

Effect of Gender and Subject Combination on the Achievement of NCE Mathematics Students in Colleges of Education in Delta State

¹ Jenije Richard

Department of Mathematics College of Physical Education, Mosogar, Delta State.

² Emeke Odogwu Aghanenu

Department of Curriculum and Integrated Science, Delta State University, Abraka.

¹Email:jenijerichard@gmail.com

²Email:mekinsmek@gmail.com

Abstract

The study investigated the effect of gender and subject combination on the achievement of NCE mathematics students in colleges of education in Delta State. The study employed the causal comparative research design. The sample consists of 110 students in college of Education Agbor and the college of physical education, Mosogar both in Delta State. The research instrument used is the 2013/2014 mathematics students' sectional performance of the 110 students across their various subject combinations and levels. Two research questions and two hypotheses were formulated to guide the study. The hypotheses formulated were tested using the independent t-test and the f-test inferential statistics at 0.05 level of significance. The results obtained revealed that: there is no significant difference in the achievement of NCE mathematics students across the various subject combinations, there is no significant difference between the achievements of male and female NCE mathematics students across the various

subject combinations. It was recommended among others that lecturers (teachers) should ensure to give both the male and female students the equal opportunity to learn together and participate in class discussions.

Keywords: *effect, gender, subject combination, achievement, NCE.*

Background to the study

Education is the springboard for the development of man, be it formal or informal. According to Onwuka (2009), it is a veritable tool which is used to measure human growth and development. The quality of life in a society depends significantly on its standard of education. According to Odili (2004), education and schooling are seen as instruments which are devised for the development of human potentials which help individuals to attain self-actualization. In Nigeria, education is categorized into three levels, namely; basic, secondary and tertiary education. The place of mathematics in the realization of the objectives of the three



levels of education cannot be overemphasized. Abraham (2004) asserts that its' symbolism, structure, elegance and the ability to develop powers of logical thinking accuracy with figures and spatial awareness are the essentials of teaching and learning of mathematics in schools. As stated by Aguele(2001), Arubayi(2001) and Moore(2005), mathematics provides the basic infrastructure on which the amazing super structures such as the advance technologies we have laid. The prosperity of a nation depends on the volume and quality of mathematics offered in it's school system and is one of the most powerful and adaptable mental tool which the intelligence of man has made for his own use (Usman;2002, Awodeyi;2004, Odogwu;2004).

The teacher training institution that is recommended for training basic school (primary and junior secondary) teachers is the college of education. Colleges of education according to Igweh (2008) are tertiary educational institutions that prepare intermediate level teachers for a minimum of 3 years to make them qualified to teach their respective subjects. Colleges of education are tertiary institutions that offer three years teacher training to students in various occupations (Bakare and Owodunni, 2011). The mandate of the teacher training programme at the NCE level, is to produce quality teachers for the basic education subsector. The NCE mathematics teacher education programme is such that students are expected to offer mathematics in

combination with other science subjects known as subject combination. Such combinations includes; mathematics/computer science, mathematics/chemistry, mathematics/economics, mathematics/integrated science, mathematics/social studies.

Few studies have evaluated the effect of subject combination on students' achievement in mathematics in colleges of education. Arigbadu (2004) carried out a study on the influence of subject combination on the performance of students in mathematics in colleges of education. The study revealed that students studying courses other than mathematics did not perform better than mathematics students. Arigbadu and Mji (2006) also examined the influence of subject combinations on preservice mathematics teachers' examination performance in Nigeria. The issue of gender difference in academic performance of students in mathematics has become a topic of debate among researchers. The results obtained by various researchers have been contradictory. Studies carried out by Agwagah (2001), Juhun and Momoh (2001), Musa and Agwagah (2006) revealed that boys outperform girls in mathematics. However, studies by Kurumeh (2007), Galadima and Yush (2007) assert that girls perform better than boys. Hence the need to further investigate the influence of gender on mathematics performance.

Statement of the problem

It is quite pertinent to note that a country cannot make progress in science and technology without mathematics. This is the reason why mathematics is made compulsory at all levels of Nigeria's educational system. Despite its' relevance, the state of teaching and learning mathematics in our schools is quite alarming. Colleges of Education are instituted to train teachers for This has resulted in the poor performance of students in the subject. In the department of mathematics in colleges of education, mathematics is combined with other subjects. Could it be that the nature of these subjects combined with mathematics has effect on their achievement in mathematics? Do sex differences influence the academic achievement of NCE students in mathematics?

Purpose of the study

Study is designed to evaluate the achievement of NCE mathematics education students in colleges of education in southern Nigeria. The study is specifically designed to

- i. Determine if subject combination contribute to the academic achievement of NCE mathematics students.
- ii. ascertain whether gender contributes to the academic achievement of NCE mathematics students.

Research questions

The following research questions were formulated to guide the study.
RQ₁: is there any difference in the

achievement of NCE mathematics student across the various subject combinations?

RQ₂: is there a difference between the achievements of male and female NCE mathematics students across the various subject combinations?

Research hypotheses

Based on the research questions, the following hypotheses were formulated.

HO₁: There is no significant difference in the achievement of NCE mathematics students across the various subject combinations
HO₂: There is no significant difference between the achievements of male and female NCE mathematics students across the various subject combinations.

Materials and Methods

The causal comparative research design was adopted for the study. The causal comparative research design seeks to identify cause-effect relationship between two or more variables. According to Johnson (2000), causal comparative research design involves comparing two groups in order to explain existing differences between them on some variable or variables of interest.

The 2013/2014 mathematics students sectional result across the various subject combinations and levels constitute the research instrument used for the study. The results were collected from the college of physical science, Mosogar and college of education Agbor. The results

represents the result from 2011/2012, 2012/2013, 2013/2014 sessions and represents the CGPA of NCE 1, 2 and 3. These results were obtained from the office of the heads of department of both colleges. The subject combinations are Mathematics/Physics (MP), Mathematics/Computer Science (MC), Mathematics/Economics (ME) and Mathematics/Integrated Science (MI). the GPA of each student in MP, MC, ME and MI were computed. The GPA for male and

female NCE mathematics students were also computed across the subject combinations in NCE 1, 2 and 3. Finally the GPA of students were computed across the various levels in MP, MC, ME and MI. The table below shows the total number of students whose results were used for the study.

Table 1: *subject combination by level and sex of students of the 2013/2014 academic sessions*

Subject combination	NCE I			NCE II			NCE III			Subject combination total
	Sex			Sex			Sex			
	M	F	Total	M	F	Total	M	F	Total	
MP	5	2	7	6	2	8	6	3	9	24
MC	7	4	11	7	3	10	8	3	11	32
ME	8	5	13	4	3	7	6	4	10	30
MI	3	5	8	5	6	11	3	2	5	24
Level/Sex Total	23	16	39	22	14	36	23	12	35	110

The research questions formulated were answered using descriptive statistics-mean and standard deviation. The hypotheses formulated were analyzed using inferential statistics; t-test statistics and the f-test statistics.

Presentation of result

Research Question 1: Is there any difference in the achievement of NCE mathematics student across the various subject combinations?

Table 2: *Mean Grade Point Average (GPA) by level and subject combination*

Level	Mean GPA by subject combination				CGPA
	MP	MC	ME	MI	
NCE I	2.44	2.71	2.55	2.47	2.54
NCE II	2.42	2.90	3.11	2.99	2.86
NCE III	3.12	2.94	3.12	3.04	3.05

The table shows that mathematics students who have economics as their second subject performed better than those that have physics, computer science and integrated science. Table 2 also reveals that the Cumulative Grade Point Average (CGPA) of NCE III mathematics students across the various subject combinations is higher than that of NCE II

and NCE I. This shows that there is a difference in the achievement of NCE mathematics students across the various subject combinations.

Research Question 2: Is there any difference between the achievements of male and female NCE mathematics students across the various subject combination

Level	Mean (CGPA) by sex				
	Male	X_1	δ	Female	X_2
NCE I	2.54	1.0029		2.86	0.8399
NCE II	2.92	1.1360		2.78	0.9452
NCE III	3.16	0.6506		2.83	0.7428

Table 3: Mean and Standard deviation of mathematics by level and gender

Table 3 revealed that the mean CGPA of male mathematics students is slightly higher than that of female mathematics students across the subject combinations in all levels. Hence we conclude that there is a slight difference between the

achievements of male and female NCE mathematics students across the various subject combinations.

Hypothesis 1 (H₀₁): There is no significant difference in the achievement of NCE

mathematics students across the various subject combinations.

Table 4: One way analysis of variance comparison of students' achievement across the various subject combinations.

Variation	Source of variation	df	ss	ms	f-ratio	p-value	decision	Reason
NCE I MP,MC,ME,MI	Between Groups	3	0.409	0.136	0.1296	0.9418	Not Significant	p>0.05
	Within Groups	35	36.797	1.05				
	Total	38	37.209					
NCE II MP,MC,ME,MI	Between Groups	3	2.228	0.743	0.7089	0.5538	Not Significant	p>0.05
	Within Groups	32	33.523	1.048				
	Total	35	35.751					
NCE III MP,MC,ME,MI	Between Groups	3	0.290	0.097	0.1596	0.9227	Not Significant	p>0.05
	Within Groups	31	18.748	0.605				
		34						

For NCE I, the f-ratio is 0.1296 and the p-value is 0.9418. The null hypothesis is retained. This implies that there is no significant difference between (p>0.05) in the achievement of NCE mathematics students across the various subject combinations. For NCE II, the f-ratio is 0.7089 and the p-value is 0.5538. Since the p-value is greater than the set level of significance (0.05), the null hypothesis is retained. This implies that there is no significant difference in the academic achievement of NCE mathematics students across the various subject combinations. For NCE III, the f-ratio is

0.1596 and the p-value is 0.9227. This reveals that there is no significant difference between the academic achievements of NCE mathematics students across the various subject combinations.

Hypothesis 2 (H₀₂): There is no significant difference between the achievements of male and female NCE mathematics students across the various subject combinations.

Table 5: *t-test analysis of the difference between the mean scores of male and female students in NCE I, II, and III.*

Gender	N	X	Δ	DF	t-cal	p-value	Std. Error	Decision
NCE I Male	23	2.54	1.003	32	0.9141	0.3675	0.350	Not Significant
Female	11	2.86	0.839					
NCE II Male	19	2.92	1.136	32	0.3836	0.7038	0.365	Not Significant
Female	15	2.78	0.945					
NCE III Male	23	3.16	0.651		1.3574	0.1839	0.243	Not Significant
Female	12	2.85	0.743					

For NCE I, table 5 shows that the t-calculated value is 0.9141 and the p-value is 0.3675. The difference is not significant. Thus the null hypothesis is retained. Thus there is no significant difference between the achievements of male and female NCE mathematics students across the various subject combinations. For NCE II, the t-calculated value 0.3836 and the p-value is 0.7038. This implies that the null hypothesis is retained. Hence there is no significant difference between the achievements of male and female NCE mathematics students across the various subject combinations. For NCE III, the t-calculated value is 1.3574 and the p-value is 0.1839. This shows that the difference between male and female NCE mathematics students is not significant.

Discussion of results

Table 4 shows that there is no significant difference in the achievement of NCE mathematics students across the various subject combinations. This implies that does not have any influence on the performance of NCE mathematics students. This is consistent with the work of Clement and Daniel (2015) who found out that there is no significant difference in the performance of physics students across their various subject combinations. According to the results in table 5, gender had no significant effect on mathematics students academic achievement across the various subject combinations. This result disagrees with Agwagah (2001), Juhun and Momoh (2001), Musa and Agwagah (2006) who found out in their various studies that boys outperform girls.

Although there exist a slight difference in the performance of male and female mathematics students, this difference is not significant which tend to agree with the words of Hydea and Mertz (2009) which reveal that girls have reached parity with boys in mathematics performance.

Summary of findings Based on the analysis of data the following are the research findings.

There is no significant difference in the achievement of NCE mathematics students across the various subject combinations.

There is no significant difference between the achievements of male and female NCE mathematics students across the various subject combinations.

Conclusion

From the research findings, the following conclusions were made.

Subject combination does not significantly affect the achievement of NCE mathematics students. Gender has no significant effect on NCE mathematics students' achievement.

Recommendation

Based on the research finding the following recommendations were made. Male and female students should be given equal opportunity to learn and should be carried along in the cause of teaching.

References

[1] Aguele, L.I. (2001). Difficulties Facing the Teaching and Learning of Mathematics in Nigeria; Implication for the Teacher.

- Science, Technology and Mathematics (STM). Education in Contemporary Nigeria. Onitsha. Kmensuo Educational Publishers. 15-2
- [2] Agwagah, U.N.V. (2001); Teaching Number Bases in Junior Secondary School Mathematics. The Use of the Baseboard. ABACUS. The Journal of the Mathematical Association of Nigeria. 26[1],1-7.
- [3] Agwagah, U.N.V. (2005); Teaching Mathematics for Critical Thinking. Essential Skill for Effective Living. ABACUS. The Journal of the Mathematical Association of Nigeria. 30[1].38-45.
- [4] Arigbadu, A.A. (2004). Subject Combination Differences in Pre-service Mathematics Teachers Performance. Journal of Science Education, 4,121-135.
- [5] Arigbadu, A.A. & Mji, A. (2006). Investigating the influence of subject combinations on preservice mathematics teachers' examination performance in Nigeria. Journal of Science Teachers Association of Nigeria, 6(1&2), 98-108.
- [6] Awodeyi, A.F. (2004); Mathematics for Sustainable Development: Implications and Illustrations for Secondary Educator. ABACUS. The Journal of the Mathematical Association of Nigeria.29 (1), 49.
- [7] Federal Republic of Nigeria (2012). National Commission for Colleges of Education. Nigeria Certificate in

- Education Minimum Standard for Sciences, Abuja: NCCE.
- [8] Galadima, I & Yush, M.A. (2007), An Investigation into Mathematics Performance of Senior Secondary School Students in Sokoto State. ABACUS. The Journal of Mathematical Association of Nigeria. 32 (1).24-33.
- [9] Ibrahim, G. (2004); The State of Further Mathematics Curriculum in Secondary Schools of Sokoto and Zamfara States. ABACUS. The Journal of Mathematical Association of Nigeria. 29(1),24-28.
- [10] Iji, P.O.(2008); Relationship Between Mathematics Knowledge of Nigeria Certificate in Education (NCE) Mathematics Students and their Performance in Computer Science. ABACUS. The Journal of Mathematics Association of Nigeria. 33(1), 42-48.
- [11] Jahun, I.U. & Momoh, J.S.(2001); Effect of Environment and Sex on the Mathematics Achievement of JSS 3 Students in Kwara State. ABACUS. The Journal of the Mathematics Association of Nigeria. 26(1), 53-58.
- [12] Kurumeh, M.S. (2007); Effects of Ethno mathematics Approach on Students Interest on Geometry and Mensuration. ABACUS. The journalofMathematical Association of Nigeria. 32(1). 103-114.
- [13] Musa, D.C. & Agwagah, U.N.V. (2006): Effect of Incorporating Practical into Mathematics Evaluation on Senior Secondary School Students Achievement in Mathematics. ABACUS. The Journal of Mathematical Association of Nigeria. 31(1). 55-67.
- [14] NCCE (2002); Federal Republic of Nigeria. National Commission for Colleges of Education, Minimum Standards for NCE Teachers.
- [15] Odogwu, H.N. (2004); Mathematics Teachers Factor in the Achievement of the Goals of UBE. ABACUS. The Journal of The Mathematical Association of Nigeria. 27(10), 72-79.
- [16] Onwuka, P.I. (2009); The Relationship Between Nigerian Certificate in Education (NCE) Students' Achievement in Mathematics Component of the General Studies and Primary Mathematics. Unpublished Ph.D Thesis.
- [17] Usman, K. & Memeh,I.M. (2007). Using guided scoring teaching strategy to improve students achievement in mathematics at secondary school level in Nigeria. Journal of Science Teachers Association of Nigeria, 42(1&2), 60-66.