ABSTRACT

The researchers investigated cognitive entry point as predictors of students' academic performance in chemistry in selected Nigerian universities. The sample was 312 chemistry students who entered the university with SSCE, UTME and POST UTME results and completed their first degree programme in the same university. The researchers employed ex-post facto design, since the data collected were already on ground without any manipulation to test four hypotheses. The scores or grade from UTME, POST UTME and school of pre-degree chemistry students admitted between the year 2004 and 2006 as well as their cumulative grade point average (CGPA) at all levels in the university were tested at alpha level of 0.05. The finding indicated that there are weak relationships between SSCE, UTME, POST UTME and students' academic performance in chemistry at all levels in the university. The findings also revealed that a part 2 result has the highest degree of relationship with POST UTME. followed by part 1, part 3 and part 4 performances was the worse and lastly POST UTME has the highest but low significant relationship with academic performance of students in chemistry in selected university. Thus, POST-UTME is the best predictor of all the cognitive entry points. Based on the aforementioned findings, the following recommendations were made: POST UTME examination should continue so as to moderate predictors.

Keywords: Cognitive, Entry point, Predictors, Academic performance, Nigerian University

Introduction

Education is an important vehicle of change and development. As Nigeria is struggling to be self-reliant and independent technologically and economically, more research-based findings were needed on the teaching and learning of chemistry at the Senior Secondary School, College and the University levels of Nigerian Education system. All students must learn and pass chemistry. The West African Examination Council (WAEC) was established in 1952 to replace University of Cambridge Local Examination Syndicate, the city and Guide London Institute, the London Chamber and Royal Society of Arts the Certificate awarded has gained national and international cognition since its establishment. However, WAEC has been intensely criticized by scholars and parents for its deficiency some of the problems identified by Temitope (1999), Kolawole (2001) and Alonge (2002) included examination malpractices, indiscriminate seizure of candidates’ results, monopoly, and delay in the release of examination results, mass acute shortage of application forms callous mass cancellation of results, leakages and corrupt staff among others. In order to solve these problems, committees were set up in University of London Institute of Education and they recommended that other examine bodies should be set up to reduce the lapses of the embattled WAEC. Based on this recommendation, the National Board for Educational Measurement (NBEM) was transformed to National Examinations Council (NECO) to conduct national examinations simultaneously with WAEC so as to break the
monopoly of WAEC thus enabling Nigerians to monitor and maintain their own educational standard, to reduce the work load of WAEC which many believed had been overstretched beyond capability (Alonge, 2003). Join Admission and Matriculation Board was established by an Act 2 of 1998 and saddles with responsibilities of conducting Matriculation Examinations into all universities polytechnics and college of Education. This agreement was in keeping with Government Policy regarding higher education for better mobility of students and easy access to higher education. JAMB has inbred a lot of erosion into the learning pose of students in Nigerian Universities as candidates involved in the examination malpractice so as to gain admission into University by all means and examination leakages.

Yakubu (1999) reported that the quality of academic performance worth of the University was suspect, pointing out that the University had been reduced to a mere certificate awarding institution. The report concluded that academic performance of undergraduates in the university had fallen considerably. Similarly, Soyinka (1999) observed the trend of events in Nigeria should be close down for a period of two years to allow for restructuring of the University system in Nigeria. Soyinka’s argument was based on the premise that academic standards have fallen drastically and that the quality of graduates being produced by some of the nation’s universities is questionable and subject to a re-examination. In order to put a cease to all these situations in Nigerian Universities, a Screening Test of Academic Readiness (POST-UTME) was established in 2005, so as to test potential ability of candidates and their readiness for University academic challenges.

**Purpose of the Study**

The purpose of this study was to determine if:

1. there was a significant relationship between the SSCE Chemistry results and the academic performance of undergraduate chemistry students at all levels in selected Nigerian Universities
2. there was a significant relationship between the UTME Chemistry results and the academic performance of undergraduates chemistry students at all levels in selected Nigerian Universities
3. there was a significant relationship between the POST-UTME Chemistry results and the academic performance of undergraduates' chemistry students at all levels in Selected Nigerian Universities.

**Research Questions**

The following research questions were generated for this study

1. What is the relationship between SSCE Chemistry results and the academic performance of undergraduates’ chemistry students at all levels in selected Nigerian Universities?
2. What is the relationship between UTME Chemistry results and the academic performance of undergraduates’ chemistry students at all levels in selected Nigerian Universities?
3. What is the relationship between POST-UTME Chemistry results and the academic performance of undergraduates’ chemistry students at all levels in selected Nigerian Universities?
4. What are the relationships between the academic performance of undergraduates’ chemistry students’ and their previous Cognitive Entry points in some selected Nigerian Universities?

**Hypotheses**

Four null hypotheses were generated and tested at 0.05 level of significance

1. There is no significant relationship between SSCE Chemistry results and the academic performance of undergraduates’ chemistry students at all levels in selected Nigerian Universities.
2. There is no significant relationship between UTME Chemistry results and the academic performance of undergraduates chemistry students at all levels in selected Nigerian Universities.
3. There is no significant relationship between POST-UTME Chemistry results and the academic performance of undergraduates’ chemistry students’ at all levels in selected Nigerian Universities.
4. There is no significant relationship between academic performance of undergraduates' chemistry students and their cognitive Entry Points in some selected Nigerian Universities.
Research Method

The researchers employed an ex-post facto design and the data were the scores of UTME, POST-UTME, SSCE and pre-degree of Chemistry students admitted between 2004 and 2006 as well as their CGPA at all levels in the Universities. The population consisted of all chemistry students of the selected Nigerian Universities. A sample of 312 chemistry students who completed their first degree programme was selected purposively for the study. The null hypotheses were tested using t test and regression analysis.

Results and Discussion

The data collected were analyzed for SSCE with their CGPA in chemistry at all levels in selected Nigerian Universities.

Table 1: The SSCE Stanine Scores and Their Weights

<table>
<thead>
<tr>
<th>WAEC/NECO GRADE</th>
<th>A₁</th>
<th>B₂</th>
<th>B₃</th>
<th>C₄</th>
<th>Cₛ</th>
<th>C₆</th>
<th>D₇</th>
<th>E₸</th>
<th>F₉</th>
</tr>
</thead>
<tbody>
<tr>
<td>WEIGHTS</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 2: The University CGPA Level and Their Grades

<table>
<thead>
<tr>
<th>CGPA</th>
<th>4.50-5.00</th>
<th>3.50-4.49</th>
<th>2.40-3.49</th>
<th>1.50-2.39</th>
<th>1.00-1.49</th>
<th>0.00-0.99</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRADE</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
</tr>
</tbody>
</table>

Hypothesis 1

There is no significant relationship between SSCE Chemistry results and the academic performance of undergraduates’ chemistry students at all levels in selected Nigerian Universities.

Table 3: Regression Analysis Showing CGPAs’ Chemistry Students with SSCE as a Predictor

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>Constant</th>
<th>SSCE (R)</th>
<th>$R^2$</th>
<th>Beta</th>
<th>$F_c$</th>
<th>$F_t$</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part I</td>
<td>2.486</td>
<td>0.012</td>
<td>0.000</td>
<td>-0.012</td>
<td>0.043</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part II</td>
<td>2.374</td>
<td>0.012</td>
<td>0.000</td>
<td>-0.012</td>
<td>0.043</td>
<td>2.21</td>
<td>Not sig.</td>
</tr>
<tr>
<td>Part III</td>
<td>2.596</td>
<td>0.022</td>
<td>0.000</td>
<td>0.022</td>
<td>0.148</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part IV</td>
<td>2.142</td>
<td>0.034</td>
<td>0.001</td>
<td>-0.034</td>
<td>0.363</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

p >0.05

1. The overall CGPA revealed that SSCE scores could only explain 0%, 0%, 0% and 0.1% of variability in part I, part II, part III and part IV respectively at all levels in Chemistry as shown by the values of $R^2$. The table 3 also (SSCE R) shows that SSCE results are weak but not significantly related to all undergraduates results at all levels in chemistry. Considering contribution of SSCE scores to each of the CGPA, Beta values showed that SSCE scores had very poor predictive strength for Part III CGPA in Chemistry. While part I, II and IV had very poor but negative predictive strength by the SSCE scores. Since all $F_c$ was less than $F_t$ at 0.05 level of significance. The null hypothesis is not rejected. This means that there was no significant relationship between SSCE results in Chemistry Students and the academic performance of undergraduates’ students in Chemistry at all levels in selected Nigerian Universities.

Hypothesis 2

There is no significant relationship between UTME Chemistry results and the academic performance of undergraduates’ chemistry students at all levels in selected Nigerian Universities.
Table 4: Regression analysis showing CGPAs’ chemistry students with UTME as a predictor.

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>UTME</th>
<th>t</th>
<th>(R)</th>
<th>R²</th>
<th>Fc</th>
<th>Ft</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part I</td>
<td>0.061</td>
<td>1.082</td>
<td>0.061</td>
<td>0.004</td>
<td>1.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part II</td>
<td>0.106</td>
<td>1.882</td>
<td>0.106</td>
<td>0.011</td>
<td>3.54</td>
<td>2.21</td>
<td>NS</td>
</tr>
<tr>
<td>Part III</td>
<td>0.070</td>
<td>1.239</td>
<td>0.070</td>
<td>0.005</td>
<td>1.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part IV</td>
<td>-0.026</td>
<td>-.464</td>
<td>0.026</td>
<td>0.001</td>
<td>0.22</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

p>0.05

Table 3 shows that there was no significant relationship to nearly all levels CGPA chemistry by the UTME scores. The result also showed that UTME scores could only explain about 0.4%, 1.1%, 0.5%, and 0.1% variations for each of the level, that is Part I-IV CGPA chemistry as shown by the $R^2$ values. More so, the values of Beta showed that UTME scores had the highest predictive values for Part II CGPA, followed by Part III and I CGPA while overall CGPA has a poor but negative predictive strength by the UTME scores. Since $F_C$ is less than $F_t$ value, hence the null hypothesis is not rejected. This means that UTME is a poor predictor of chemistry academic performance.

Hypothesis 3

There is no significant relationship between POST-UTME Chemistry results and the academic performance of undergraduates’ chemistry students at all levels in selected Nigerian Universities.

Table 4: Regression analysis showing CGPAS Chemistry students with POST-UTME as a predictor

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>UTME</th>
<th>(R)</th>
<th>R²</th>
<th>Fc</th>
<th>Ft</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part I</td>
<td>0.0087</td>
<td>0.145</td>
<td>0.021</td>
<td>6.664</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part II</td>
<td>0.0095</td>
<td>0.154</td>
<td>0.024</td>
<td>7.574</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part III</td>
<td>0.0061</td>
<td>0.131</td>
<td>0.017</td>
<td>5.440</td>
<td>2.21</td>
<td>Sig</td>
</tr>
<tr>
<td>Part IV</td>
<td>0.0055</td>
<td>0.099</td>
<td>0.01</td>
<td>3.093</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

p>0.05 (* Significant)

Table 4 shows that there were very weak but significant relationship between part I-IV academic performance of Chemistry students and their POST-UTME scores. The result also showed that POST-UTME scores could only explain about 2.1%, 2.4%, 1.7% and 1.0% variations for each of the level in Chemistry as shown by the $R^2$-values. The Beta values showed that POST-UTME scores had the highest predictive strength for part II CGPA in Chemistry, closely followed by Part I and III CGPA in Chemistry. While Part IV CGPA had the least predictive strength by the POST-UTME scores. Since all values of $F_C$ are greater than $F_t$ value, the null hypothesis is rejected. This implies that POST-UTME scores had predictive strength for undergraduates Chemistry students in Nigerian Universities.

Hypothesis 4

There is no significant multiple relationship between academic performance of Chemistry Students and the undergraduates chemistry students cognitive Entry Points in some selected Nigerian Universities.
Table 5: Regression analysis showing CGPAS’ Chemistry students with their cognitive Entry Points (CEP) as Predictors.

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>CEP (R)</th>
<th>T</th>
<th>R</th>
<th>R^2</th>
<th>F_c</th>
<th>F_i</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>2.410</td>
<td>10.474</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSCE</td>
<td>0.0221</td>
<td>0.514</td>
<td>0.154</td>
<td>0.24</td>
<td>2.504</td>
<td>2.21</td>
<td>Sig</td>
</tr>
<tr>
<td>UTME</td>
<td>0.0014</td>
<td>-0.148</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-UTME</td>
<td>0.0197</td>
<td>2.623</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(P>0.05 * Significant)

The regression analysis model is given by Y = a + Bx₁ + Bx₂ + B x₃.

Y = 2.410 + 0.0221X₁ – 0.00136X₂ +0.01070X₃

Where x₁ = SSCE, x₂ = UTME, X₃=POST-UTME and Y = Overall CGPA.

Table 5 shows that there is a significant relationship between CGPA Part IV and previous cognitive entry points. The result shows that cognitive entry points could explain about 2.4% variation, that is, overall CGPA in chemistry as shown by the value of R² (0.024). In other words, about 97.6% variation in overall CGPA were as a result of other extraneous variables, which also contributed to the students overall CGPA more than the basic cognitive entry points.

Considering contribution of previous cognitive entry points to overall CGPA, POST-UTME, score had the highest predictive strength (beta weight 0.190 (19%) This is followed by SSCE result with beta weight of 0.221(22.21%) and the least predictor of overall CGPA was UTME with the beta weight of -0.00136. The effect of each cognitive entry points on overall CGPA, t-value shows that there is significant relationship between POST-UTME and overall CGPA chemistry. Also, there is significant negative relationship between overall CGPA and UTME and there is no significant positive relationship between overall CGPA and SSCE. UTME is the worst predictor of overall CGPA. While POST-UTME contributed positively to the overall CGPA.

Findings

The study revealed that all the cognitive entry points (SSCE, UTME) except POST-UTME are poorly related and poor predictors of students’ academic performance in chemistry in selected Nigerian universities. Also, the study further revealed that POST-UTME is the best predictor, while SSCE is the worst predictor of academic performance in chemistry in selected Nigerian universities.

Conclusion

The values of the multiple R in Tables 3-5 respectively showed that there were very poor relationships between SSCE, UTME, POST-UTME and CGPA of the Chemistry students at all levels in the Universities. Also, the finding showed that there was low relationship between Part II performance and UTME Scores, this is closely followed by Part III, Part I and Part IV performance is the worst. Furthermore, the finding showed that part II performance had the highest relationship to the POST-UTME, this is closely followed by Part I, Part III and the Part IV performance is the worst. Lastly, POST-UTME had the highest but low significant relationship to the all levels academic performance among the others, which are SSCE and UTME scores.

This study is in line with past similar researches by Ndem (1991) and Kolawole (2007) in their studies that there was a significant positive and linear relationship between students’ entry qualifications and their academic achievement in Universities. Lastly, the null hypotheses 1 and 2 were not rejected. Kiriakidis (2008) asserted that instructional practices are vital to students’ academic success. Kiriakidis and Schwardt (2011) asserted that Senge’s learning organization model can apply to schools where administrators use team learning.
While the null hypotheses 3 and 4 were rejected which implies that POST-UTME and Cognitive Entry Point significantly contribute to academic performance of Chemistry students at all levels in selected Universities.

Recommendations

Based on above findings the following recommendations were made:
1. In view of the fact that the findings of this study will be of immense benefit to educators as far as admissions into Nigerian Universities are concerned, a replication of this study could be carried out in other subject areas, using samples from many Universities for effective coverage.
2. It is also recommended that a great percentage of future samples for this kind of study should comprise all the University undergraduate students in order to assess the effectiveness of the new system of education in the country.
3. POST-UTME should continue to serve as moderator cognitive entry predictors.
4. SSCE curriculum should be reviewed so as to relate much more to university curriculum.

References


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