Academic Achievement of Undergraduate Chemistry Education Students in Universities in Rivers State

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Abstract
This study examined academic achievement of undergraduate chemistry education degree students in the Ignatius Ajeru University of Education, Rivers State University of Science and Technology and University of Port Harcourt. A population of 569 Undergraduates students was used for the study. Using a stratified sampling technique the students were grouped into male (289) and female (280) and classes of degree per school. The descriptive statistics were analyzed using the mean scores while the inferential statistics were analyzed using t-test, chi-square and two-way analysis of variance. The results revealed that academic achievement level among gender was significant with the t-calculated value of 40.43 for female and 37.49 for male greater than the critical t-value of 1.96; hence, the null hypothesis was rejected. The schools indicated a low level for the three universities with an F-interaction value of 14.90 significant at a p-value of 0.009 less than the 0.05 significant levels at 1 and 568 degree of freedom. It was therefore concluded that base on the findings of the study, there is a difference in the academic achievement of undergraduate chemistry education degree students among gender, schools and classes of degree. It was therefore recommended that to improve academic achievement level among gender and schools, each school should incorporate periodic Success Support schemes, such as motivational awards, achievement seminars and integrated guidance and counselling.

Keywords: Chemistry Education, Academic Achievement, Student enrollement.
Chemistry education is a Science education course that specializes in chemistry as a subject combined with education. Over the years, there has been low enrolment of this course in Nigerian institutions as identified by Aina (2013). However, as interesting as this course and its importance to human and national development, students' achievement have practically not been encouraging and this is of great concern which calls for an investigation. This achievement has been dwindling in both secondary and tertiary institutions as shown by Aina, (2013). Therefore a conscious study of Students' achievement and academic assessment will go a long way to make prompt improvement on the Achievement gap experienced by many Schools not only in Rivers State but all over the world.

The outcome of the learning process in our today universities is a big concern to parents, stakeholders and the government because in a situation where for example out of hundred and seventy-one students studying chemistry education only ninety-four students graduated with over half of the students with third class. This means that the number of students with first-class or second upper is very low in Chemistry education and implies that the level of achievement recorded is of a low quality which concerns both the stakeholders and the individual students. Today, the achievement is measured for one reason or the other, but universally affects the individual and schools growing population in Nigeria. The average parents with the desire for high-level achievement for their children are interested in doing what it will take to see that their children achieve this dream. The desire for high-level achievement is affected by so many factors like gender, school factor, self-esteem, intelligence, self-concept and attitude.

Ameh and Dantani (2012) reviewed that despite so many studies on these and many other factors affecting academic achievement the problem is still experienced concerning Science Education subjects. The individual achievement in terms of gender is periodically an issue of doubt which can also be verified among the universities in Rivers State. Over the years, there has been a lot of public outcry on the poor performance of the Nigerian chemistry students. Soyebbo, (1985) stated that more than a decade now, it has been a commonplace not to find a fairly good performance which has led to the general feeling that schools are fallen short of their mission.

The Nigerian higher institutions have been worried about the poor academic achievement recorded in chemistry and another science program because the development and the economy of the nation are at stake in terms of quality academic achievement. So if our universities keep recording high failure rate then our schools' system will seem to have lost the mission to be able to meet her educational goals. In a study of the Students’ Achievement by Kano (2004), out of 175 students who sat for the chemistry examination 114 failed within 1999-2004. The level of achievement among universities undergraduates have also not been satisfactory as a result of many factors that affect academic achievement in Chemistry Education, this Oginni (2013) attributed to lukewarm lectures and students study habits. Gbore (2006) mentioned that the level of achievement is the true test of qualitative and functional education. Gbore said that the level of academic achievement among the university undergraduates in Ado-Ekiti was affected by the Students Study habits and self-concept with females performing better. The researcher, therefore, intends to examine the achievement levels of undergraduates' degree students in the universities in Rivers State.

To comparatively study the academic achievement of chemistry education students in the universities in Rivers State, three independent variables (gender factor, school factor and
classes of degree) are discussed with the dependent variable as chemistry education academic achievement. Gender factor in academic achievement is in relation to the sexes of the various students. Students are human beings as either male or female. Some males feel that they can do better than their female counterpart while on the other hand, some females feel they can do better than the males. In this study, we shall find out the true position of gender as a factor in academic achievement in Chemistry Education in the universities in Rivers State. Abubakar and Ubo (2010) gave a report that gender difference exists in Chemistry Education achievement in the College of Education Akoka while Adekola (2011) reported a significantly low achievement for both male and female students at the University of Ilorin.

Another variable is the school factor that has an interaction with Achievement. Here, we are looking at the achievement per school (Ignatius Ajuru University of Education, Rivers State University of Science and Technology and the University of Port Harcourt). School serves as an environment where learning takes place. It, therefore, means that for academic achievement to be high the learning environment should be comfortable and conducive. So if the academic achievement is low there is the likelihood that the school did not provide students with the right environment. Ekeh (2003) cited that an intelligent, totally submissive and conforming child will excel academically in a school environment that suits the child psychologically. In our today universities, Students achievement is affected by the uncomfortable environment in terms of classrooms, equipped laboratories, practical teaching, including the quality of teacher/lecturer factor, student’s accommodations Uhumuavbi (2009). The School as a factor comprises of all the activities, instructional objectives and all other requirements that are not students’ responsibilities.

The peak of any Educational programme is the class or category of the achievement obtained by students at the end of the programme which should be 1st class or at most 2nd class upper and not just any class irrespective of gender factor. A class of degree is what determines the quality of achievement a student can obtain at the end of his educational pursuit. The class of degree is measured by the Cumulative Grade Average Point (CGPA) which falls within the range of first-class to pass the class as recommended by the National Universities Commission. The benchmark report of the National Universities Commission's recommendation for measuring academic achievement is a CGPA from 1.00 to 5.00 and above. Any student with a CGPA less than 1.00 are advised to withdraw from the course. In attempting to compare the level of academic achievement of Chemistry Education Students among the three universities in Rivers state, the researcher adopts the National Universities Commission in other to study the true position of the students’ achievements at the end of the programme. Hence, to have a true picture of the academic achievement in the three universities in Rivers State, the researcher studies the academic achievement of undergraduate Chemistry Education degree students from 2008-2015 and make some recommendations.

Statement of the Problem
One of the major challenges of any educational programme is poor academic achievement scores in Science subjects like Chemistry. The study of chemistry education achievement from reports has not been encouraging in our Nigerian institutions; this is worrisome for stakeholders, Government, administrators, individual, society and parents. If the level of achievement in a course such as chemistry education that is a vital tool for scientific development then the society, government, industries etc will face unsatisfactory expectation. Another problem is does the individual Students' and Schools' interaction in the classroom context have a significant impact on the overall academic achievement? Are there disparities
in the classes of degree recorded in the various schools? The findings of other researchers on the low level of achievement in science-related courses gave rise to the researcher to investigate whether this interaction and low level are applicable in the universities in Rivers State.

In order to proffer solutions to the consistent poor academic achievement in our Universities, there is the need to study the Students' academic achievement base on the interaction of school and gender factor and the categories of the classes of achievement of undergraduate students in Chemistry Education among universities in Rivers state. In doing so, it will assist to empirically document the facts of whether or not undergraduate students in chemistry education record poor academic performance. Also, a study such as this is carried out will help to bridge the research-based knowledge gap that people have about poor academic achievement in undergraduate chemistry education.

Purpose of the Study
The purpose of this study is to comparatively study the academic achievement of undergraduate chemistry education students in the Ignatius Ajuru Universities of Education, Rivers State University of Science and Technology and the University of Port Harcourt. Specifically, the study will attempt to achieve the following:

i. Compare the level of academic achievement of male and female undergraduate Chemistry Education degree students in the universities in Rivers State.

ii. Determine the interaction effect between school and students academic achievement in the three universities in Rivers State.

Research Questions
The following research questions guided the study:

i. What is the level of academic achievement of male and female Chemistry Education degree students in the universities in Rivers State?

ii. What is the interaction effect of the Universities in Rivers State on students’ academic achievement?

Research Hypotheses
The following three null hypotheses were formulated and tested at 0.05 alpha level of significance:

i. There is no significant difference in the level of academic achievement of Male and Female Chemistry Education degree students in the universities in Rivers States.

ii. There is no significant interaction effect of the Universities in Rivers State on students’ academic achievement from 2008 to 2015.

Methodology
The research design used for this study was the Ex-Post Facto research design. It involves collecting and analyzing data about chemistry education degree students’ academic achievements which are already in place, does not require manipulating any of the scores but to study them retrospectively and find out the level and difference in the schools, male and female variables and the categories of the classes of degree achievement in the Universities in Rivers State at the undergraduate level. The population for the study consists of all the male and female undergraduate Chemistry Education Degree Students with CGPA of 1.00 and above from 2008-2015 in the Ignatius Ajuru University of Education, Rumuolumeni, Rivers State University of Science and Technology, Nkpolu and the University of Port Harcourt, Choba which comprises of 569 students. Using stratified random sampling technique, the
students were grouped as male and female in each school and their achievements into the different categories of classes of degree (1st, 2nd Upper, 2nd lower, 3rd and pass class) per school. The instrument for the study was the Student Academic Achievement test Cumulative Record (SAATCR) already existing in the three schools examination and records units of their various departments. It is the record of the Students cumulative academic achievement collected from the achievement test. The scoring of the instrument was based on the National Universities Commission standard for measuring students’ achievement.

The students' academic achievement test cumulative results of chemistry education undergraduates from 2008 to 2015 was collected directly from the folders of the students by the researcher through the Heads of the department of the three universities. The data collected were analyzed using both descriptive and inferential statistics. To determine the level of achievement, the three research questions were answered using the mean and standard deviation scores while the null hypotheses were tested at 0.05 significant alpha level using independent t-test, two-way ANOVA and chi-square to establish if there were differences in (1) the level of male and female academic achievement in the universities in Rivers State, (2)the interaction effect between school and student academic achievement and (3) the categories of the classes of degree obtained by the students in the universities in Rivers State through the statistical package for social sciences.

Results
The results of the data analysis were presented below:

Research Question 1:
What is the level of academic achievement of male and female undergraduate Chemistry Education degree students in the Universities in Rivers State?

Table 1: Mean computation of male and female students level of academic achievement in the three schools.

<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>MALE</th>
<th>FEMALE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Sum</td>
</tr>
<tr>
<td>UOE</td>
<td>188</td>
<td>442.54</td>
</tr>
<tr>
<td>UST</td>
<td>33</td>
<td>72.73</td>
</tr>
<tr>
<td>UNIPORT</td>
<td>68</td>
<td>141.36</td>
</tr>
<tr>
<td>TOTAL</td>
<td>289</td>
<td>2.21</td>
</tr>
</tbody>
</table>

Note: UoE = University of Education, UST = University of Science and Technology, UNIPORT = University of Port-Harcourt

Table 1 shows that Mean (X) scores of male students in school UOE, UST and UNIPORT were 2.35, 2.20 and 2.08 respectively with the mean scores of male students in UST higher than those in UOE and UNIPORT. Mean(X) scores of female students in UOE, UST and UNIPORT were 2.30, 2.48 and 2.20 respectively with mean scores of female students in UST higher than those in UOE and UNIPORT. This implies that the grand female mean scores are higher than the grand male mean scores but the achievement level is generally low because their various grand mean scores are lower than the average mean score point of 2.95.

Research Question 2:
What is the interaction effect between the three Schools and academic achievement in Rivers State?
Table 2: Mean (X) computation of Schools Academic Achievement.

<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>N</th>
<th>SUM</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>UOE</td>
<td>371</td>
<td>929.8</td>
<td>2.51</td>
</tr>
<tr>
<td>UST</td>
<td>56</td>
<td>129.82</td>
<td>2.32</td>
</tr>
<tr>
<td>UNIPORT</td>
<td>142</td>
<td>303.94</td>
<td>2.14</td>
</tr>
<tr>
<td>TOTAL</td>
<td>569</td>
<td></td>
<td>2.32</td>
</tr>
</tbody>
</table>

Note: UoE = University of Education, UST = University of Science and Technology, UNIPORT = University of Port-Harcourt

Table 2 shows that the sum of scores at the University of Education is more than the scores in the other schools because the number of students was more. Mean (X) scores of students in UOE was higher than those of the students in UST and UNIPORT. The grand mean score of 2.32 for the three schools is less than the average means scores of 2.95. This indicates that the achievement level among schools is low.

**Hypothesis 1:** There is no significant difference in the male and female Chemistry Education students’ level of academic achievement in the three universities in Rivers State

Table 3: t-test computation of difference in male and female Students level of academic achievement

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>X</th>
<th>SD</th>
<th>t-Cal</th>
<th>t-Critical</th>
<th>Df</th>
<th>P</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>289</td>
<td>2.27</td>
<td>1.10</td>
<td>37.49</td>
<td>1.96</td>
<td>289</td>
<td>0.05</td>
<td>Reject</td>
</tr>
<tr>
<td>Female</td>
<td>280</td>
<td>2.29</td>
<td>1.02</td>
<td>40.43</td>
<td>280</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>569</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In table 3, the results showed that the calculated t-value of 38.49 for males and 40.43 for females are greater than the critical t-value of 1.96 at 289 and 280 degree of freedom when tested at 0.05 levels of significance. This implies that the result is significant. Thus, the null hypothesis 1 is rejected.

**Hypothesis 2:** There is no significant interaction effect between the schools and students academic achievement in the Universities in Rivers State.

Table 4: Analysis of variance of interaction effect between schools and academic achievement

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>35.224</td>
<td>5</td>
<td>7.045</td>
<td>6.535</td>
<td>0.000</td>
<td>Reject</td>
</tr>
<tr>
<td>Intercept</td>
<td>1468.798</td>
<td>1</td>
<td>1468.80</td>
<td>1362.426</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>GENDER</td>
<td>1.912</td>
<td>1</td>
<td>1.912</td>
<td>1.773</td>
<td>0.184</td>
<td></td>
</tr>
<tr>
<td>SCHOOL</td>
<td>32.133</td>
<td>2</td>
<td>16.066</td>
<td>14.903</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>GENDER * SCHOOL</td>
<td>3.671</td>
<td>2</td>
<td>1.835</td>
<td>1.703</td>
<td>0.183</td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>614.503</td>
<td>563</td>
<td>1.078</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4141.503</td>
<td>569</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In table 4, the results showed that the sum of squares for school is 32.133 and has an interaction effect on students’ academic achievement with an F-value of 14.903 at 1 and 568 degree of freedom. Gender has a sum of squares of 1.912 and an F interaction effect of 1.773 at 1 and 568 degree of freedom while the gender and school had the sum of squares of 3.671 and F-value of 1.703 at 1 and 568 degree of freedom. The P-values of gender and school combined were all greater than the 0.05 significant alpha levels. This implies that only school factor as the source of variation was statistically significant and has an interaction effect with Students academic achievement because the $P$-value of 0.000 is less than the 0.05 significant alpha levels. Therefore, the null hypothesis 2 that there is no significant interaction effect between School and Students Academic achievement is rejected and the alternative upheld.

**Discussion**

From 2008 to 2015, 38 Students had first class, 57 had second class upper, 184 had second class lower, 194 had third class and 96 had a pass of which 289 were male and 280 were female Students. The findings will be based on the results of the tested hypotheses. The results of hypothesis 1, shows that there is no significant difference in the male and female Chemistry Education Students academic achievement. A critical look at table 4.1 showed that the highest and lowest mean score of male Students were 2.90 and 2.09 while the highest and lowest mean score of female Students were 2.21 and 2.33 with University of Port Harcourt male and female Students having the lowest mean scores. Again, the t-test for the male and female students showed that the calculated male t-test result of 37.49 was greater than the t-critical value of 1.96 at 289 degree of freedom. In the same vein, the t-calculated test for female Students of 40.43 was also greater than the t-critical value at 280 degree of freedom indicating that the result is significant. Hence the null hypothesis 1 was rejected based on the result of table 4.4. This means that there is a significant difference in the academic achievement of male and female Chemistry Education Students. The result of the findings agrees with the study of Abubakar and Uboh (2010) on the gender difference in College Chemistry Students achievement (Kano, 2004). Their studies establish a degree of comparative coefficient difference between gender and academic achievement which is similar to this study.

The findings of the study showed that the level of academic achievement in Chemistry Education is low for male and female students in the University of Port Harcourt but it was high for the male and female students of the University of Education while it was high for the male students of Rivers State University of Science and Technology and low for the female students. A positive correlation of $R = 0.111$ and $0.143$ jointly accounted for gender relationship to academic achievement. The general impression that Science related subjects like Chemistry are more of male perspective is not accepted because the study discovered that even the female students sometimes perform better than the male as revealed by the present study.

The hypothesis 2 shows that there is no significant interaction effect between School factor and Students academic achievement in Chemistry Education in Universities in Rivers State. The result of the study in table 4.5 showed that the hypothesis is not accepted because the calculated F interaction value of 14.90 is greater than the critical F value of 3.09 and the significant p-value is less than the 0.05 significant levels at 1 and 568 degree of freedom.
This implies that there is a significant interaction effect between school and students' academic achievement in Chemistry Education at the University of Education, University of Science and Technology and University of Port Harcourt. However, gender does not show any significant interaction with students' achievement. This result supports the study of Kul and Hu (2001); Soyebo (1985); Ogoloso and Wagbara (2013) on school factors as correlates of students’ Achievement in Chemistry. The findings of Kul and Hu (2001) revealed that school type made no significant relative contributions to the students’ achievements which contradict the findings of Kul and Hu (2001), Ogoloso and Wagbara (2013). However, the findings revealed high significant interaction effect for the three schools with their F-interaction values greater than their F-critical values; this implies that apart from student factor, school factor in terms of quality/quantity of instructional procedures, enabling learning environment and teaching style has a high effect on the quality of academic achievement. The low level of achievement scores could be attributed to these and many factors since achievement is related to input-output theory and school plays a vital role in providing the students with learning materials and the responsibility of completely meeting the required activities that enhance achievement. The researcher, therefore, concludes that there is a significant interaction effect between school and students' academic achievement.

Conclusion
The study examined the level of academic achievement of undergraduates’ Chemistry education degree students in Universities in Rivers State. It focuses on the achievement scores obtained from the final achievement test of the chemistry undergraduate degree students in the Ignatius Ajuru University of Education, Rivers State University of Science and Technology and University of Port Harcourt all in Rivers State. The results were obtained from the exams and record departments of the various Universities from 2008 to 2015. The results of the study showed that the level of achievement was low for the three Universities in Rivers State. Looking at the mean scores of the male and female students, the study reveals a low achievement level for both males and females but females having better achievement level. The results indicate that the general impression according to Aina (2013) that Science Education especially Chemistry is consistently poor was established from the analysis where a large number of the students in the Universities fall between second class lower and third class. The overall result shows a low level of academic achievement in chemistry Education among the schools. The low level of academic achievement could be related to some of the factors earlier mentioned. Also, the gender analysis showed a positive difference among the three Universities but the margin suggests that in the study of Science Education courses like Chemistry education gender discrimination should not be because female students can perform higher than the male and sometimes the male students can perform higher than the female, hence there should be equality and equity for any students in the sciences. Also, the study discovered significant interaction effect between School and Students academic achievement which implies that the overall students' achievement is affected by the quality and quantity of all learning activity provided by the various Universities.

References


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