African Educational Research Journal
Vol. 3(2), pp. S1-S6, May 2015
ISSN: 2354-2160
Full Length Research Paper

Relationship between entry qualification and performance in A'level chemistry: A case study of School of Basic and Remedial Studies, Yobe State University, Damaturu, Yobe State

Ibrahim T. Babalola[1,2]

[1]Department of Chemistry Faculty of Sciences Yobe State University, Damaturu, Yobe State, Nigeria
[2]School of Pre-Degree Studies, Yobe State University, Damaturu, Yobe State, Nigeria.

Accepted 27 May, 2015

Abstract

This study is on correlation between entry qualification and performance in A'level chemistry at the school of Basic and remedial studies, Yobe State University, Damaturu. The grade in chemistry at the West African Examination Council (WAEC) or National Examination Council (NECO) is the predictor while the criterion is the grade earned in the short structured test administered at the end of Basic 1. Three research questions and one hypothesis guided the study. A population of 99 regular students who registered for A'level chemistry were used for the study. The students' data file and a check list were the instruments used for data collection. The Pearson Product Moment Correlation Coefficient (R) calculated from the data analyzed revealed negative correlation of 16.36×10^{-2}. The paper concluded that there was no relationship between performance of the students in the A'level chemistry and the entry grade (O' level chemistry) in the Basic programme.

Keywords: Entry grade, Basic programme, A'level chemistry, product moment correlation.

E-mail: chemibrabal@gmail.com.

INTRODUCTION

The global education for all (EFA) effort provided added advantage for the growth in secondary education. Furthermore, globalisation and the increasing demand for a more sophisticated labour force, combined with the growth of knowledge based economics gave rise to an increasing demand for secondary education.

Secondary education is a gateway to the opportunities and benefits of economic and social development. Demand for access to higher levels of education is growing dramatically as countries approach universal education. There is a little doubt that the future well-being of society depends not just on how well educated our children are, but also on how well they are educated in science, mathematics and technology.

When new education policy was promulgated in 1976 and the Universal Free Primary Education was launched in 1977, Nigeria was at a height of the oil boom. The most important investment the country could have made at the time was in education, and it made it. However, by the time the new system ran full cycle in 1982 to 1988, a global recession had set in and the resources available for the education sector had dwindled considerably. The result was deterioration of infrastructural facilities, disappearance of the most rudimentary instructors' materials and equipment, a lowering and degradation of standards and the quality of the knowledge and learning imparted (Nwabueze, 1995). Unlike their more fortunate predecessors, large proportions of today's young Nigerians are coming away from school with neither practical nor intellectual skills because they are hardly being taught and their school environment is primitive and uninspiring. Hundreds of thousands of Nigerian children in the last decade of the twentieth century have only cement blocks as chairs, they sit on bare floors in

the midst of crumbling walls and blown off roofs or have only shades of three classrooms. They have no books and no hope of possessing them. Even in schools where the walls are standing and the roofs are on, classes are overcrowded especially in urban areas, sometimes with up to 120 children in one class; to avoid this some schools operate morning and afternoon shifts. The above scenario is the learning situation of not less than 70% of children of school age in Nigeria (Nwabueze, 1995). Developed nations also have their own share of the ugly trends in education. Gilmore (2003) lamented over the poor performance of American students' results from the National Assessment of Education Progress and from the third International Mathematics and science study involving 41 countries were cited as evidence of the failure. This shows that the fallen standard in primary and secondary education is becoming a global phenomenon. The quality of learning experience students enjoyed in the 70s has become a mirage for students nowadays.

Chemistry occupies a central position amongst the science subjects. It is a core subject for the physical and medical sciences, textiles technology, agriculture and pharmacy. In many communities in Africa, students' phobia for chemistry has constituted serious issues in schools. The erroneous opinion about science subjects especially chemistry being difficult and abstract in nature is being transmitted from generation to generation. This factor that has been identified and implicated for students' lacklustre performance in chemistry and it is popularly referred to as anxiety. Jegede (2007) reported in his work that some of the basic causes of students' anxiety towards learning of chemistry include:

1. Wide range of the syllabus,
2. Quality and quantity of chemistry teachers in schools,
3. Absence of well equipped laboratory as well as poor teaching methods.

Theoretical framework

It has become a common knowledge that a sizeable number of students completing secondary education and going for further studies through Pre-ND, Pre-degree and Remedial Programmes in our higher institutions do not exhibit quality training and exposure. To validate the observed trend, an assessment of relationship between O' level credit pass in chemistry and performance in 'A' level chemistry was studied using David P. Ausbel's theory of learning. Ausbel stresses the value of prior (that is, previous) knowledge in student learning. It is generally accepted that what a student already knows could aid or hinder new learning. Ausbel define subsumes as prior or a generated body of knowledge that the learner already acquire that can provide association or anchorage for the various components of the new knowledge. That is, a new learning must be linked to the existing knowledge.

Concept of predictive validity

Michael (1982) saw prediction as an effort to ascertain what will occur concerning an outcome or even not yet observed on the basis of information/data judged to be relevant to this unobserved event. He emphasized that the concept can be used in any of the following:

i) Using test scores to forecast the level of achievement that prospective student might display in academic programme;
ii) Using ability and interest measures to forecast/prognosticate the probability of success of subjects in various job categories.
iii) Determine on the basis of a battery of psychomotor tests and motivational indicators which members of a freshman class are likely to be most valuable competitors on the football or on the track events.

It is understood here that validation consists of checking the test, score against some other observation that serves as the criterion. The aim of testing is therefore to predict this criterion and the merit of the test is judged simply by the accuracy of prediction (Cronbach, 1971). In essence, predictive validity is concerned with the usefulness of the test score in predicting some future performance (Ogunlade, 1990; Uzomah, 1999; Ogunniyi, 1989). Determining the predictive validity of an instrument according to Normally (1978), consists of correlating scores on the prediction test with scores on the criterion variable. The size of the correlation is a direct indication of the amount of validity. He mentioned that the predictive validity is determined only by the degree of correspondence between the two measures involved the predictor and the criterion.

LITERATURE REVIEW

A number of predictive validity studies have been carried out on the basis of one – to – one relationship. Some of the studies focused on the relationship between secondary certificate examination/general certificate examinations (SSCE/GCE) with their performance in corresponding subjects at university level. Others correlated the scores of candidates in UTME/JAMB or SSCE/GCE examination with their performance in the first year of university education.

Yoloye (1982) for instance correlated the performance of candidates JME and WASC aggregates in the same subjects with their performance in the preliminary year. He found that both JME and WASC correlated positively with performance in the preliminary year. However, he found that on the average, JME aggregate predicted success better (approximately 0.4) than WASC aggregate did (approximately 0.3). Similarly, Abdullahi (1983) carried out a study on the predictive value of JME

in selected school subjects. He sought to establish empirically, the predictive value of JME by correlating its scores with measures of first year university examination at the University of Ilorin, in Biology, Chemistry, Physics, Geography and Economics. He discovered a significant correlation between JME and first year scores in Chemistry (0.72), Physics (0.59) and Economics (0.41) but low correlations in Geography (0.20) and Biology (0.32).

Majasan and Bakare (1974) on the other hand, carried out a study on the predictive validity of the different entry qualifications of students (SSCE/GCE O' Level grades and JME/UME Scores) in the University of Ibadan. He found a low predictive validity of the various qualifications. The correlation co-efficient ranged from 0.3 to 0.5, the researcher opined that the use of various qualifications as criteria for selection of students into the Universities is futile, as they cannot predict the performance of students in their degree examination. Akeyobi (1999) studied the predictive validity of the requisite qualifications on first year university studies performance in humanities. She attempted to ascertain the relationship between students' scores in UME and GPA of the same student in the first year. Her study involved the use of students' results in all relevant subjects at credit level and the corresponding subjects required for the course of study at UME from 1993 to 1996. She discovered that though there was a positive and moderate correlation between the students' O' level, UME and first year examination GPA, the UME score was a better predictor of first year GPA than O' level result. In 1994, JAMB conducted a predictive validity study of its University Matriculation Examinations in the study, two predictor variables (SSCE/GCE O' Level grades and UME scores) and are criterion variables (end of first year University scores) were used. The study revealed that, both the UME and SSCE/O'level grades were good predictors of performance in first year university examination. It was also found that UME was better and more stable predictor than the SSCE/GCE O'level grades. Other reports in literature have also points to the fact that GCE and Secondary Certificate Examination results are good predictor of university performance (Othuon and Kishor, 1994; Ajogbeje, 2011; Kolawole and Illugbusi, 2007).

This work aimed at finding out whether or not relationships exist between performance in Chemistry at O' level (WAEC/NECO) and Basic Science Programme. The assessment will determine whether credit pass in Chemistry at secondary school final examination necessarily translate to a good background in Chemistry or necessary pre-requisite for advance level chemistry.

Research questions

The research was designed to answer the following questions:

RQ1: What is the profile of performance of Basic one chemistry students?
RQ2: What is the difference in performance among Basic one chemistry students with respect to sex.
RQ3: What is the relationship between entry qualification and actual performance of Basic one chemistry students of School of Basic and Remedial Studies, Yobe University, Damaturu.

MATERIALS AND METHODS

Research design

This work is a survey or descriptive research which involves an assessment of performance in Chemistry by students of Basic One Science, School of Basic and Remedial Studies, Yobe State University. The study employed an ex-post facto research design.

Study area

The research studied the academic performance of Basic One Chemistry students in relation to their entry qualification for the two years A'level programme (IJMB) consisting of four semesters.

Sampling and population of study

The subjects of this study were Basic One Chemistry Students of Bukar Abba Ibrahim University, now known as Yobe State University, Damaturu, Yobe State. The research examined the performance of the entire ninety-nine (99) regular students who registered for A'level Chemistry. These regular students are those students who duly registered and were involved in both practical and theory classes as one of their subject combination. A purposeful random sampling was adopted, such that all individuals in the defined population have and had equal and independent chance of being selected for the sampling. All duly registered and consistent students were sampled.

Instrumentation and data collection

For the purpose of generating data for this research, a teacher designed test was developed. The test was adjudged fair and balanced in terms of coverage. It was found to represent teaching-learning objectives and goals. The materials for the test were also found to be of variety and also systematically selected. The reliability of the designed test was assessed using test-retest method. To correlate scores of students in WASSCE and the A level test score, the scores were transformed into ordinal scale as follows: A=5, B=4, C=3, D=2 and F=0. The entry grade and the performance in A' level Chemistry were correlated. The entry point score in Chemistry and the score in the designed test for male and female in the programme were also compared. The Pearson Product Moment Correlation Coefficient statistics was used to determine the extent of relationship between the two results. The data used for the research were both primary and secondary data. The primary data used was the scores obtained from the performance of the students in the structured examination administered to the students. The secondary data used were information obtained from the interpretation of O'level results of the students in Chemistry. The grades of individual students were obtained from the registry, School of Basic and Remedial Studies, Yobe State University, Damaturu.

Data analysis

The analysis of the results involves comparing the performance of Basic One student in A' level Chemistry with their entry qualification in Chemistry.

The entry qualification in Chemistry (O' level) and the performance in a structured test administered were graded into eight divisions for easy comparison; F - Fail (0 to 39); P7/D7 Ordinary Pass (50 to 54), C4 – Credit Pass (55 to 59); B3 – Lower distinction (60 to 65); A2 – Mid Distinction (65 to 69); A1 – Upper distinction (70 to 100). The WAEC and NECO grades were also converted for the purpose of this comparison. The information obtained were analysed and presented as bar chart and product moment correlation method. Correlation co-efficient is a statistics that helps to describe with members, the degree of relationship between two stets or pairs of scores.

Pearson Product Moment Correlation Co-efficient:

$$R = \frac{N(\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N(\Sigma X^2) - (X)^2][N(\Sigma Y^2 - (Y)^2]}}$$

Product Moment Correlation Method:

$$R = \frac{\Sigma[(X - X) - (Y - Y^-)]}{\sqrt{[\Sigma(X - X^-)^2\ \Sigma(Y - Y^-)^2]}} = \frac{\Sigma dxdy}{\sqrt{(d^2 x \Sigma dy^2)}}$$

Σ = Sum
X = A raw score in test A.
= The mean score in test A.
Y = A raw score in test B.
d = Deviation from the mean.
N = Total number of scores.

Positive correlations are between 0.00 and 1.00, while negative correlations are between 0.00 and -1.00. Correlation at or close to zero shows no reliability.

RESULTS

The analytical methods adopted were keyed to the respective research question. The profile of performance of the entire Basic 1 students in the short structured test administered is presented in Figure 1. The relationship between entry qualification and actual performance of Basic 1 Chemistry students was examined using the performance profile and product moment correlation coefficient.

Pearson Product Moment Correlation Co-efficient:

$$R = \frac{N(\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N(\Sigma X^2) - (X)^2][N(\Sigma Y^2 - (Y)^2]}}$$

Product Moment Correlation Method:

$$R = \frac{N[(X - \overline{X}) - (Y - \overline{Y}^-)]}{\sqrt{[\Sigma(\overline{X} - X^-)^2\ \Sigma(\overline{Y} - Y^-)^2]}} = \frac{\Sigma dxdy}{\sqrt{(d^2 x \Sigma dy^2)}}$$

The mean for WAEC/NECO scores (X)

$$= \frac{\Sigma X}{N} = \frac{4858}{99}$$

$$\overline{X} = 49.07$$

The mean for the scores in structures test

$$Y = \frac{\Sigma Y}{N} = \frac{3605}{99}$$

$$\overline{Y} = 36.41$$

$$R = \frac{\Sigma\ [(X - \overline{X}) - (Y - \overline{Y}^-)]}{\sqrt{[\Sigma(X - \overline{X}^-)^2\ \Sigma(Y - \overline{Y}^-)^2]}}$$

But

$$\Sigma X^2 = \Sigma\ (X - \overline{X})^2 = 3696.51$$

$$\Sigma Y^2 = \Sigma\ (Y - \overline{Y})^2 = 35247.7$$

$$\Sigma\ (X - \overline{X}) = 9.413$$

$$\Sigma\ (Y - \overline{Y}) = 198.36$$

$$R = \frac{(9.413)\ (198.36)}{\sqrt{(3696.51)\ (35247.7)}}$$

$$= \frac{1867.16268}{\sqrt{13029347.5}} = \frac{1867.16268}{11414.6167}$$

$$= 0.163576467$$

$$= 16.36 \times 10^{-2}$$

This is a negative correlation (fall within 0.00 and -1.00)

DISCUSSION

The profile of students performance (Figure 1) of the entire Basic 1 students in chemistry represented by the pie chart revealed that 84% of the students came in with credit pass in chemistry but only 33% of the population made credit pass in the research design test. Invariably, 66% of the population failed (scores between 0 and 44). Figure 2 shows that 85% of the male students came in with credit pass in chemistry, but only 25% of the population made credit pass in the structured test (75% failed). In Figure 3, it is evident that 87.5% of the female

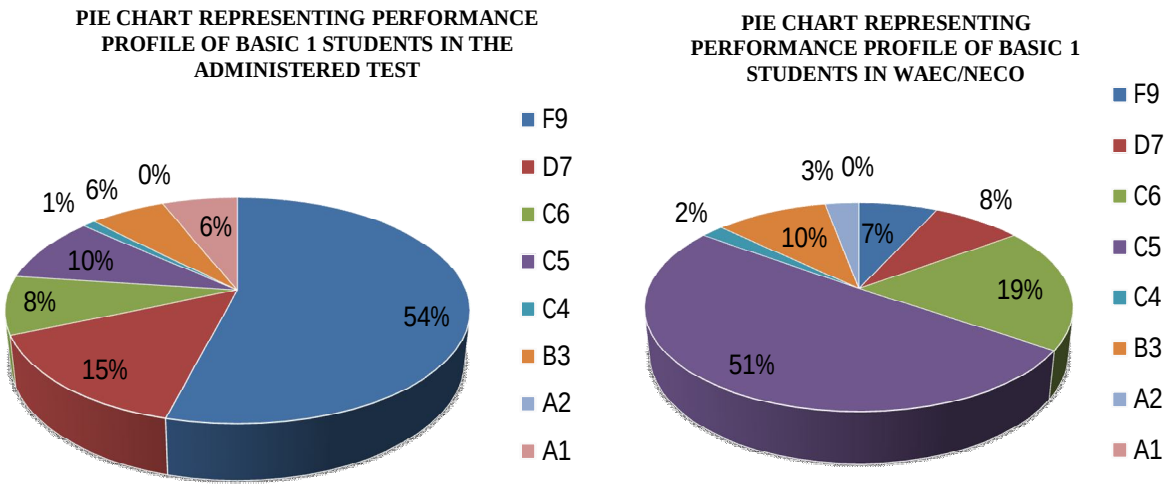

Figure 1. Performance profile of Basic 1 students in chemistry.

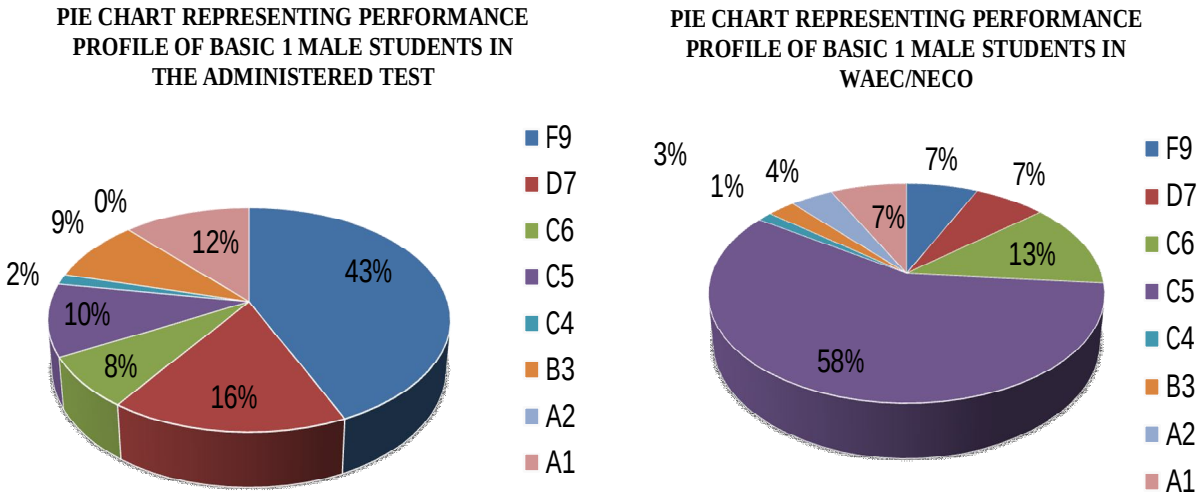

Figure 2. Performance profile of male students in the administered test.

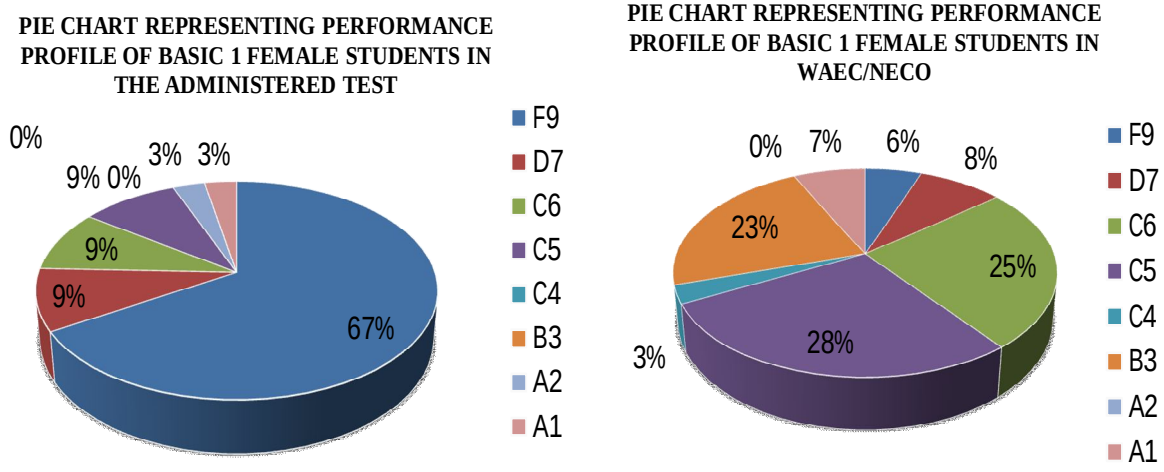

Figure 3. Performance profile of female students in the administered test.

population came in with credit passes in chemistry but only just 25% of this population made credit pass in structured test. The percentage of the female students without credit pass in chemistry in WAEC/NECO was only 15.7% as against 75% in the administered test. The Product Moment Correlation Coefficient (R) calculated from the performance profile of Basic 1 students was 16.36×10^{-2} (a negative value), indicating that there is no correlation between entry qualification and actual performance in the Basic program. It is established from the results that more than fifty percent of the students admitted for the program were below average of the expected standard. Many factors have been implicated by previous researchers on poor performance in chemistry - use of unqualified teachers, wideness of syllabus, abstract nature of the subject and absence of well equipped chemistry laboratory in most secondary schools (Jegede, 2007). As obtained from the profile of performances, majority of the students do not seem to have transferred what they have learnt in secondary school, in other words they do not exhibit previous knowledge. Perhaps they didn't get the required experience while in school but possessed credit pass in chemistry at the final secondary school examination. Impact of gender on student performance is also revealed in this work. It is interesting to report here that only 25% of the female population passed the standard test as against 40.3% of the male population. The findings here are in agreement with previous reports by Balogun (1993) and Kurumeh and Iji (2009).

In contrast, there is only slight difference in the percentage credit passes between the two sexes in their SSCE/NECO entry qualification (85 and 87.5%). These also add to the suspicion that the results of these students may not necessarily be true output of their performance. Malpractice of diverse forms is common features of final secondary exterminations in the recent times; Babalola (2002) drew the attention of the Senate Committee on Education on the evil trends and the dangerous implications of malpractices for the country. The findings from this study revealed that the set of students admitted for the program were generally not performing well and that the poor performance is more pronounced in the females. It also established that there is no correlation between the entry qualification and performance in 'A' level program.

Conclusion

Findings from this research corroborate and clearly support the established fact that gender differences exist in specific abilities of students (Jegede and Inyang, 1990; Adesoji and Fisuyi, 2001). The finding further stresses the need for a renewed and concerted effort towards addressing the challenges of primary and secondary education in the state and the nation at large.

REFERENCES

Abdullahi, A. (**1983**). A study of the prediction value of joint matriculation examination in selected schools subjects. Journal of Nigerian Education Research Association, 3(1).

Adesoji, F. A., and **Fisuyi**, M. O. (**2001**). Analysis of problem–solving difficulties of students in volumetric analysis according to gender. Ibadan Journal of Educational Studies, 1(1):106-117

Ajogbeje, J. O. (**2011**). Relative contribution of cognitive entry qualification and semester grades on mathematics achievement of environmental studies students. Journal of Education and Policy Review, 3(1):45-49.

Babalola, I. T. (**2002**). Daily Trust, 17th July.

Balogun, T.A. (**1993**). Gender issues in Teaching of science, Technology and Mathematics. A Paper presented at a round table conference on women in Science and Technolgy. Ijebu- Ode.

Cronbach, L. J. (**1971**). Test Validation. In: R. Thordike, (2nd Ed). Education Measurement. Washington D.C. America Council on Education.

Gilmore, W. F. (**2003**). A magic Bullet? American Scientist Online. *The Magazine of Sigma XI*. The Scientist Research Society.

Jegede, O. J., and **Inyang**, N. (**1990**). Gender differences and achievement in integrated science among junior secondary school students: A Nigerian study. International Journal of Education, 36(3):364-368.

Jegede, S. A. (**2007**). Students'anxiety towards the learning of chemistry in some Nigerian secondary schools. Educational Research and Review, 2(7):193-197.

Kolawole, E. B., and **Illugbusi**, F. (**2007**). Cognitive entry grade as predictor of student performance in Mathematics in Nigeria Universities. Medwell Journal of Social Sciences, 2(3):323-326.

Kurumeh, M. S., and **Iji**, C. O. (**2009**). Improving Student's Achievement in solving Algebraic Word Problem Using Aesthetic Value Approach. Journal of the Mathematical Association of Nigeria 34(1): 37-45.

Majasan, J. A., and **Bakare**, C. G. M. (**1974**). The predictive validity of Ibadan University entry qualifications. AJER, 1(1):61-71.

Michael, W. B. (**1982**). Prediction Method. Enyclopedia of Education Research, 5th ed. Vol. 3.

Normally, J. C. (**1978**). Psychometric Theory. MC Graw Hill Inc.

Nwabueze, B. O. (**1995**). Crises and Problems in Education in Nigeria. Spectrum Books Limited; 1st ed. Pg. 40.

Ogunlade, F. R. (**1990**). The Productive and Current validity of Common Entrance Examination of Primary six Pupils in Oyo State (Unpublished).

Ogunniyi, M. B. (**1989**). WAEC/SSCE/GCE Examination and JME or Predictors of Performance in University RP 87/6 WAEC Research Report.

Othuon, L., and **Kishor**, N. (**1994**). Hierarchical linear modelling of predictive validity: The case study of Kenya certificate of primary education examination. Student Education Evaluation, 20(2):175-194.

Uzomah, N. P. (**1999**). The Predictive Validity of State Common Entrance Junior Secondary School certificate Examination. M. Ed. Thesis. Imo State University, Owerri, Nigeria.

Citation: Babalola, I. T. (2015). Relationship between entry qualification and performance in A'level chemistry: A case study of School of Basic and Remedial Studies, Yobe State University, Damaturu, Yobe State. Afr Edu Res J, 3(2): S1-S6.