test mean interest scores of male and female students exposed to ASIM. The t-calculated value of 1.96 is greater than the t-critical value of 1.96. Based on this, the null hypothesis (HO_4) was rejected. This indicates that there is a significant difference in the mean interest scores of male and female Mathematics students exposed to ASIM in favour of male students.

IV. Discussion of Findings

The finding arrived at from table 1 showed that the post-test mean achievement test scores and standard deviation of male students exposed to ASIM were 17.22 and 4.11 respectively. Also, the mean and standard deviation of the female students at the post test were 18.39 and 4.00 respectively. The mean achievement gains for male and female students were reported to be 5.03 and 6.42 respectively. From the above analysis, female mathematics students achieved significantly better than the male students in the ASIM teaching strategy. The corresponding hypothesis tested indicates that there is a significant difference in the mean achievement scores of male and female mathematics students exposed to ASIM. This implies that female Mathematics students with the mean score of 18.39 achieved significantly better than the male Mathematics students with a mean score of

17.22 in the group taught with ASIM. This finding gives credence to the findings of Nwagbo (2002) who reported that female science student's appreciation of the role of science as much as their male counterparts but lagging behind in knowledge, application and communication in science.

Similarly, this finding also concur to the study of Nwosu (2001) in her study which revealed that exposure to science process skills based learning involving activities for both boys and girls yielded more effective learning irrespective of gender and ability level. Ogunboyede (2003) in line with Nwosu (2001), also, reported that boys are not better than girls in terms of educational achievement in his study of sex difference and students' achievement at the primary school level. This finding seems to be in disagreement to the work of Akanbi (2004) on his research works carried on gender effects on academic achievement which have shown that there is proportionately low achievement of females in science education programmes and careers.

Finding from table 3 showed that male students had a mean and standard deviation of 18.46 and 1.77, respectively, while those of the female were 11.77 and 2.41, respectively. From the above analysis, male Mathematics students had better interest than the female students when exposed to ASIM. Also, the corresponding hypothesis tested in table 4 showed the t-test comparison of post-test mean interest scores of male and female students exposed to ASIM. The t-calculated value of 2.419 is greater than the t-critical value of 1.96. Thus, the null hypothesis (HO_4) is hereby rejected. This implies that the mean interest scores of male and female Mathematics students exposed to ASIM differ significantly, with male students scoring higher. This finding corroborates the findings of Aigbomian (2002) who reported that boys performed better than girls in science, Technical and Mathematical subjects. Uhumuavbi, Oriahi and Olusi (2003) still raised the concern and worry that female achievement in Science, Technology and Mathematics is not encouraging. Nwaiwu and Audu (2005) in the same vein agreed, that, the number of women enrolment in tertiary education has increased at a slower rate than male enrolment. Nwaiwu and Audu (2005) viewed gender gap in education to be very wide with male enrolment at least three times higher than female. This development perhaps has resulted from girls difficulty in understanding the physical sciences notably Physics as observed by Aigbomian, (2002).

V. Conclusion

The following conclusions were formed based on the findings of this study:

1. The achievement and interest of mathematics students exposed to ASIM depend on the student sex in favour of females. Conclusively therefore, students' sex was a strong variable in the study.
2. Female students achieved significantly better than male students when they are taught with ASIM.

VI. Recommendations

Based on the finding and conclusion drawn in this study, the following recommendation is offered to boost the academic achievement of Secondary schools Mathematics;

1. Teachers should expose the students irrespective of the sex to ASIM to promote effective learning among students.
2. Government and education stakeholders should organized a seminar and training workshop especially for male students on ASIM.

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