

# Academic Achievement of Non-Specialist and Specialist Biology Students in Basic Science Education

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**Abstract:** - The purpose of the study was to explore the correlation between non-specialist and specialist Biology students. Thus, the study investigated the relationship between non-specialist and specialist Biology students in Umar Suleiman College of Education Gashua – Yobe State. There were 308 non-specialist students against 15 Biology specialist students which made a sample of 323 randomly selected NCE I students was taken from a population of (1,617) students. The Data analysis was done using an ex-post-facto design as well as the ANOVA and Z-Statistic. The result shown that, NCE course combination can affect students' academic achievement in Biology; although, there is no significance relationship among the mean performances of students in various NCE programmes. But on the contrary, there is a significant difference in the mean performance of specialist and non-specialist Biology students at 0.05 level of significance. The findings were briefly discussed with a view of making a necessary provision to cater for all sorts of students in Basic science education.

**Keywords:** Academic Achievement/Specialist Students/Non-specialist Students/Basic science education

## I. INTRODUCTION

Science education is one of the core courses in Nigeria Certificate in Education (NCE) programme meant to be studied by all science based NCE students. For that reason, a big number of non-specialist Biology students (who are more than specialist Biology students) study these science education courses together. According to National Commission for Colleges of Education (NCCE) Minimum Standard (2012), these courses are designed to develop students' critical thinking and imagination so as to apply Basic science in solving problems of everyday life (GNU, 2013). These courses tend to improve the skills required by all NCE students regardless of field of study in the science education section; this perhaps accounts for the reason why most General Studies Education (GSE) courses are designed to expose students to a variety of knowledge across disciplines.

In fact, these courses are aimed at enabling students appreciate the inter-relationship among disciplines in an integrated world, which is fast becoming global village (NCCE, 2012). In a simple way, it follows therefore that preparing students to meet the global challenges is the singular philosophy of basic science education. But in particular, Basic Biology is designed

to be the necessary pillar required by all students in order to acquire the desirable manipulative skills and logical abilities needed for bridging the gaps in human knowledge (Porter, 1996). To that effect, it is imperative that we investigate the kind of relationship with respect to academic achievement of specialist and non-specialist Biology students in Basic science education. Perhaps, definitely we will be at a better position to foster solution(s) to all categories of students most especially the NCE students.

Although the critics might ask – isn't this Basic Biology problem specially tied to the third world countries and restrained to Colleges of Education? But surprisingly Asher (2007), in the article *'Why students of all ages are failing these courses and what can be done to turn it around'* revealed:

In fact, evidence from past and present research in Biology education and other related sciences have confirmed that academic achievements of all categories of students have been a point of concern to many educators. For example, the UNESCO report of papers presented at the Fifth International Congress on Science Education, Adelaide – Australia (1984) on the theme *'Science education for All'*.

### *Statement of the Problem*

Teaching and learning of Biology, like other sciences, has its own peculiar challenges (Barreiro & Albandoz, 2001). In the words of Dickey (1997), "Today's Biology teachers are experiencing major changes not only in the Biology content they teach, but also in the way they teach". He further notes that, nearly all of these teachers came through school when Biology consisted of a collection of facts and skills to be memorized or mastered by relatively homogeneous group of students taught using a lecture approach. Now teachers are called on to teach new, more challenging Biological techniques to a very diverse audience using active learning approaches designed to develop understanding.

Moreover, considering the current NCE Minimum Standard (2012) curriculum, it provides that Basic science education be taught to all NCE students regardless of whether they might specialize in Biology or not. This might have generated a lot of rejoinders from the students (Barreiro & Albandoz, 2001).

This call for concern, especially in view of the fact that teaching/learning of Biology has to cater for seemingly 'fused' heterogeneous students. Thus, it is somewhat a necessity to explore the relationship between non-specialist and specialist Biology students so as to foster immediate solution in area of difficulty.

#### *Purpose of the Study*

The overall purpose of the study is to find out the correlation of academic achievement between non-specialist and specialist students in Science education; in particular, the research is aimed at accomplishing the following:

- Explore the degree of relationship between non-specialist and specialist students in aspect of Biology.
- Investigate the form of disparity between the academic achievement of non-specialist and specialist students of Biology.
- Identify factors responsible for similarity/dissimilarity between the non-specialist and specialist students in Biology.

#### *Scope of the study*

The study was designed to cover all NCE students of Umar Suleiman College of Education Gashua, Yobe state but due to time and financial constraints the researcher delimited the study to NCE I students only. Furthermore, the researcher considered basic science education courses.

#### *Research Questions*

The researcher is of opinion that there should be uniformity in academic success/failure of non-specialist and specialist Biology students, basically in view of the fact that all the students fulfilled the same entry requirement with no or less consideration to their educational background. Furthermore, Basic Biology (I - V) is primarily designed for all NCE students irrespective of their area of specialization. That's why the study seeks to answer the following questions:

- To what extent is the academic achievement of non-specialist Biology students similar to other science education specialist students?
- To what extent is the NCE course of study (or course combination) capable of affecting students' academic achievement in Biology?

#### *Research Hypotheses*

In this study, the following null hypotheses were formulated and tested.

$H_{01}$  There is no significant difference in the mean performance of specialist and non-specialist Biology students.

$H_{02}$  There is no significance relationship between the mean performance of students in various NCE programmes (Physics Education, Biology Education, Chemistry Education, Geography Education and Integrated Science)

## II. RESEARCH DESIGN

An ex-post-facto design was used in an attempt to explore the correlation between non-specialist and specialist students in Biology. This study adopted survey approach because it is said to be suitable for investigation and besides there is no special treatment or control group.

#### *Sample & Sampling Technique*

The study targeted all NCE I students of Umar Suleiman College of Education Gashua – Yobe state. A sample size of three hundred and twenty-three (323) students was drawn from the total of one thousand six hundred and seventeen (1,617) students representing 20% of the entire population that registered BIO 101 Introduction to Biology in 2012/2013 academic session. According to Afolabi (2001), a sample is worthless unless it reflect the entire population upon which generalization is made.

Thus the students were sampled regardless of sex or age to allow for easy analysis of data; there were 308 non-specialist Biology students against 15 Biology specialist students. Meanwhile a stratification technique was used to allow even distribution of students across various schools as follows: 35 students from School of Education (SOE), 95 students from Geography education, 96 students from Chemistry education and 97 students from integrated science education.

#### *Validation of Instrument*

Two experts were used to validate the research instrument (structured questionnaire) from science education Department of Umar Suleiman College of Education Gashua. In addition, they were asked to assess whether appropriate standard had been set in the questionnaire for the intended research purpose. All the suggestions and the recommendations of the valuator were carefully considered and used in the final preparation of questionnaire. However, for the purpose measuring academic achievement, the researcher used the students' examination result of BIO 101 as it is accessible.

## III. RESULTS AND INTERPRETATION

Results are presented in accordance with the research questions as well as the hypothesis that guided the study.

Research Question 1: *To what extent is the academic achievement of non-specialist Biology students similar to Biology specialist students?*

Table I: Academic Achievement of Non-Specialist & Specialist Mathematics Students

SN	Statement Strategy	Mean	SD	Remark
1	It is hard to do well in Biology if you're not in Biology department.	2.57	14.50	Accept
2	Students of Biology department can do better in Biology than other students.	2.14	12.44	Reject
3	I cannot do well in Biology because it is not important to my field of study.	2.38	13.16	Reject

4	Introduction to Biology is not supposed to be a General course in science Education.	2.54	13.99	Accept
5	Students find it difficult to pass Biology because it irrelevant to their course of study.	2.59	14.22	Accept

Source: Field Work

Opinions of the respondents provided evidence that the academic achievement of non-specialist and specialist Biology students is similar. The fifth item, however, the respondents acknowledged the reality that most students under-achieve in Biology because they perceived it is not relevant to their course of study. Although responses to the second item opined high possibility for students from other departments to outperform Biology students in Basic Biology.

Research Question 2: *To what extent is the NCE course of study (or course combination) capable of affecting students' academic achievement in Biology?*

Table II: Effect of NCE Course of Study (Course Combination) on Students' Academic Achievement

SN	Statement Strategy	Mean	SD	Remark
6	Introduction to Biology should be studied by Sciences students only	2.36	13.08	Reject

Table III: Z Test - Comparison between Non-Specialist and Specialist Biology Students

Class of Students	N	Mean	S D	Df	Z – Cal.	Z – Crit.	Decision
Specialist	15	18.73	1.32	321	25.30	1.64	Reject $H_{01}$
Non- Specialist	308	6.09	6.41				

Source: Field Work

Since the calculated Z value (25.30) is greater than the Z table value (1.64) at 95% level of confidence and 321 degree of freedom, so null hypothesis 1 is rejected. Hence, there is a

7	Knowledge of Basic Biology is useful to all science education students.	2.63	14.57	Accept
8	I can do better in Biology If my course of study is changed.	2.38	13.31	Reject
9	I do not need to understand Biology because my field of study (or Course Combination) does not require it.	2.43	13.33	Accept
10	The knowledge of Biology is not helpful to other science education students.	2.42	13.30	Accept

Source: Field Work

The result upholds the fact that knowledge of Biology is useful to all NCE fields in the science education section but reject the claim that students can do well in Biology whenever their course is changed. Thus, to some extent, the respondents credit that NCE course of study (or course combination) affects students' academic achievement in Biology.

significant difference in the mean performance of specialist and non-specialist Biology students.

Table IV: ANOVA - Comparison of Students' Performance in Various NCE Programmes

Source	Sum of Squares	Degrees of freedom	Mean Squares	F – Cal.	F – Crit.	P < 0.05
Between	96.48	3	32.16	2.14	2.60	Accept $H_{02}$
Within	4791.38	319	15.02			
Total		322				

Source: Field Work

Since F-calculated value (2.14) is less than the F-critical value (2.60), we accept the hypothesis  $H_{02}$ . Therefore, there is no significance relationship between the performance of students in various NCE programmes across departments - Chemistry education, Geography education, Physics Education and Integrated Science.

#### IV. CONCLUSION

In the course of this study, the major findings of this research had shown that:

- 1) Academic achievement of non-specialist students is comparable to that of their counterparts - specialist Biology students.
- 2) NCE course of study (or course combination) can affect students' academic achievement in Biology.
- 3) There is a significant difference between the mean performance of specialist and non-specialist Biology students.

- 4) There is no significance relationship among the mean performances of students in Biology in various NCE programmes.

As earlier mentioned, teaching and learning of Biology, like other sciences, has its own peculiar challenge (Barreiro & Albandoz, 2001). Nevertheless, the research findings had provided some vital information about specialist and non-specialist Biology students. It shows that, course of study (or course combination) can affect students' academic achievement in Biology. It simply means that Biology specialist students may be at higher advantage than other students. In fact, it is obvious that there is a considerable distinction between the mean performance of specialist and non-specialist Biology students.

On the issue that Basic Biology course infuses skills required by all NCE students (GNU, 2013). The result is in agreement with Dickey (1997) that today's Biology teachers are experiencing major changes not only in the Biology content they teach, but also in the way they teach since they are called on to teach new, more challenging Biological concepts to a very diverse audience using active learning approaches designed to develop understanding. This pointed out the reality that nowadays, teaching/learning Biology must take into cognizance a lot of factors most especially the students' personality.

Therefore, on a final note, it is imperative that Biology teachers should consider the caliber of the students they teach; in so doing, their method of teaching Biology should cater for seemingly heterogeneous students. More so, there should be a

deliberate plan to uplift the non specialist students but not at the detriments of the specialist Biology students and vice versa.

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