

# Effects of Teacher Preparation on Students Academic Achievements in SS2 Biology Practicals

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## Introduction

Teacher preparation is essential if the educational sector of any society wants to grow towards achieving its goals and meeting its teacher's needs. If teachers are empowered properly through effective training, the task of teaching and learning will become a mirage. Teacher's preparation is the training undertaken by prospective teachers before being employed in teaching (Gwany, 2005). Effective teacher preparation is a very vital instrument for the development and transformation of any nation. Good teacher preparation programmes will give birth to quality teachers who in turn will produce quality school leavers, quality school leavers will give quality manpower in all spheres of life that can support, sustain and trigger development. Therefore, any teacher education programme that is deficient calls for concern, It is on this basis that the Federal Government of Nigeria prescribed the current curriculum content for teacher education programmes that can help produce quality teachers who will educate Nigerian citizens. Some of these teachers are to teach biology at the senior secondary level.

## Literature Review

The concept of teacher preparation began in the first decade of the 18<sup>th</sup> century in Germany. Within the same period it was started in France by a Roman Catholic Monk, Jean Babtiste de la Salle. In England Joseph Lancaster and Andrew Bell established teacher training institutions by the first quarter of the 19<sup>th</sup> century. The Teachers College founded in 1888 in New York, was incorporated into Columbia University. By the end of 19<sup>th</sup> century, teacher training became established in most countries of the world (Bansal, 2008).

The first attempt at training teachers for secondary school level started at the Yaba College of Technology which was established in 1932. The curriculum was science based and the certificates awarded by the institution included Post Graduate Diploma in Education. Following the recommendations of the Ashby Commission, many universities in Nigeria started degree programmes to prepare teachers who will teach at the secondary school level.

Teacher preparation for the award of B.Sc (Education) in Biology started in 1961 at the University of Nigeria Nsukka. Currently many Nigerian Universities award B.Sc (Education) Biology and B.Ed (Biology) degrees after a duration of two to four years study depending on the entry qualifications.

Ukeje (1991), Gwany (2006), Rakum (2007) the Teacher's Registration Council of Nigeria and Federal Ministry of Education (2009) have all expressed in one way or the other, their reservations on the efficacy of teacher preparation and by extension the attainment of the purpose of teacher education in Nigeria.

However, teacher preparation programmes that will lead to the attainment of the stated purpose occur in various institutions such as National Teachers' Institute (NTI), Colleges of Education (COE) and the Universities. Specifically, the preparation of secondary school teachers takes place in the higher institutions (the Universities) and in some degree-awarding Colleges of Education. In such Universities and Colleges, secondary school teachers are prepared through various pathways. These include Nigeria Certificate in Education (NCE); Bachelor of Science Education (BSc. Ed); Postgraduate Diploma in Education (P. G. D. E.) and so on. The pathway or approach whereby training in the teaching subject proceeds at the same tune with the Professional Training in pedagogy are "concurrent approaches" to teacher preparation; the other approach or pathway, where training of teachers in the teaching subjects precede the professional training pedagogy is referred to as consecutive approach. Whether teachers produced through "concurrent approach" are more effective than teachers produced through "consecutive approach" is an unanswered question, which this study attempt to answer.

Speaking from the Nigerian perspective Ukeje (1991) said from experience that teachers' education programme is better undertaken in Colleges of Education. After serving for 28 years in teacher education, 19years in the universities and 9 in the college of education, he preferred that all pre-service programmes for teacher education leading either to Nigeria Certificate in Education (NCE) or Bachelors degree should be undertaken in Colleges of Education. He was dissatisfied with the execution of teaching practice in the universities, because they were often disorganized, haphazard and ritualistic. More so that teaching practice supervision was irregular with some of the students supervised only once.

Gwany (2006) and Banu (2007) supported his position. They both picked holes with the content of Teacher Education Curriculum and its implementation. Gwany in particular castigated the Postgraduate Diploma in Education. While, we note Ukeje's views and experiences, universities should be commended for producing the bulk of secondary school teachers in Nigeria. The variables that may be responsible for the programme observed by Ukeje and others should be a subject of another study. These institutional and pathway defaults that bedeviled teacher preparation programmes affects all disciplines especially the sciences. The preparation of biology teacher is therefore subjected to the same predicaments.

Biology is one of the science subject taught at the senior secondary school level and is the basic science subject offered by almost every student in senior secondary school. Biology is taught through two major components, that is, theory and practical. Practical activities in Biology provide opportunities for students' to actually do science as opposed to learning science. Nzewi (2008) asserted that practical activities can be regarded as a strategy that could be adopted to make the task of a teacher more real to the students as opposed to abstract or theoretical presentation of facts, principles and concepts of the subject matter. Ango (2002) corroborated by Nwagbo (2008) agreed that practical activities should engage the students in hands – on and minds-on activities, and a variety of institutional materials to drive the lesson home.

While it is a pre-requisite that the Biology teacher should have his subject matter at his finger tips, both in theory and practicals, the efficacy with which the biology teacher conducts his biology lessons may be dependent on the level of preparation he was exposed to in pre-service teacher education time. Ofoegbu (2003) has attributed the poor performance of students' in WAEC examinations to teaching and that poor teaching results from ill-prepared pre-service training, lead to situations which are unpleasant, awesome, scaring and a cause for anxiety later in actual job performance which must be corrected.

Since pre-service teacher-preparation takes place in different institutions and in different pathways, it is apparent that products of different institutions and different pathways will never be the same in terms of acquisition of subject matter, skills, methodology and output.

Teacher preparation is of two types: the pre-service and in-service teacher preparation which usually takes place in colleges of education, the universities and the out-of-service, continuous training and reframing as well as updating of teachers in the service. Programmes aimed at equipping the student-teacher with the subject matter and professional competencies needed to enter into the teaching service are essential preparations for the prospective teachers. In the context of this study, preparation of biology teachers implies the training the would-be senior secondary school biology teacher is subjected to in the university before being employed to teach.

Biology teachers' are trained through various pathways B.Ed (Biology), B. Sc Ed Biology, B.Sc Biology with PGDE and HND with PGDE). The problem of this study is an unanswered question which bothers on how the type of teacher preparation affects student learning achievement in biology practicals. This study specifically assessed the impact of teachers' preparation on students' learning and achievement in biology practical in some selected schools in Jalingo Local Government Area of Taraba State.

### **Research Questions**

Based on the objectives of this study the following research questions were answered.

1. To what extent does the learning achievement of student taught by teachers' from different teacher preparation pathways vary?
2. Which teacher preparation pathway is associated with greater learning achievement in Biology Practical?

### **Hypotheses**

The following hypotheses were tested at 0.05 level of significance.

1. There is no significant difference in the learning achievement of students taught by teachers from different preparation pathways (Grade II, NCE, B.sc Ed (Biology), and B.sc (Biology) with PGDE).
2. Students' achievement in Biology Practical Taught by B.Sc.Ed holders is significantly higher than those taught by NCE holders.

### **Methodology**

The study adopted the descriptive survey design. The sample of the study is made up of 2050 and 50 teachers, selected through stratified sampling. The teachers were stratified into four pathways; Nigerian Certificate in Education (N.C.E.), Bachelor of Science Education (B.Sc.Ed), Post Graduate Diploma in Education (PGDE), and Masters of Education (M.Ed) in Biology. The students sample also follows the teachers' stratification thus: 164 for N.C.E, 1230 for B.Sc. (Ed), 246 and 410 for M. Ed teachers respectively. This was in order to have an even distribution of teachers from different preparation pathways. Most of the teachers were used for the teaching exercise while the rest of the teachers were respondents to the questionnaire items.

Biology achievement test for practical work (BATFP), and a five-point Likert rating scale constructed by the researcher were used to collect data. BATFP was used on the students, while the Likert rating scale was

used on the teachers. BATFP is a 20 test item drawn from the Senior Secondary School Biology curriculum, based on the objective of Senior Secondary School Biology. The test was administered on these two categories of students as the two groups taught same topics but by different teachers who passed through different teachers' preparation pathways.

The instruments were validated for content and face validity, by experts and lecturers the Department of science and Technology Education. The reliability coefficient of the instruments was determined using split – half reliability co-efficient. The reliability coefficient of BATFP was found to be 0.82 and that of five-point Likert rating scale is 0.73. Analysis of variance (ANOVA) and independent t-test were used to test the hypotheses at 0.05 level of significance.

## Results And Discussion

### Research Question 1:

To what extent does the learning achievement of student taught by teachers' from different teacher preparation pathways vary?

**Table 1: Students' Mean Scores According to Teachers' Preparation Pathways**

| Preparation Pathway | Frequency | Mean | Std Deviation |
|---------------------|-----------|------|---------------|
| N.C.E               | 4         | 15   | 2.4           |
| P.G.D.E             | 6         | 22   | 1.8           |
| B.Sc Ed (Biology)   | 30        | 26   | 0.9           |
| M.Sc Ed(Biology)    | 10        | 35   | 0.4           |
| Total               | 50        |      |               |

Table 1 shows student's mean scores according to teachers' preparation pathways. The mean scores of students' taught by teachers' who had B.Sc(Ed) is higher than those of P.G.D.E and N.C.E except M.Sc (Ed) implying that those teachers' with higher qualified impact the achievement of students' positively.

**Table 2: Ranking of teacher preparation pathways according to their students' mean learning achievements**

| Preparation Pathway | Frequency | Mean | Std Deviation | Rank            |
|---------------------|-----------|------|---------------|-----------------|
| M.Sc Ed(biology)    | 10        | 35   | 0.4           | 1 <sup>ST</sup> |
| B.Sc Ed(Biology)    | 30        | 26   | 0.9           | 2 <sup>ND</sup> |
| P.G.D.E             | 6         | 22   | 1.8           | 3 <sup>RD</sup> |
| N.C.E               | 4         | 15   | 2.4           | 4 <sup>TH</sup> |
| Total               | 50        |      |               |                 |

Table 2 shows the ranking of teacher preparation pathways according to their students mean learning achievement students' taught by teachers' with M.Sc (Ed) were rank first followed by those taught with B.Sc (Ed) and then those taught with P.G.D.E finally those taught with N.C.E. implying that teaching pathways has significant impact on students' learning achievement.

### Hypothesis 1:

There is no significant difference in the learning achievement of students taught by teachers from different preparation pathways (Grade II, NCE, B.sc Ed (Biology), and B.sc (Biology) with PGDE

**Table 3: Students' mean learning achievement by teachers' pathways**

| Source of Variation | df   | Sum of Mean Squares | F <sub>cal</sub> | F <sub>critical</sub> | Remark |
|---------------------|------|---------------------|------------------|-----------------------|--------|
| Between Groups      | 3    | 66.67               | 42.84            | 2.60                  | Sig    |
| Within groups       | 2046 | 3361                | 1.64             |                       |        |
| Total               | 2049 | 3561                |                  |                       |        |

The critical value of f ratio at 2046 degrees of freedom at 0.05 level of significance is 2.60. The computed value of 42.84 is greater than the critical value of 2.60 therefore we reject the null hypothesis. There is therefore significant difference in the learning achievement of students taught by teachers' from different preparation pathways.

### Hypothesis 2:

Students' achievement in Biology Practical Taught by B.Sc.Ed holders is significantly higher than those taught by NCE holders.

**Table 4: t-test for mean achievement of students taught by teachers from different pathways**

| Teachers' Pathways                     | N     | Mean | df   | t <sub>cal</sub> | t <sub>tab</sub> |
|--|-------|------|------|------------------|------------------|
| Students taught by B.Sc. (Ed) teachers | 1230  | 30   | 2049 | 2.43             | 1.65             |
| Students taught by NCE teachers        | 24622 |      |      |                  |                  |

Table 4 shows learning achievement of students taught by teachers from different teaching pathways. Students taught by B.Sc Ed holders had higher mean achievement (30) higher than students taught by NCE holders with mean achievement of 22. Since the t-calculated value is higher than the table value the null hypothesis is rejected. The learning achievement of students taught by Biology teachers having B.Sc (Ed.) was higher than NCE holders.

### Discussions

In this study, two research questions were raised, the analysis carried out showed that indeed there exist a difference between the academic achievements of students taught by different Biology teachers preparation pathway. The responses of respondents to questionnaire items testify to this finding. Their responses when analyzed are statistically significant to support the findings of this study.

The findings have compelled the researcher to draw conclusions that there exists a huge difference in students' academic achievement performance as teachers from different pathways teach these students'.

Also, the academic achievement of learners taught by the teacher who passed through the University or had B.Sc.Ed was significantly higher to those who were taught by the teacher who passed through the College of Education and had NCE.

The reason for this higher achievement in learning as shown by the results of the test scores, is due to the experiences acquired by the teachers during their preparation pathways, also questionnaire items responses shows that the teachers believe that preparation pathways have significant effect on their classroom organization, management and content delivery. From the result of the second hypothesis, it can be deduced that teachers from the universities are better prepared or equipped than their counterparts from the Colleges of Education.

Results also suggest that teachers' preparation have a hug part to play in his ability to evaluate learning outcome. As research question four was dealt with, teachers' preparation play a huge role in understanding the place of evaluation in the teaching learning process and the knowledge of good evaluation techniques aids in teachers delivery.

It is also evident that the level of experience of the teacher aids their classroom delivery, as the result obtained from the questionnaire items suggests. It is believed that the longer Biology teachers stay on the job, the better their improvement as teachers of Biology practicals, getting more acquainted with the specimen and their features, clearer understanding of the best teaching technique as well evaluation techniques that will aid meaningful learning.

Teacher preparation has huge effect on their understanding of teaching learning process in terms of content mastery and delivery in Biology Practical. The exposures during the training, the result obtained in answering research question one attests to this fact. Teacher preparation is essential in the process of equipping a teacher before he heads out to the field to teach learners, if a teacher is not properly equipped to do the job, the society at large will feel the effect wrong teaching, as members of the community will exhibit that which the teacher has taught as they will hold firm to ideas despite it negative effect but since that is what the teacher has taught it sticks to heart of the learners and they will always exhibit the ideas behind what the teacher has taught.

### Conclusions

That there exist differences in the academic achievement in Biology of students in SS II due to the different preparation pathways the different teachers that teach Biology in Jalingo passed through. Students' academic performance is significantly higher when teachers with M.Sc. Ed or B.Sc.(Ed) and PGDE qualification teach the students compared to those that pass through Colleges of Education.

Teachers' level of experience aids his management, organization, content mastery, subject matter delivery of Biology in the senior secondary schools in Jalingo, as continuity improves knowledge of subject. Also, teachers' preparation pathway tells on his understanding of evaluation of learning outcomes which is an essential part of the teaching learning process. The teachers' during their training were taught the essentials of evaluation as it applies to the teacher and the learners

### Recommendations

Based on the findings of this study, the following recommendations are made:

1. Efforts should be made to equip the various teacher preparation institutions to equip and train teachers'

- effectively for academic achievement even as they find themselves in the classroom where whatever they teach is what the learners will hold dear
2. Seminars, workshops and refresher courses should be organized from time to time to help the teachers' to improve in their capacity for effective delivery in the classroom and better impact knowledge effectively to the students.
  3. Biology teachers' should be motivated more efficiently for them to give in their best in the job, because if they do well the students' will be properly taught as they ought to and our society will feel the positive effect of quality teaching.
  4. More studies should be carried out in this field of teacher preparation pathways and institutions for teacher preparations.

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