UNIVERSITY MATRICULATION ENTRANCE EXAMINATION SCORES IN CHEMISTRY AS PREDICTORS OF ACHIEVEMENT IN CHEMISTRY-BASED COURSES IN PUBLIC UNIVERSITIES IN ENUGU STATE

BY

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PG/PhD/05/39794

A THESIS SUBMITTED TO THE DEPARTMENT OF SCIENCE EDUCATION, FACULTY OF EDUCATION, UNIVERSITY OF NIGERIA, NSUKKA IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF DOCTOR OF PHILOSOPHY (PhD) DEGREE IN SCIENCE EDUCATION

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NOVEMBER, 2013.

CERTIFICATION

I, NWEZE, BERNARDINE NGOZI, a postgraduate student in the Department of Science Education with Registration Number PG/Ph.D/2005/39794, has satisfactorily completed the requirements for the degree of Doctor of Philosophy (Ph.D) in Science Education.

The work embodied in this thesis is original and has not been submitted in part or full for any other diploma or degree of this or any other university.

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DEDICATION

This thesis is dedicated to the two inseparable hearts: the sacred heart of Jesus and Immaculate heart of Mary.

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ABSTRACT

The controversy over the lapses noticed in the conduct of examinations and the process of admission of candidates into Nigerian Universities through University Matriculation Examination (UME) necessitated the call for the introduction of post-UME (PUME). Certain problems were found to be associated with these processes such as content coverage, variation in question type and structure, admission through quota system, peculiarities of different Universities. The evident uncertainty in the validity and uniformity of admission criteria called for empirical investigation of the predictive validities of UME, PUME and combined UME/PUME chemistry scores used for admission into chemistry-based programmes in public Universities. The study was guided by four research questions and four hypotheses. The design of the study was correlational. Multistage sampling technique, were used to select a total of 1370 students that sat for UME and PUME and admitted into the public universities in Enugu State, in 10, departments from 20, chemistry-based faculties, used for the study. Records on performances of students in the examination were obtained from departmental admission lists and the students' records of their various universities. The stepwise multiple regression technique was used for the data analysis. The correlation coefficients were tested for significance using F-test at 0.05% level of significance. The study revealed among others that: In federal University, UME score did not predict studentsô first year result in all the courses in public Universities except in Industrial chemistry (R^2=0.14) in Federal University, where weak relationship was recorded. PUME chemistry scores predicted studentsô first year scores in all the departments studied in Federal University: Agricultural Economics (R^2= 0.17); Biochemistry (R^2=0.02); Electrical/Electronics (R^2=0.06); Industrial Chemistry (R^2=0.39); Medicine (R^2=0.06). In State University, PUME chemistry scores predicted studentsô first year scores in Electrical Electronics (R^2=0.07) but did not predict studentsô scores in Agricultural Economics, (**R^2=0.02) Industrial Chemistry (R^2= 0.01), Biochemistry (R^2=0.01) and Medicine (R^2=0.02). The average scores of both UME/PUME chemistry predicted students first year scores in all the courses in Federal University: Ag/Econs (R^2=0.07); Bio/Chem (R^2=0.06); E/E (R^2=0.05); Ind/Chem (R^2=0.36); Med (R^2=0.78), but in State University, the average scores of UME/ post-UME chemistry predicted studentsô first year scores in Electrical Electronics only (R^2=0.04).There were no relationships between studentsô average scores of UME/PUME and their first year result in Agricultural Economics (R^2= 0.01), Industrial chemistry (R^2=0.01), Biochemistry (R^2=0.04) and Medicine (R^2=0.01). Studentsô UME chemistry scores predicted their PUME chemistry scores in Biochemistry (R^2=0.02) and Industrial chemistry (R^2=0.27) in Federal University but did not predict the studentsô PUME chemistry scores in Agricultural Economics (R^2=0.01), Electrical Electronics (R^2=0.01) and Medicine (R^2=0.01). In State University, UME chemistry scores only predicted post-UME chemistry scores in Biochemistry (R^2=0.06) and Electrical Electronics (R^2=0.11) but did not predict their post-UME scores in Agricultural Economics (R^2=0.02) Industrial chemistry (R^2=0.01) and Medicine (R^2=0.04). Based on the findings, the educational implications were highlighted. Appropriate recommendations were made, among which were, that all the problems associated with the process of UME have to be urgently addressed by JAMB and other stake holders in order to improve the quality and credibility of UME. A follow up policy should be made on post-UME and appropriate committee set up to look into the activities of PUME in public Universities. Chemistry questions should be standardized and unified within the chemistry-based faculties and across the public Universities.

CHAPTER ONE

INTRODUCTION

Background of the Study

Higher education in Nigeria began effectively in 1948 with the establishment of University College at Ibadan, as a campus of University of London. Thereafter, five others were established, between 1948 and 1974, owing to the recommendation of Ashby Commission set up to study the needs for university education in Nigeria [Sojo, Adeniran and Samaila, (1992)]. These are regarded as first generation Universities, which include: University of Nigeria Nsukka, the first indigenous and autonomous (1960), followed by the Universities of Ife, now Obafemi Awolowo, Lagos, Zaria, an autonomous University at Ibadan all in (1962) and Benin (1970).The second generation universities were established between 1970 and 1976, due to the increasing population of qualified students, and the need for the scientific and technological development. These are Universities of Calabar, Jos, Maiduguri, Kano, Illorin, Sokoto and Portharcourt. Between 1979 and1984, eight state and seven federal universities of technology known as third generation universities emerged out of the need to address the countryôs special needs of technological and agricultural demands [Emevon, (1989), Sojo et al, (1992) and Huntar, (2003)]. The first State University of Technology to be established was Enugu State University of Science and Technology formerly known as Anambra State University of Science and Technology in 1979. Other State and privately owned universities were also established following the pressures from qualified students from each state, who could not get admission to any of the federal universities and also, the need to encourage private participations in the university education. Following from the ongoing, it has been observed that, University of Nigeria, Nsukka and Enugu State University of Science and Technology were the first and the oldest Federal University and State University of Technology to be established in Nigeria. They are the only two public universities located in Enugu State, the former headquarter of the then Eastern region, now South-East geopolitical zone.

Prior to the establishment of JAMB in 1978, each of these first generation universities on inception, was responsible for the conduct of its own entrance examination and admitted its candidates (Busayo, 2010), exclusively on merit level (Emevon, 1989) and sometimes on

concessionary basis (Okafor, 1971) or in accordance with laid down criteria which varied among Universities (Ofoegbu and Ojogwu, 2006). For instance, minimum qualification for the universities of Ahmadu Bello, Ibadan, Ife, and Lagos within that period include: possession of five credits including English at general certificates of Education, two of which must be at advanced level or possession of four credits, three of which are at advanced level. But at Ibadan, Lagos, and Ahmadu Bello universities, English language was given special consideration to science students. In addition, these four universities have concessionary entry for students fresh from school, who hold G.C.E ordinary level in five subjects including English and Mathematics.

These candidates sit for an examination and if successful, undergo one year preliminary course (at Ahmadu Bello, two years) before being admitted to run the degree courses. This concession extends especially to science students. At Ibadan, it extends to Arts and at Ahmadu Bello, there is also a preliminary course in Arabic and Islamic studies. The University of Nigeria, Nsukka, differs from the others in having a minimum entry qualification of credits in six subjects at G.C.E. ordinary level or five credits in the West African School Certificate including English and Mathematics or an approved science subject at one sitting. University entrance examination, is an examination that educational institutions worldwide in selecting students for admission. The entrance examinations used for the admission of candidates into Nigerian Universities are, the University Matriculation Examination (UME) and post-University Matriculation Examination (PUME), being conducted by Joint Admission and Matriculation Board (JAMB) and different Universities. The average of both UME and PUME had been in use since 2005 for the admission of candidates, apart from the year 2008, when the post-UME was used alone for the admission.

It should be noted that western education is at different level of development in the different component units of the federation including the universities. In this regard, other proprietors of tertiary institution had different guidelines for admission into their various tertiary institutions, due to differences in university ownerships by state, federal and private. Since then, the growth of students has increased marginally from 30,000 in 1978 to well above one million in 2013 (Esien and Lawal, 2007). The number of universities in Nigeria has increased tremendously, starting from 1, university in 1960 to 113 in 2013.This is distributed as follows: 36, federal, 36, state and 41, private universities as indicated by (NUC, 2010) and

(Adeoye, 2011). In other words, these universities are differently owned and sponsored by federal government, state government and private individuals or agency each with different ideology. The differences in ownership of the universities pose some difficulties in maintenance of uniform standard and, quality control across these universities and to meet up with the acceptable international standard across the globe. In addition, (Onyekakeyah, 2012), noted that there is nowhere in the world where all the universities and tertiary institutions have the same standard.

However, this system of decentralization of admission in each university after sometimes, revealed some limitations as evident in wastage of resources, in the process of administering the entrance examinations, on the part of the candidates and their sponsors (Nwokike, 2003). Then, a candidate seeking a university admission had to collect as many forms as his financial capacity could afford. This approach resulted in multiple applications and admissions by some candidates and thus leading to blockage of admission chances of other candidates (Ajaja, 2010). This is because the individual universities based their admission processes on essentially their peculiar guidelines and standards, a situation that naturally led to multiple applications by candidates seeking admission into various universities. (Esien and Lawal, 2007).This system, in addition, put tremendous strain on the applicants and their sponsors, particularly those who applied to two or more institutions only to find themselves rejected in all at the end. The general untidiness in the uncoordinated system of admission, into universities together with the attendant problems as manifest in loss of admission, by the increased number of candidates seeking admission into the universities, were sufficient causes for concern to the committee of Vice Chancellors and other stakeholders in Nigerian Education System. This consequently necessitated the then federal military governmentôs decision in 1976 to set up a national committee on university entrance under the chairmanship of Mr. M. S. Angulu. (Busayo, 2010). This committee was specifically requested to consider the possibility of setting up a joint board. The committee recommended the setting up of two bodies, the central admissions board and the joint matriculation board. The federal military government, based on that, accepted to set up the joint admission and matriculation board (JAMB) in April 1977. (Nwokike, 2003). This was the federal governmentôs solution to the problems of: unequal opportunities and standard (NUC, 1988); multiple offers of admission to single candidate (Emevon, 1989) and the need to use a fair method of selection to ensure equitable distribution of available spaces in tertiary institutions (Asien and Lawal, 2007). Joint Admission and Matriculation Board (JAMB) is one of the

external examination bodies whose responsibility it is to administer examinations (UME) in Nigeria for the purpose of selection of qualified candidates into Nigerian universities.

The legal instrument establishing the board was promulgated by the (Decree no 2 of 1978 of the Federal Military Government on 13th February 1978 (Supplement to Official Gazette no 8). This was amended by decree 33 of 1988, which extended its jurisdiction and powers to conduct qualifying examinations into Nigerian polytechnics and colleges of education. This was subsequently amended by decree no 4 of 1999, which officially removed discretionary measures from the parameters for admissions [Ofoegbu and Ojogwu, (2006)].The summary of the major functions and activities of JAMB include: conducting matriculation examination into universities, polytechnics/colleges of technology and colleges of education, marking and grading of JAMB examinations; determining admission requirements, selection and placement of candidates into the universities. The JAMB system of admission into higher institutions particularly the first generation universities (Ibadan, Ife, Lagos, Zaria, Nsukka, and Benin) is classified according to (Ofoegbu and Ojogwu, 2006) into three broad categories:

i. Merit list: This includes the potential students who sat for and met the stipulated cut-off mark for a particular course of study. It accounts for 45% of the candidates admitted for each course.
ii. The catchment area (locality) takes up 35% of the overall admission into each course. This takes care of candidates living in the area where the university is located with some affiliated areas. The catchment area is determined every year by the Joint Admission and Matriculation Board.
iii. Educationally disadvantaged states. JAMB admits 20% of the potential students from such states which are considered to be retarded in educational development into the university. The institution assigns lower cut off mark to this category of candidates so as to be given the opportunity to close the gap.

In addition to that, (Abdulrahman, 1992) included another criterion as the discretion of the institution which accounts for 10% of the admission into each course. For instance, a candidate from Enugu can only go into the University of Lagos on the basis of merit or discretion of the institution, because Enugu is not part of the catchment area of the University of Lagos. It is also possible to see a candidate with a lower mark from educationally

disadvantaged state admitted during supplementary admission because he is the only candidate qualified or available for that particular course from the state. The merit quota according to this distribution accounts for 40%; locality of the institution accounts for 30%; educational less development state accounts for 20% and discretion of the institution 10%. (The Nigerian Economist, 1993) in supporting this, reported that JAMB is guided by the need to ensure balanced geographical representation and federal character. This implies that merit is not the only criterion for securing a place through JAMB, the requirement to meet the quotas from all geopolitical areas was also a factor. This is responsible for the different cut off points the examination body employs to determine placement of different candidates in the federation, depending on their states of origin.

According to (JAMB, 2010), for a candidate to be regarded as being successful in admission into the institutions, such candidate must have met up with the age and entry requirements for that particular course in a particular university. The approved general age requirement for entry into the Nigerian University is a minimum of 16 years. The general entry requirement for admission into first degree course for the university matriculation candidate includes: writing of University Matriculation Examinations; possession of five credits in Secondary School Certificate Examination (SSCE)/General Certificate Examination (GCE) ordinary or advanced level/National Business and Technical Examination Board (NABTEB) passes in grade six and above, obtained at not more than two sittings in relevant studies and institution. The five credits should include English in case of those applying for arts, business administration, education (arts), law, medical sciences and social science courses. Candidate applying for Agriculture, Education (science or social science), Engineering, Medical Sciences, Social Sciences and other science-based courses, where a credit in English is not mandatory, a pass is required. (JAMB Brochure, 2010) The same brochure provides that, there are identified prerequisite entry requirements for some courses and, this at times varies according to universities. For instance, chemistry being one of the core science subjects is necessary in some courses in the following faculties in most universities: Agriculture; Engineering; Biological sciences; Environmental sciences; Medical/Pharmaceutical/Health sciences and Physical sciences.

The implications of this are as follows: one of the objectives of chemistry curriculum according to new national policy on education is to show its link with industry, everyday life,

benefit and hazards. Chemistry knowledge and skills are necessary for successful engagement in those programmes. It is quite unique in its involvement in several aspects of modern life (Ikoku, 1973). Chemistry is therefore required as one of the ordinary level entry requirements, UME and Post-UME subjects to be taken and passed for admission into those chemistry based courses. Chemistry-based courses as used in this work include, those courses in which chemistry is compulsorily required at ordinary level requirement, UME and post-UME subjects. Thus performance in chemistry in UME, Post-UME and the average performance of both UME and Post-UME is assumed to be positively predicting the candidatesô performance in chemistry or the related courses in Public universities.

Since the inauguration of JAMB in April 1977, to replace the concessionary admission exercises into Nigeria universities, it had continued to grow in strength and popularity and also taken series of measures to address the problems of admission in Nigeria before the centralized system. (Esien and Lawal, 2007).This notwithstanding, many academics had registered their reservations [Eghagha, (2005); Yola, (2006) and Awosiyan, (2007)]. They reasoned that such central examination and admission of that nature might lower admission standard. This was confirmed by the poor performance of students in different examinations such as West African examinations council and also in the universities [Obe, (2005); Onyekakeyah, (2009) and Otti, (2011)]. Yet, there was an order for universities to lower their cut-off points, below the recommended two hundred (200) points by JAMB (Taiwo, 1995). Worse still by decree 33 of 1989, JAMB coverage was expanded to include both federal and state polytechnic, colleges of education and technology. Many Nigerians [Ighadoro, (2002); Oyekanmi, (2005) and Yola, (2006)], then wondered aloud how JAMB could cope with such tedious assignments. In their views, JAMB had been so much criticized over its non-performance such that the federal government had set up a panel to probe its activities. This was sequel to the fact that the vice chancellors had earlier petitioned the federal ministry of education reporting that JAMB was no longer relevant and should be scrapped, while admission exercise should be conducted by individual universities [Education Mail, (2000); Onyekakeya, (2012)]. In support of that, one of the recent recommendations of the Steven Oronsaye Presidential Committee on Rationalization and Restructuring of Federal Government Parastatals, was that tertiary institutions should conduct its Examinations and admit its candidates and JAMB be reduced to a supervisory body that serves as both clearing house and administrative body to ensure that there is no multiple offers and entries (Mohammed, 2013)

Furthermore, leakages, cancellations and malpractices in UME were prominent. For instance, the 1990 pronounced examination leakage led to the cancellation of two major papers, English and mathematics(Nigerian Economist Editorial,1993), 31 out of 160 examination centres were involved in cheating and malpractice while 45,438 had their results cancelled in the year 2002 (Salim, 2002). Another report by (Oyekanmi, 2005) showed that examination malpractice forced JAMB to cancel up to 95,985 results of students in that year. In 2012, JAMB was accused of not providing writing materials for the candidates in South-West, and also for bringing faulty biometric system that could not function during UME. (Otti, 2011) observed that from 2007 to 2009, a total of 2,993,197 candidates sat for UME but only 427,777 candidates were successfully admitted. (Onyekakeyah, 2012) also reported on the mass low performance in this yearôs UME. The report showed that, out of 1,503,931 candidates who sat for the examination, only three candidates scored 300. The rest of 27,266 were withheld due to involvement in large scale malpractice. 374,920 candidates, scored 170-199; 601,151 candidates scored 200-269 while 901 candidates scored 270-299. All these suggested in a way that Nigeriaôs higher education facilities have expanded beyond what one centralized examination body can efficiently cope with. By the beginning of 21st century, JAMBôs criticism became a national issue as students who scored as high as 180 and above in JAMB examinations were not and are still not able to read and write properly. (Gbore, 2007) This perhaps resulted in the call by various stakeholders for JAMB to assume the role of a clearing house, and ensure that students do not have multiple admissions, while the individual universities take up the conduct of examination and admit the students of their choice [Okogie, (2011), Onyechere, (2013)].

Perhaps, several subsequent criticisms of JAMB especially that of the former president of Nigeria, Olusegun Obasanjo, who accused JAMB of high corrupt practice, which had affected the standard of Education in Nigeria. (Ebirin, 2006) led the federal government to adopt the post-UME screening as part of quality control measures in the admission process (Yola, 2006). Post-UME examination is a screening examination conducted by different Universities to all the candidates that have successfully met up with the required cut-off point in UME. Post-UME, was intended according to (Oyekanmi, 2012) to tackle the problems of fraudulent scores emanating from UME. (Amatareotubo, 2006) describes how the Federal Government of Nigeria introduced the policy of Post-UME screening by universities in 2005, through the former minister of education, Chinwe Obaji. This policy made it mandatory for

all tertiary institutions to screen candidates after their UME results and before giving admission. Candidates with a score of 200 and above would be shortlisted by JAMB and sent to their universities of choice for further screening using aptitude tests, oral interviews, or even another examination. Obaji asserts that some candidates scored 280 and above in UME but could not score 20 percent in the post-UME, indicating that those students must have cheated on their UME and could not pass the post-UME because there was no way to cheat.

This notwithstanding, the viewpoints expressed so far [Isuamara, (2005); Odogwu, (2005); Alaneme, (2007) and Ajaja, (2010)] were serious indication of doubtful criteria used for admission of students into Nigerian universities. In their views, post-UME screening leads to waste of money, an unfair tests, leads to indulgence of the university authorities in ethnicity and nepotism in the process of admission and the students placed at the mercy of corrupt admission officers of different institutions. The agitations for and against the introduction of post-UME by the students, parents, government and the vice chancellors, pro-chancellors, Academic Staff Union of Universities (ASUU) and other stake holders, created a lot of confusions and divisions to the extent that the legislative arm of government viewed it as an avenue for Universities to make money and suggested for the scrapping of PUME.(Sams 2010).This controversy according to (Badmus, 2008) came to its climax when the Upper and the Lower House of Assembly came into the matter. A motion was moved at the House of Representative, by Hon, Sampson Positive from Kogi State arguing that the test is an additional burden on the students and parents and therefore should be abolished. A report was formerly sent to the Federal Ministry of Education and National Universities Commission advising them to cancel the post-UME, basing their argument on the public outcry for extortions. Similarly, another motion was moved independently at the Upper Chamber of National Assembly by Senator Lokpobiri (Bayesa West Senatorial District), directing its committee on Education under the chairmanship of Senator Uche Chukwumerije to investigate all the Universities conducting post-UME test with a view to cancelling the PUME. In response to the report and allegations, the chairman of the committee of vice chancellors in Nigeria, Professor Don Baridan argued that, while JAMB charges four thousand six hundred naira for a two hours examination, many Universities charge between one thousand and two thousand naira for days examination. (Badmus and Idoko, 2008) The former president of ASUU, Professor Ukachukwu Awuzie in his reaction, to the advice by the House of Representative, urged them not to take over the responsibility of the Senates

of the Universities, he noted that the admission of candidates all over the world is the responsibility of the senate of each University. Professor Femi Bamiro, the Vice Chancellor of the University of Ibadan illustrated his Universityôs experience before the inception of post-UME, observing that out of 30 students admitted in the faculty of technology with high scores of 250 and above, 23 were asked to withdraw at the end of the first year because they could not cope with their academic works. It was also reported by (Mohammed, 2010) that before the introduction of the screening test, over 40% of the registered students in most Universities could hardly cope with academic works. This questions the high scores recorded by the students at JAMB.

Following the high level of corruption in the society, it becomes difficult to isolate any establishment with corrupt free activities. In support of that, (Guardian editorial, 2011) reported that, even with post-UME, admission processes are riddled with corruption, with admission lists credited to influential persons in the society in utter disregard of due process. Therefore, the Government and other stake holders in Education should look for every possible means of dealing with these corrupt practices in the system that paved way for all the vices recorded in the Education system as well as other establishments. Furthermore there appeared to be the practice of some universities, particularly the private and state owned universities, not adhering to some of the regulations of the JAMB (Ebongabsi, 2010) probably because these universities are not funded by the Federal Government. The claim appears to be that as most of the State universities are funded by the respective state governments, they have the ñrightò to admit their state indigenes who are ñrejectedò in the Federal universities and in most cases without reference to the JAMB policy of admission. This implied that they have right over the state Universities. There is, therefore, the need to fine tune post-UME tests by the universities to reflect current realities and international good practices to achieve the quality control as was advocated.

The evident uncertainty of the credibility and uniformity of admission criteria into the Nigerian universities, therefore, called for empirical investigation of the predictive validity of the current criteria for university admission into the various programmes across the universities in Nigeria. Validity according to Uzoagulu (2011.88) ñmeans the appropriateness of instruments in measuring what is intended to measureò. For instance a wrist watch is a valid instrument if it serves its purpose of keeping time correctly. Prediction on the other

hand is a state that a particular event will occur in future in more certain terms than forecast (Wikepedia). It is often based on information from the past and the current state (Obitko 1999). Thus, the predictive validity is the ability of an instrument to envisage future events. Example, a student that performs well in West African School Certificates Examination (WASSCE) result is expected, other things being equal; to replicate the same measure in other related examinations. If the student does, the WASSCE result is said to have a high degree of predictive validity. The predictive coefficient is obtained according to (Osuala, 1982) by computing, the correlation coefficient between a distributions of test scores obtained earlier, against a distribution of scores on some later criteria measures. Example includes UME and common entrance scores (Ezeh, 2011) and other examination scores of students.

Furthermore, there are also expected problems following the variations in the method, structure, timing and many other attributes associated with the admission criteria under study. Such variations include: Non-uniformity of subjects being taken in JAMB and Post-UME across the universities. Some universities maintained consistently the four subjects as were taken in UME while some, example ESUT, suddenly changed from examining the candidates in four subjects to two subjects including English and Mathematics irrespective of the discipline; other differences include: question strength, structures and items across the universities in both UME and Post-UME and within Post-UME across the universities ranging from 50 item questions in UME uniformly taken as against restricted 15 to 25 item questions taken in Post-UME depending on the university; standard of questions administered; coverage of UME syllabus ; time of preparation for the two examinations and finally, the unilateral way of conducting the Post-UME across the universities. The implication is that no two universities have uniform way of administering this Post-UME. These and other problems envisaged during and after examinations and during selection processes underscore the justifications of this study that aims at ascertaining the predictive validities of (i) UME, (ii) post-UME and the average of UME and Post-UME chemistry scores on the studentsô first year result in Chemistry and the related courses as criteria.

Statement of the Problems

There has been continuous shift in the process of selection of candidates for admission into Nigerian universities. This shift has been necessitated by lapses associated with the selection process that tend to cast doubt on the validity of the process. This process ranges from decentralization of admission to each university, to the establishment of JAMB and recently the injection of post-UME screening in the process. The entrance examination by JAMB and post-UME were conducted and selection process done in almost all the school subjects, including chemistry in different universities with all the associated problems. These problems ranged from: uncoordinated system of admission observed in different universities that gave rise to multiple applications and admissions before the inception of JAMB, to the inefficiency and corrupt practices such as impersonation, manipulation of scores and other examination irregularities associated with JAMB and UME, which resulted to the admission of candidates who find it difficult to cope with their first year studies in the Universities, even with their high UME scores. This later gave rise to the introduction of Post-UME as a measure of quality control in the system. Moreover, there are some other inefficiency expected to associate with these examinations and procedure for selection. These include: variations in examination structures, item and content coverage, peculiarities of different universities, and selection by recommendation and not based on any laid down criteria as were seen with different university ownership. All these tried to cast doubt on the validity of the examinations used in admission process. Besides, in considerations of the important nature of chemistry as a link and determinant of success in several other courses, its link with the industry, all life process, and its inter-relationship with other subjects, admission of candidates in the following chemistry-based courses: Agricultural Economics, Biochemistry, Industrial Chemistry, Electrical Electronics and Medicine, through such a doubtful criteria as UME, post-UME and average scores of both UME and Post-UME chemistry, would likely result in the selection of candidates, who might not be able to meet up with the challenges in these chemistry-based courses in the public universities. This underscored the need for an empirical investigation of the predictive validities of UME, post-UME and average of UME/post-UME used as admission criteria. Thus the problem of this study put in an interrogative form is: what are the predictive validities of chemistry scores in (i) UME (ii) post-UME, and average of UME and Post-UME on studentsô achievement in their first year university courses of study

Purpose of the Study

This study was designed to examine the UME, post-UME and average of UME and Post-UME scores in chemistry as predictors of studentsô first year university achievements in the following chemistry-based faculties: Agriculture, Engineering, Biological sciences, Medical sciences and physical sciences in different universities.

Specifically, the study sought to determine:

i. The predictive validity of the UME chemistry scores for admission into some chemistry-based courses including: Agricultural Economics, Electrical Electronics, Biochemistry, Industrial chemistry and Medicine in the University of Nigeria, Nsukka and Enugu State University of Science and Technology.
ii. The predictive validity of the post-UME chemistry scores for admission into some chemistry-based courses in the public Universities in Enugu State.
iii. The predictive validity of the average UME and post-UME chemistry scores used for admission into some chemistry-based courses the public Universities in Enugu State.
iv. Establish the extent of relationship between UME and post-UME chemistry scores used in admission into some chemistry-based courses public Universities in Enugu State.

Significance of the Study

In Nigeria just like every other country of the world, important decisions on job employments and placements; school admissions; course selection; direct entry placement of students to different levels in the higher education system are principally determined by the candidatesô previous qualifications. These range from Senior School Certificate Examination; University Matriculation Examination; Post-UME results and Degree results. These certificates if objectively acquired would be able to predict favorably or provide useful information about candidateôs acquired skills and subsequent abilities of such candidates. It is very doubtful to determine exactly whether these examinations and previous certificates, have correctly measured the studentsô abilities and capabilities as were claimed assuming these

qualifications have been in any way contaminated with variables such as any form of malpractice which might question the credibility, validity and reliability of these certificate. For such decisions to be effective, this present study that seeks to determine the predictive validities of UME, Post-UME chemistry scores for admission into chemistry-based courses holds a source of relief and is expected to provide useful information to the teachers, school administrators, employers of labour and JAMB, the empirical evidence needed for proper assessment of the candidatesô previous qualification, especially, presently where excellent grades are awarded to wrong persons or rejected candidates from Federal universities become the champions in state and privately owned universities.

To the students, it is expected that this study would pay a diagnostic function as well as a feedback to the students. A detailed understanding of concepts and skills involved in the problems students are trying to solve is important when trying to make predictions about studentsô performance or assist students. Failure on a problem is more likely a consequence of lack of that concept or skills. The performance of students in different examinations taken at different levels of Education should be brought to their notice through: Quarterly or annual publications by different schools and examination bodies, such as JAMB, WAEC, NECO; Institutions internal and external examinerôs report; Chief examinerôs reports which should include, detailed information on the paper, candidateôs weakness and strengths; their general and individual performances; comments on each question and suggested recommendations and solutions. These would, therefore, provide the students with accurate knowledge of their current positions with respect to learning and understanding of chemistry concepts; the extent of mastery of expected knowledge and their readiness to move on smoothly. This would get them fully involved and prepared for more effective learning strategies that would enhance their understanding of this concept and maximize achievement. Consequently, the students would be fully prepared to take up their various future responsibilities as Engineers, Doctors, Pharmacists and Scientists as would be demanded by their various courses of the study. Finally, the candidateôs eligibility for admission into the university can be justified after the study.

Accordingly, this feedback is also very important to the parents and guardians. It would help them to know how well and how far their children have acquired the required knowledge and

skills from the school. This study would expose the weakness and strength of the studentsô previous results and possible deficiencies in the university entrance examinations and admission process which might lead to wrong selection of candidates for the right courses. The studentsô result, chief and external examinersô reports should be made available to the parents and other stakeholders through the internet; public interactive programs on media; parentsô forum organized in schools and conferences. With these, the teachers would be fully informed and concerned about the prevailing situation of their childrenôs educational achievement. The qualities of the entrance examinations and, therefore, become interested and involved in a concerted effort made towards improving or maintaining a particular standard on their childrenôs education.

Teachers and school administrators from both secondary and tertiary educational institutions might also benefit from the findings of this study. Teachers are important figures and are deeply involved in every aspect of educational development of the individuals. They are either directly or indirectly involved in almost all educational activities, ranging from curriculum development and implementation, test development and administration, teaching, assessing and placement of students, supervision and invigilation of both internal and external examinations, marking and grading of students examinations and also in carrying out researches in different problem areas in order to suggest possible solutions to different educational challenges. Concretely predicting students performance as that of the present study is a task where teachers, administrators will like to find out how the students learn (specifically or generally); how, slowly or quickly they adapt to new situations; how possible it is to deduce the knowledge requirement to solve the problems directly from students performance data and finally the extent of performance of the task whether correctly or with some levels of certainty. However, teachers want feedback on studentsô performance much more often than on yearly basis so as to evaluate the outcome of both the activities of the teachers and the students. The issues involved in this study such as the students chemistry scores and university entrance examinations: UME and Post-UME, and their first year results, in different other courses of interest will provide students performance data which will be of relevance to teachers as well as school administrators. Therefore, teachers in secondary schools should be aware of the findings from this study through workshops, seminars, interactive sections with the inspectors on external evaluation of schools to schools who should have been provided with the summary of this type of study from the research and

statistical section of the ministry. This is important because the products of university education are mostly from secondary schools. Candidates are exhibiting their acquired knowledge through such entrance examinations as well as their preparedness for the tasks ahead.

The tertiary institutions management team has to find a way of making the findings of the study available to related faculties and departments for discussion in their management meetings. It should be made available to the accreditation teams properly constituted to include representatives from professional and regulatory bodies such as Science Teachers Association of Nigeria (STAN), Chemical Society of Nigeria (CSN), and National University Commission (NUC), National Board for Technical Education (NBTE) and others. During their visit, there should be a forum with the lecturers and management staff where such research works would be exhaustively discussed. This would help the school management board; lecturers and teachers from these departments to be prepared to help the students, through some special educational support programmes as tutorials, remedial studies, special counseling activities as guidance on study skills and note-taking and other basic academic skills. It would also be easier for teachers to make data-driven changes in the classroom if such information about the studentsô previous learning outcome is made available. This would eventually help to draw down the teaching of chemical skills and concept to the studentsôzone of proximate development so as to maximize achievement.

To education managers/policy makers, this study hoped to assist them to make pro-active; knowledge driven decision on the formulation of appropriate policy on the conduct of public examinations and also on the adoption of admission policy. The strongest or weakest predictor variable of success which was ascertained in this study would serve as a guide to rational decision geared towards achieving relevance in chemistry teaching and learning. The quality and credibility of these criteria (UME and Post-UME) would also be ascertained. This would lead to rational decision on how best to improve on each criterion, either by standardizing the PUME in all the universities or by setting a committee to look into the test and conduct of these examinations in different universities, so as to come out with adequate policy about the uniformity of these examinations.

To curriculum planners, if it is established that there is a mismatch between the expectations expressed in the content and the cognitive skills of the students, the planners would be informed of the need to build in remedial measures into the curriculum, plan for review of the current JAMB Syllabus and the need to produce a standard syllabus for PUME that will cut across the whole universities for uniformity purposes. A thorough understanding of which criterion is hard for students can lead to a better categorization of test items and better guidance for teaching.

To external examination bodies, example, JAMB, poor achievements of science students in different educational levels in the past decades have been a source of concern and enough to trigger worry in examination bodies and, therefore, the urgent move to seek for immediate solutions. For years now, JAMBôs system of assessment has been with the use of standardized tests, mainly multiple choice items, which seem not to encourage high thinking skills. The implication is that the examination has not succeeded in measuring the studentsô ability to formulate problems and carry out investigations. This study would provide them with empirical evidence and information about the predictive strength of UME and post-UME with other examinations. The criterion with the strongest predictor of academic success would also be determined. This might be a function of performance, conduct of examination, coverage of scheme; validation or reliability of test, scope of the test or method of instruction. For instance, if the scheme of work is not covered and the students are tested in those areas or if the test does not represent the objective or if the conduct of examination, is subjected to malpractice, the implication is that the test is not efficient in measuring what it is supposed to measure. Thus, the lower the predictive quality, the more the department in the university and JAMB become more curious about what information makes the current assessment work. If the predictor quality is high, their interest would be directed towards: using the predictor as support for the current process or identifying success factors specific to the chemistry education programme or modifying the assessment quality and methods resulting to a better prediction. Moreover, if strong predictors for academic success can be found, it will also be used to gain understanding of success and risk factors regarding the curriculum. Awareness of these factors by teachers, education personnel and management would help to select appropriate measures to support the risk group and eventually resulting to enhanced performance. JAMB will, therefore, be alerted on its onerous responsibilities to tertiary

institutions in Nigeria and the larger society and the need to conduct its examination with utmost seriousness and commitment.

Furthermore, this study would serve as a working document to all these bodies responsible for quality control measure in school, such as the National University Commission (NUC), Federal and State Inspectorate Services; Science Teachers Association of Nigeria (STAN) and other science related professional bodies. Detailed information about the status of students in different external examination has to be made available to them before hand. This would guide their various discussions with the students, teachers and the management about the studentsô performances; their true positions; the predictive value of these examinations and possible effect on future endeavors. This could be carried out during inspections in secondary schools or accreditation visits to tertiary institutions. At professional conferences; workshop; seminar, the summary of a study like this, should be made available and discussed with the participants which should include, the parents, teachers and other stake holders for them to be aware of the status of education and suggests a practical measures in order to increase quality performance in schools. This information may also be used in rating or ranking of the students in chemistry based courses across the universities by subject basis. Finally this study will serve as a source of information and guide to other researchers who plan to carry out related studies in other disciplines, schools and states.

Theoretically this work is anchored on a classical test theory. This deals with prediction of outcomes of psychological testing such as the difficulty of items or the ability of test-takers. It is aimed at good understanding and improving the reliability of psychological tests, it also assumes that each person has true score that is obtained if there is no error in measurement. Classical test theory is used to say something about the quality of test scores. A lot of psychometric tests are carried out often and in different places and for different purposes such as tests and examinations done at schools and universities including UME and post-UME or recruitments and selection tests done when applying for a job. This theory tries to explain every variable surrounding the variety of constructs that a psychometric tests measure. This includes psychological variables that are not directly observable. Examples include: intelligence, personality, motivation etcetera. But how can one know whether a test is a good test, measures a construct accurately or actually measures what it claims to measure, what about influences from outside the testing situation, the effect they have on the outcome of a

test? For instance, if a group of candidates given a test in a small room surrounded by a lot of noise is compared with another group who completed the same test in a large, noise-free room. Will these two groups have comparable scores or could the testing situation have affected the scores or what they obtained. It is, therefore, possible to think of several scenarios where a test ends up measuring differently from what it had aimed to. Thus, classical test theory deals with the effect of unsystematic and systematic influences on the observed test results. The unsystematic influence includes any distraction from outside the testing situation; physical well being of the candidate. Sometimes these influences have a positive effect on the test result; other times they have a negative influence. In other words they cause a brand range of errors around the true scores. Systematic influence includes; the characteristics of the test of testing situation that affects all measurements equally. For example, if there is a mistake in any test item presented to all the candidates taking a test, it would influence all the candidates in the same way. Following from the foregoing, the result of this study that tends to determine the predictive values of UME and post-UME chemistry scores for admission into chemistry based courses in different universities would be justified. The performances of these candidates that took the same chemistry questions in UME may differ from the performances of the same candidates that took different chemistry questions differently in different universities for post-UME examinations. Therefore, from the predictive quality of this psychometric test, the need to study the predictive validities of these entrance examinations for admission into Nigeria universities as well as the relationship between the entrances examinations used as determinant of admission criteria for selection into chemistry-based courses in different universities was justified.

Furthermore, the theory of multiple regression is also applied and also very useful in order to explain the relationship between a dependent variable (university achievement and one or more independent variables (UME, Post-UME and average UME and Post-UME). It involves generally, two applications: prediction and explanation. That is being able to make a projection concerning an outcome for a particular candidate or attempting to understand a phenomenon by examining the variable correlates on a group level. This would be of great importance to their work because it would help in a prediction equation and also to create the best equation so that for instance, guidance counselors, school administrators, teacher, employers of labour and other stake holders could predict future achievement scores for their

students and wards and hopefully intervene in those students identified as at risk for better performance or to select students into programs based on their projected scores.

Scope of the Study

This study was delimited to the determination of the predictive validities of (i) UME, (ii) Post-UME and average UME/Post-UME Chemistry scores of students, admitted in 2007/2008 and 2008/2009 sessions, on their first year scores in Chemistry-based courses in public universities in Enugu State. There are two public Universities in Enugu State: one federal and one state, including, University of Nigeria, Nsukka and Enugu State University of Science and Technology. Since the work cannot understudy all the chemistry related programmes, in all the faculties in which chemistry is a prerequisite, one programme each from these faculties, from the two public Universities in Enugu State, were selected for this study as follows: Agriculture (Agricultural/Economics); Biological sciences (Biochemistry); Engineering (Electrical-Electronics); Physical sciences (Pure and Applied chemistry) and Medical Sciences (Medicine and Surgery).

The selection of one course each from the above chemistry-based programmes was guided as follows: Chemistry must be one of the ordinary level entry requirement as well as the UME and Post-UME subjects and the courses selected must be similar in both universities for both uniformity and comparative purposes.

Research Questions

The study was guided by the following research questions:

i. What are the predictive validity indices of UME scores in chemistry for each of the following chemistry-based courses in public universities: Agricultural-Economics, Biochemistry, Electrical-Electronics, Pure and Industrial chemistry, and Medicine?
ii. What are the predictive validity indices of post-UME chemistry scores for each of the chemistry-based courses in public universities?
iii. What are the predictive validity indices of average UME and Post-UME scores in chemistry for each of the chemistry-based courses in the public universities?

iv. To what extent do the studentsô UME scores in Chemistry predict their post-UME scores in Chemistry in various chemistry-based courses?

Hypotheses

The following null hypotheses were tested at 5% level of significance.

Ho_1: Studentsô UME mean scores in chemistry do not significantly predict their mean achievement scores in each of the chemistry-based courses in the public universities: Agricultural Economics, Biochemistry, Electrical Electronics, Pure and Industrial Chemistry, and Medicine.

Ho_2: Studentsô post-UME mean scores in chemistry do not significantly predict their mean achievement scores in first year chemistry-based courses in public universities.

$Ho_{3:}$ The students mean UME and Post-UME scores in chemistry do not significantly predict their mean achievement scores in first year chemistry-based courses in public universities.

Ho_4: StudentsôUME mean scores in chemistry do not significantly predict their mean post-UME score in chemistry in various chemistry-based courses in public universities.

CHAPTER TWO

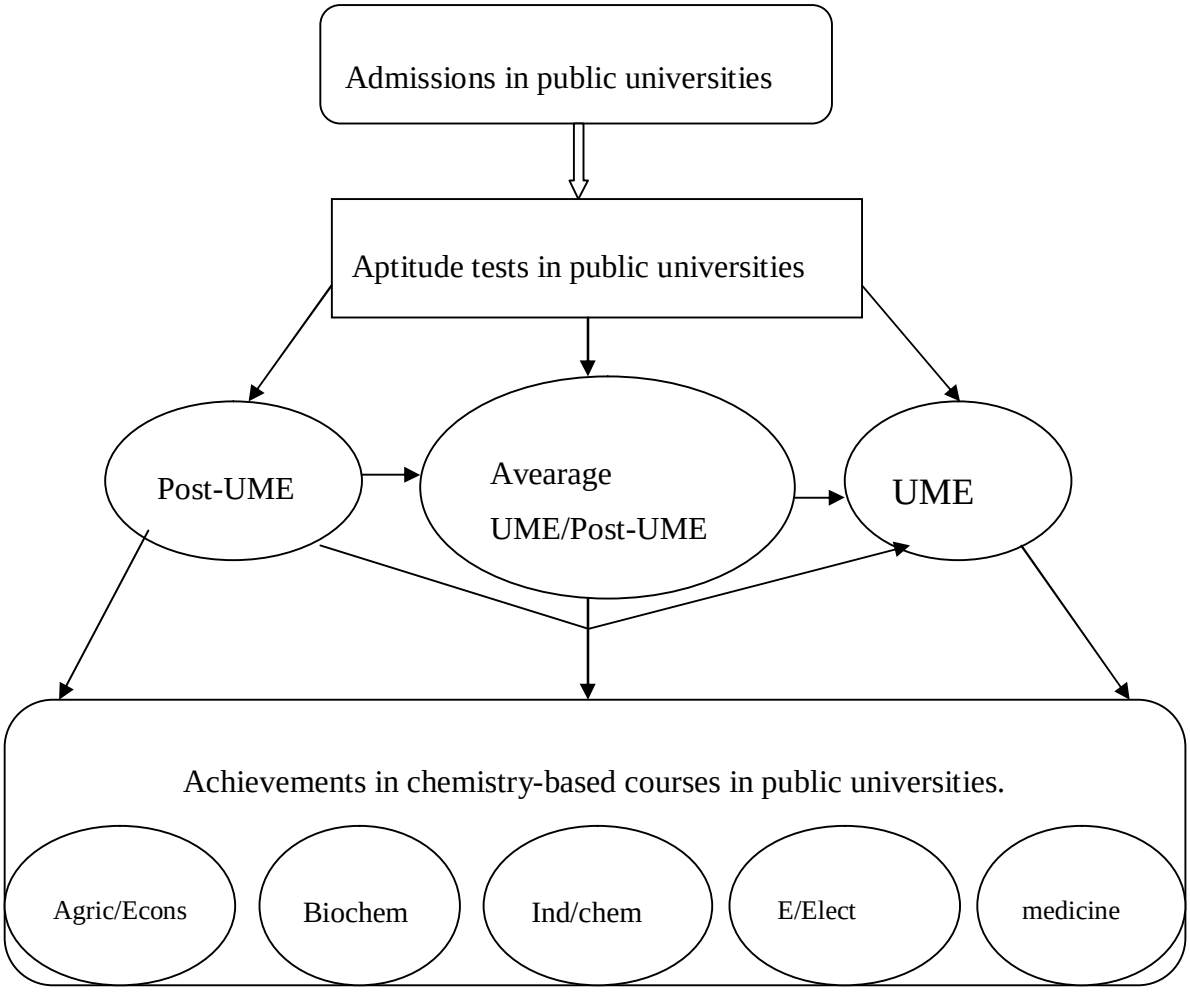
REVIEW OF LITERATURE

The literature review for this study is organized under the following sub headings:

Conceptual Framework

- University Matriculation Entrance Examinations as modes of admission into public Universities.
- Aptitude tests in public universities.
- Studentôs achievement in Chemistry.
- Chemistry and chemistry-based courses in public Universities.
- Public Universities and University ownership

Fig 1.The prediction of studentôs first year result by the University Entrance scores.



This shows the schematic relationship among all the variables. The main independent variable is the aptitude test comprising of the UME, post-UME and average UME/post-UME scores. While the studentsô achievement in chemistry-based courses serve as the dependent variables. The interactions of these variables give the predictive relationships existing among the variables

Theoretical Review:

Theory of Prediction

- Classical Test Theory.
- Item Response Theory.

Empirical studies:

- Studies on Prediction
- Studies on Studentsô achievement in Chemistry and Related Courses in Tertiary institutions.

University Matriculation Entrance Examination as Modes of Admission into public Universities in Nigeria

In Nigeria, since independence, access to university education has undergone some evolutions. Initially, each university conducted its entrance examination and selected its own candidate exclusively on merit basis (Emevon, 1989). This individual university admission exercise was not satisfactory as it created too much room for wastage of places, through multiple offers and depriving others of places into the university (Newswatch, 1988). The admission into the university system became centralized with the establishment of the Joint Admission and Matriculation Board (JAMB), which is responsible for conduct of University Matriculation Examinations (UME) for entry into all the universities. The modes of admission were firstly, through entrance examination in which the students were slotted in on performance basis and this eventually solved the problem of multiple admission offers. Secondly, the problem of educational disequilibrium due to uneven educational development in the country culminated into zoning of the country into educationally advantaged and

disadvantaged areas and this brought about the quota system of admission into universities (Adebo, 1988). The federal government allocated such areas to federal universities as their catchment areas for candidates. For example, university of Jos has: Bauchi, Benue and Plataeu as its catchment area.

As the number of universities increased marginally, this marked the genesis of centralized and coordinated university admission system that led to the establishment of Joint Admission and Matriculation Board in 1978 to undertake the process of admission into Nigerian universities through UME. According to section 5 of (decree) no 2 of 1978, the functions of the board are as follows: Notwithstanding the provision of any other enactment, the board shall be responsible for the following: the general control of University Matriculation Examination (UME) for admissions into all the universities in Nigeria; appointment of examiners, moderators, invigilators, members of subject panels and committees and other persons with respect to matriculation examinations and any other matter incidental thereto or connected therewith; placement of suitably qualified candidates in the universities. After having taken into account the vacancies available in each university, the preference expressed or otherwise indicated by candidate for certain universities and courses and such other appropriate in the circumstances. The collection and dissemination of information on call matters relating to admissions into universities or to any other matter relevant to the discharge of functions of the board under this decree, and the carrying out of such other activities as are necessary or expedient for the full discharge of all or any of the functions conferred on it under or pursuant to this decree. For the avoidance of doubt, the board shall be responsible for determining matriculation requirements and conducting examination leading to undergraduate admission and for admission to non-degree courses but shall not be responsible for any examination or any other selective process for post-graduate courses.
Subject to the provision of this decree, the commissioner may give the board directions of a general character or relating generally to particular matter, with regard to the exercise by the board of its functions under this decree and it shall be the duty of the board to comply with such directions. It conducts examinations for students seeking matriculation in the universities and also processes application for direct entry students. Its jurisdiction was extended by decree no. 33 of 1988 to conduct entry, qualifying examination into Nigerian polytechnics and colleges of education in the country. The JAMB carries out the following responsibilities through its structure consisting of JAMB governing board. Office of the

registrar, seven (7) departments; two (2) national headquarters annexes, one (1) liaison office; fifteen (15) zonal offices and nineteen (19) state offices. Subject to the provisions of the JAMB act chapter 193 of (1989), the board shall consist of the following members to be appointed by the President, Commander in chief of the armed forces on the recommendation of the minister, that is a chairman who shall have appropriate qualifications, seven representatives of all the universities in Nigeria, five representatives of all the polytechnics in Nigeria; two representatives of the Nigerian confederation of principals of secondary schools, one representative of the Federal Ministry of Education; the registrar of the West African Examination Council (WAEC) or his representative; the executive secretary of the National Board for Technical Education or his representative; the executive secretary of the National Commission for College of Education or his representative; the registrar to the board and five other persons to represent interests not otherwise represented on the board.

Since the inauguration of JAMB, the Nigerian universities had continued to grow in numbers, with corresponding growth in the number of students. For instance in the country, there are about thirty-six federal universities, thirty-six state universities making a total of seventy-two public Universities and forty-one (41) privately-owned universities at present (NUC, 2010 and Adeoye, 2011). This growth, together with other inefficiencies, corrupt practices (Ighadoro, 2002), poor performance of students in this examination (Okoye, 2004), fraudulent practices in the computer (Ajeyalemi, 1995), examination malpractices (Eghagha, 2005) and many other grouses, against JAMB as were extensively discussed earlier gave rise to the introduction of another screening exercise, conducted by different universities before giving admission to the successful candidates. JAMB had other problems but mainly compounded by inefficiency in other sectors, particularly the erratic postal system, shortage of postal orders which led to the inability of some candidates to submit their application forms. For instance, there were a lot of complaints that admission letters do not get to the screened candidates sometimes after six months of release of the result (Nigerian Economist editorial, 1993). (Ajeyalemi, 1995) equally noted that another reason why JAMB's relevance is called to question is the alleged fraudulent practices in which the computer section of the Board has been engaged in the recent past. For instance, in the University of Lagos alone, about one hundred and sixty (160) students were flushed out because of manipulation of studentsô scores in the computer. This was discovered by the substandard performance of those students and suggested that in order to resuscitate and sustain the ailing standard, that

JAMB should assume the role of clearing house and ensure that students do not have multiple admission problems, while the individual universities take up the conduct of entrance examinations.

In support of this call, (Obe, 2004) reported that UME and screening scores are negatively correlated. This is because the high scorer in UME did not come out as the high scorer in the test. For somebody who scores three hundred and three (303) in UME, just about 75% now scored 28% in the screening exercise. Moreover, someone who scores two hundred and twenty (220) in UME and scored 48% in the test implies that his UME score is about 52%. Also in accordance with the above, (Yola, 2006) stated that the former past President of the Country, President Olusegun Obasanjo accused the authorities of JAMB and the organizers of the entry examinations into tertiary institution of massive corruption which he said has affected the standard of university education in the country. Another case of a JAMB candidate who got the highest score in UME but withdrew in the first year due to her inability to cope was reported by (Okoye, 2004). Over the years, universities have had their expectations and hopes on students who came in with very high UME marks but disappointed as many of such students fail to make it even beyond year one due to poor performance and this will eventually lead to some of the negative behaviors exhibited by such students joining bad gangs out of frustration. Their sorrows according to (Adebayo, 2011) were expressed out in deviant behaviors and thereby turning the University into battle ground, filled with physical violence and making the University environment unsafe for conducive teaching and learning. Some may request for change of course after some years and those who have nowhere to go predictably take out their frustration on one another and the whole system in form of violent acts by joining cults that carry out obnoxious activities that rampage our institutions today.

(Ali, 1998) in compliance with him also asserted that even those who demonstrated superior academic achievement in science often cannot demonstrate superior functional competence and this indicates serious under-achievement in the purpose of study. Sequel to that, the qualities of graduates produced yearly become alarmingly poor and such candidates cannot defend the certificates they claimed to have acquired. This is why the universities across the country started calling to question the integrity of JAMB conducted examinations. JAMB like all public Institutions according to (Adebayo, 2011) has failed, not because her administrators

are incompetent but because the climate within the country has simply made it impossible for JAMB to function normally.

Based on these anomalies, many are of the opinion that JAMB be scrapped. (Eghagha, 2005) suggested that UME be scrapped because it is conducted in an atmosphere devoid of control and regulation, a free for all affairs without any guiding morality and involvement in different forms of cheating and therefore failed as an examining body. It was out of desperation that the post-UME tests were introduced (Adebayo, 2011) in order to sanitize University admission system. (Ighadoro, 2002) on the other hand reported the abolition of JAMB by Rivers state government on the account of alleged corrupt practices. These he continued were part of a paper presented to the senate committee on education by the state attorney general and commissioner for justice during its public hearing in Port Harcourt. The attorney general represented by the director legal drafting committee in the state ministry of justice noted that JAMBôs activities are not well coordinated, involves poor planning and frustrates students including other corrupt practices. The state government then suggested that JAMB be left with the function under section 5(b) and (a) as a supervisory body. (Adeyemi, 2005) also included that many of the UME results students use to get into schools are not real. The argument of most university governing councils according to report by (Awosiyan, 2007) was that the UME was not a true reflection of the candidates' academic ability and that it would be counterproductive to use it as the ultimate prerequisite for university admission. For JAMB to remain relevant, it has to improve on its present performance (Guardian, 2011).

It is perhaps on these scores that the need to re-examine the future functions and role of JAMB in Nigeria's higher education services delivery should be critically based. For once, Nigeria's higher educational facilities have expanded beyond what only one centralized, examining body can efficiently cope with and in a bid to correct this anomaly, the erstwhile minister of education, Mrs. Chinwe Obaji, introduced the policy of post-UME screening by the universities in 2005 according to (Alaneme, 2007). The policy made it mandatory for all universities to undertake the task of further screening of candidates after their UME results before giving admission. In conjunction with that, her successor, (Ezekwesili, 2007) stated in her current reforms on education that the reasons why they decided on the post-UME screening are to prove that one really got whatever mark one claims in the UME and secondly because of loss of credibility of this examination body.

The approval of this Post-UME exercise according to (Okoye, 2004) will lead to the admission of candidates with proven ability and intellect. The implication he continued, is heart-warming for the average students who rely on their intellect to write UME. This is because those average students who scored average marks in UME and still go ahead to replicate the same feat in the internal qualifying oral and written examinations will be admitted while those that score very high mark but fail to justify that feat in the subsequent university tests will not be admitted. In support of that, (Anekekhai, 2004) noted that, the idea of screening exercise will enable lecturers to do a proper assessment of candidates while (Olawunmi, 2004) also concurred that the need to conduct Post-UME oral and written tests for candidates seeking admission into the polytechnics across the country has been deliberated upon for sometimes now. He continued that the academic board of the Lagos state polytechnic had since approved the decision to conduct special oral and written tests for candidates seeking admission to the polytechnic. This interview he explained revealed that some of them have been dismissed or rusticated for various offences such as cultism, robbery and examination malpractices in their different schools.

Recently, it has been concluded that both UME and post-UME results are jointly used for admitting students into the universities and this is supported by (Abdulrahman, 1992) who advocates that the need to have more instruments for assessment is because the more instruments we have in assessing a candidate, the better the selection. But if it is based on just one instrument, it narrows the chances of the candidates. This, if objectively carried out will help to curb the problem of selection of non-qualified candidates into the system, and eventually lead to positive relationship between the students entrance scores and their first year university achievement in chemistry-based courses in public Universities.

Aptitude Texts in Public Universities

It has become a convention for texts and examinations to be conducted at various levels of education for the purposes of finding out the learning outcome, selection and job placement (Mgbodile, 1988); for assessment of the effectiveness of teaching and learning in the teacher and students respectively (Ezeh, 1997); as a prediction and success of pupils motivation, selection and teaching instrument (Maduekeh, 1996); for the selection of students for successive levels in the education system, Kellaghan and Greaney, 2003) and as research

purposes, sources of data and information for administration decision (Onyigbo, 2005). In conjunction with the above purposes the American Association for the Advancement of Science (1998) has categorized the purposes of assessment into internal and external purposes to include, studentsô expectations about what is important to learn, providing information about student's progress, helping students to judge their own learning, guiding and improving instruction, classifying and selecting students while external purposes on the other hand relate to the needs of those outside the school. These include provision of information for accountability systems, guiding policy decisions on funding, staff development, gathering information for program evaluation, sorting and classifying of people for admission, certification and hiring.

Texts in Science according to (Ali, 1998) should be designed to measure two broad areas of learning: the content and inquiry. Testing the content is an attempt to determine the cognitive and affective competence levels of the students. Testing the inquiry is an attempt to determine the psychomotor, cognitive and affective competences attained by the science students on the science curriculum completed. Written texts are classified into two types: achievement text which determines the individualôs ability and Aptitude texts which measure the candidateôs capabilities or prospects. Aptitude text is designed to predict an individualôs ability to learn certain skills or to predict success in a future course, example, University Entrance Examination such as UME and post-UME. (Gbamajah, 1991) classified teacher-made tests according to their functions as follows: Placement test, if it is used to test for entry behavior; Formative test, if it is given periodically to monitor learning processes during instructions; Diagnostic, if it is used to identify the learning difficulties of the learner and Summative test if it is administered at the end of a course and the result used for promotion exercise. These aptitude texts, if well designed, constructed and administered will be able to predict favorably the studentsô academic achievement. This, therefore, prompted the need for the empirical investigation of the predictive validity of these aptitude texts, used for admission of candidates into public Universities.

In agreement with the above, (Black, 1993) categorized the functions of assessment into two major categories: formative and summative. Formative assessment he continued is carried out during instructional period to provide feedback to both the teacher and students on how well the material is being taught and learnt. Whereas external examination bodies globally are involved in the summative functions of assessment. Good performance of students according

to (Obije, 1995) in their present task rests on the quality of their entry qualification to their new situation.

Students' Achievement in Chemistry

The students achievement as attested to by the academic performance of the students especially at the secondary school level have been rather very disappointing and the situation actually tends towards threatening the future of the nation (Olaniyi, 1992). However, studentsô achievement in examination according to (Aderounmu, Aworanti and Kasali, 2001) is one of the criteria for measuring and establishing the effectiveness of Nigerian schools and colleges. This achievement as expressed by the (Kanno, 2001) is evaluated after the teacher have taught and completed the course work stated in the syllabus mapped out for the students. Hence, for the students to perform well, they need to have some confidence in themselves as they face their school work (Obije, 1995). It is then obvious that previous success in terms of quality certificates obtained from previous schools will provide some form of confidence and spur them to better achievement.

Generally, the studentsô poor achievement in public examinations and also science in Nigeria have been consistently reported (Mordi, 1993; Keeves; 1992 Olatoye and Afuwape, 2004). Many students as asserted by (Onwuka, 1995) are interested in the position the possession of a particular certificate would attract. They are not in school for the knowledge and services they want to render to mankind but to be able to pass examination in order to gain admission or employment. (Ali, 1998) in compliance also stated that education is a certificate chasing exercise where everybody including the parents, teacher and students are all interested in the studentsô good performance so as to secure a good job after their schools. (Chijioke, 1990) described it all as mere emphasis on paper qualification. This situation according to (Awambor, 2003) would probably lend insight into some parents sponsoring their wardsô involvement in malpractice and ultimately the legacy of procurement of certificate after their studies. This deplorable level of science achievement by students had necessitated the call by the government and several researches for more positive action to be initiated to put science achievement back on track (Monk and Osborne, 2000). The poor achievement in science subjects has also been a subject of concern to many stakeholders in education (Keeves, 1992; Mordi, 1993; Sahim, 1999 and Olatoye, 2004). The statistics of studentsô performance in

senior secondary certificate examination for science subjects from (1977ï 1997) is used to buttress this point (Ibrahim, 2004). This declining trend has been causing a lot of concern and fear in various governmental quarters since the reports conclude that the nation is heading for the breeding of generation of illiterate Nigerians according to (Olaniyi, 1993).

Chemistry as one of the basic sciences has been characterized for several years by the same poor achievement in school certificate examinations. The statistics of studentsô performances in senior secondary school certificate chemistry examinations from 1999ï 2010 as indicated in (appendix k. p. 246) reveals the trend of poor achievement in chemistry over the years. This declining trend in studentsô achievement in sciences including chemistry has been recorded by examination bodies and several other studies like (Afemikhe, 1981; Ajewole, 1991; Ivowi, 1991; STAN, 1992; WAEC, 2010; Jimoh, 2004 and Njoku, 2007).

In view of that, a cluster of variables have been implicated as being responsible for the dismal performance of students. These factors according to (Betiku, 2002) include government related, curriculum related, examination body related, teacher related, home related, students related and textbooks related. Apart from these, some specific variables have been identified by (Olorutegbe, Orole and Oduttuy, 2005) of which the most important is teacher related factor including what they teach and ways of teaching it. (Nwachukwu, 2004) in agreement, observed the lukewarm attitude of some science teachers to duties as well as the depth of competent teachers. (Durutola, 1994) also affirmed in addition that the academic performance of students in institutions of higher learning and ultimately their successes or failure are largely determined by factors such as those relating to economic, political, social and cultural milieu. Chief examinersô reports from WAEC (2004, 2005 and 2007) in addition also identified some difficult chemistry topics as one of the reasons for low achievement. Such topics include: mole concepts, ion-electron half equation, redox reaction, balancing of chemical equation and nuclear reaction, chemical equilibrium, nomenclature of organic compounds, concept of PH, collision theory and rate of reaction, periodicity of properties, formulae of compounds and non-metals and their compound. These chemistry topics may appear difficult until the students are able to think in a particular abstract way which gradually develop with age and influenced by experience. Consequently, the studentsô inability to understand some aspects of chemistry and to grasp the writing of correct chemical formula and equations has prompted the use of valency cards, games and alternative procedure as indicated by Holmes (1980); Kahn (1980); Bruce (1983); Fleming and Sleet

(1983). Despite all the attractiveness of all these innovations in the teaching and learning of chemistry, there is still no empirical evidence to substantiate the potency of the approaches (Bello, 1990).

Chemistry education, therefore, becomes more effective when the teaching and learning experiences are proved to real practical rather than rote learning. If for instance, a student that has been consistently failing a particular teachersô subject as a result of teacherôs poor method of teaching happened to pass under this particular method of teaching, it is assumed that during the scoring procedure some examination rule may have been tampered which thereby invalidating the authenticity of the result or certificate. Any attempt to tamper with examination questions before, during and after the examination by either the teacher or student or any other collaborator is termed examination malpractice or cheating (Omede, 2003). This is one of the worst hindrances to realizing and achieving standard in schools. The above variables are expected to interfere either directly or indirectly to the predictive validity of the Examination processes used for admission of students in schools and, therefore, the need for this study

Today in Nigeria, examination malpractice has pervaded all levels of our educational system, from the primary through secondary to tertiary levels. Examinations are no longer regarded today as challenges to learning but as a challenge to try to beat the system. So many factors have been identified to be responsible for this malpractice. Such factors include: constant closure of schools, inadequate proper tutelage and poor teaching styles, overemphasis on examination, poor living condition as identified by (Gbenedio, 1993). Also included according to (Bunza, 1993) is immorality in wider society: inadequate supervision, poor teaching and non-completion of syllabus, tying promotion of teachers to candidatesô success and absence of guidance and counseling services. Added to these factors and worthy to be mentioned is the over-emphasis on paper qualification (Ezugwu, 1998). To substantiate this claim, (Maduabum and Maduabum, 1998) said that ours is not an education system but a certificate system where every learner at all costs wants to be certified as having mastered. Examination malpractice has become a serious threat to educational standard and it must be fought and conquered and until this is done our certificate will not be respected after the gate of our colleges (Omonu and Alhassan, 1998). With malpractice, credit is awarded to wrong persons (Egede, 1993) and innocent candidates become affected because their performances

are weighted against the performance of those dishonest students and thereby giving some students undue advantage. Examination results were cancelled due to examination malpractice as recorded by (WAEC, 2004; Adomako, 2005; Guardian, 2005; Olushola, 2006 and JAMB News, 2006). The incessant occurrence of examination malpractice makes it difficult for teachers to effectively evaluate their students and thereby making the whole evaluation exercise very unreliable and prediction based upon such judgment misleading too because they are built on false foundation. Examination malpractice is indeed one of the major factors that make prediction of academic achievement difficult to make. Sequel to that, the qualities of graduates produced yearly becomes alarmingly poor and cannot defend the certificate claimed to have acquired. This is why (Ezekwesili, 2007) stated that the reason why they decided on the post-JAMB examination was to prove that one really got whatever mark claimed in JAMB and again because of loss of credibility of this examination. This study, therefore, focuses on determining the predictive power of these entrance examinations so as to identify a more credible examination. In view of the above, it, therefore, becomes necessary for a proper investigation to be carried out in order to determine the predictive validities of the entrance examinations (UME and post-UME) used for the admission of candidates into the public Universities.

Chemistry and Chemistry-based Courses in public Universities

Education is an effective as well as a fundamental tool for self actualization, national and development. Accordingly, and in view of the global ñbattle cryò for sustainable development, environment related chemistry is increasingly being integrated in science and chemical education worldwide (Tomboulian and Parrot, 1997; Cooper, Elzerman and Lee, 2001; Zoller and Scholz, 2004). It is against this background that the national policy on education was published and then the subsequent revisions. In order to be updated with the dynamics of social changes and the demands on education, the recent edition was necessitated by some policy innovations and changes among which include, in the area of science, technical and vocational education for optimal performance. The governmentôs intention is to transform all aspects of the nationôs life over time and as a result the national policy on education made it clear that subjects like English, mathematics and sciences be made compulsory as core subjects in the school system (National Policy on Education, 2004). Competence in the basic sciences is very important in the pursuit of science-based career

such as medicine, engineering and so on. The choice of secondary subjects should be geared towards preparing particular goal in a particular area of specialization. For instance, those that are interested in the above professions need all the three basic science subjects as their prerequisite.

In view of that, (Ali, 1998) asserted that the scope and sequence desired from these secondary subjects will determine the kind of content matter included in it. Who it is meant for and how long it will take? He continued by saying that most course outlines used in science now are purely geared towards the academically-inclined students and it is possible that the science course of the future will be partly geared to both academically inclined and professionally-inclined. Thus continued under achievement at secondary school level by students poses an enormous constraint to the students with ambition to pursue science-based programme (Shaibu and Iroegbu, 1998). This state of affair according to (Pwol, 1993) does not augur well for the desired scientific and technological development of the nation.

Chemistry being one of the important basic sciences has been described by different scholars in diverse but related ways. According to (Abdulahi, 1982), it is described as the study of matter, its component and its properties. It is also viewed according to (Ikoku, 1973) as a study of change and for that, practicing chemists should have a professionally derived commitment to change. They should also accept any dynamic situations that will likely lead to something new and hopefully qualitatively better. Chemistry catalog (2007 ï 08) described chemistry as the study of matter at the atomic and molecular levels. Concepts and tools are used to study the composition, structure, reactivity and energy changes of materials in the world around us. This implies that chemistry as a branch of natural sciences deals principally with the properties of molecules, reactions and laws that describe the molecular interactions. It is, therefore, regarded according to chemistry catalogue as a central science because it has strong interaction with biology, medicine, earth and environmental sciences, physics and mathematics. (Ezeliora, 2009) concurred that the power of chemistry is what creates an enabling infrastructure that delivers food, medicine and materials which are the hallmark of modern life. However, students will, therefore, find a chemistry programme that supports their interests whether in the chemistry of natural products, polymers or inorganic compound and that supports their educational goals, whether towards graduate study, medical and health professions, Biotechnology education, business or as a complement to other studies in the natural science, humanities or social sciences.

The importance of chemistry as a science subject in fulfilling the technological needs of the society cannot be overemphasized. (Nwachukwu, 2004) noted that lots of technological advancement being made in the field of medicine, pharmacy, engineering, agriculture and others are largely made or based on the researches conducted in the field of chemistry. (Ibole, 2009), therefore, described chemistry as the bride of science due to its indispensable role in all science and technology endeavors. Chemistry is taught in all the secondary schools in Nigeria and one is expected to obtain a certain grade in chemistry as one of the entry requirements into the above mentioned fields. According to JAMB brochure (2009), it is one of the major prerequisite subjects required in so many areas of studies. It is required as both university matriculation examination subject and as entry qualification into engineering and related courses, faculty of medical sciences, educational science, agriculture and natural sciences.

Chemistry, because of its scope and potentials, is quite unique in its involvement in several aspects of modern life. Its role as a transforming agent is recognized as crucial, especially in a developing economy in Nigeria. For instance, according to (Ikoku, 1973), where the major problems could be summarized as provision of adequate supply of food for a rapidly growing population, banishing of the unemployment and building the infrastructure for industrialization and concomitant economic take-off, the role of chemistry is undeniably dominant. He continued by saying that the production and proper use of fertilizers and pesticides, adequate storage and preservation of food stuff, food processing, manufacture of adequate building materials such as cement, processed wood, metal frames reinforcing steel, glass aluminum, galvanized iron sheets, nails and tiles the setting up of agro-allied cottage industries aimed at providing employment and reducing migration to urban centre, manufacture of drugs, petrochemicals and the establishment of a salt industry, processing of coal and manufacture of other basic heavy industrial chemicals such as Tetraoxosulphate (vi)acids and caustic alkalis and so many other chemical processes all of which require chemistry as a tool for their various activities. Chemistry as (Ezeliora, 2009) pointed out, remains the most important science subjects due to its central position to manôs survival.

One of the greatest problems students have is that they are not aware of chemistsô role in society. That was why (Ikoku, 1973) advised that chemistry departments in the colleges and universities must broaden their curricula to include efforts to make chemistry students aware of chemistsô role in the society and to sensitize them for societal need. Chemistry

departments through a variety of individual courses and sequential programme, provides an opportunity for students to explore the nature and significance of chemistry, an area of important achievement in our quest for knowledge about ourselves and the world around us. The students of chemistry are able to become aware of the special viewpoint of chemists, the general nature of chemical investigation, some of its important results, how these results are expressed, and their significance within the fields of science and in the area of human endeavor as a whole (chemistry at williams). The chemistry major provides excellent preparation for graduate study in chemistry, biochemistry, chemical engineering, environmental sciences and the medical sciences. It can also be useful to those whose later professional or business career may be related to chemical materials or processes. According to the chemistry courses retrieved from www.rmc.edu/academics/chemistry/ courses/aspx, there are chemistry courses intended for different students in their different areas of study such as for non-science major, for members of the collegiate honour programme, for students majoring in chemistry and the sciences and for the students majoring or minoring in chemistry. The courses intended for non-science major include:

Science in the movies: This focuses on scientific principles and ethical issues in science fiction films.

Chemistry for the citizens: This uses familiar topics to introduce chemical concept such as aids, chemistry behind forgery, outdoor sports.

Chemistry and crime: This involves understanding of the methods and techniques used in crime detection.

Environmental chemistry: This involves the understanding of the chemical processes that govern environmental phenomena including ñglobal warmingò: and the ñozone holeò and ñbiomass conversion.ò

Courses for members of the collegiate honors programme include:

Better living with chemistry: This deals with how the development of chemical technology affects our lives on a daily basis.

Courses for science majors and pre-health professional students include:

Introduction to health professions: It is designed to introduce students to both medical and paramedical professions.

College Chemistry: This focuses on preparing science major students for an in-depth study of the fundamental principles of chemistry.

Organic Chemistry: This satisfies a requirement for chemistry minors, chemistry and biology majors and premedical and pre-dental students.

Courses for chemistry major/minors include:

Directed study in chemistry. This is designed for students wishing to work on a research projects.

Physical chemistry: This deals with the application of the laws of physics to chemical phenomena.

All these courses are well planned, organized with practically oriented activities in order to meet up with the fast growing technology. The students, according to the chemistry catalog have hands on the use of sophisticated instrumentation in course work research with faculty including 300mhz Fourier Transform Nuclear Magnetic Resonance (FTNMR), Spectroscopy, Atomic Force Microscopy (AFM), Inductive Coupled Plasma Atomic Emission Spectroscopy (ICPAES), Spectrofluorometry, Differential Scanning Calorimeter (DSC), Fourier Transform Infrared (FTIR) and Raman Spectroscopy, Laser Light Scattering Instrumentation, Gas Chromatography with Mass Selective Detection (GCMS), High Performance Liquid Chromatography (HPLC), and Linux Workstations for Molecular Modeling and Computational Chemistry. This implies that in developed countries, the faculty research projects and their curriculum involve undergraduate participation. Thus, the developmental role of chemistry becomes well pronounced appreciated and adequately sustained in the developed countries than in developing countries. This is in agreement with (Cole, 1975) who said that science and other school subjects are taught at secondary level in the developing countries not for the purpose of gaining useful knowledge and skills that would enhance rural transformation, but to prepare the learners to pass examinations and this emphasis on examinations and college entrance creates syllabus based upon materials and criteria that are examinable and not necessarily useful for the individual or the societal development.

However, great effort has been made over the years by science educators to improve science achievement through effective teaching strategies (Awodu, 1984; Alaiyemola *et al*, 1990; Ogunsola-Bandele, 1992, 1994; Duschill and Giltomer, 1991; Novak *et al*, 1993 and Okebukola, 1990). Therefore, it is expected that the achievement of students in sciences and mathematics should give a commensurate returns with the level of effort put forth but according to (Onwuakpa, 1998), the performance is not encouraging. This could be seen in the poor performance of students on science and mathematics as recorded by (Obeameata, 1990, 1991 and 1995; Onwuakpa, 1998 and Uwadiae, 1997). Thus, continued underachievement at secondary school level by the students pose enormous constraints to the students with ambition to pursue science-based programmes (Shaibu and Iroegbu, 1998), and this state of affair according to (Pwol, 1993) does not augur well for the desired scientific and technological development of the nation.

This poor achievement has been attributed to a number of factors as reported by some scholars. Such prevailing factors include overloaded curriculum (Adeyegbe, 1993); non-availability of resource materials (Tambawal, 1991); poor classroom management (Pwol, 1993); parental influences (Madugu, 1977), among all other factors that affect the achievement of students in chemistry and related subject, the secondary school teachers is the most crucial. According to (Ikoku, 1973), he is the most crucial link in the complex of factors involved in producing the right type of chemists and chemical workers for the national development. Because he is the one that introduces them to chemistry as a distinct academic discipline, guide them through the formative periods when they develop attitudes to chemistry and science at large. Whether positive or negative attitude will depend on what the secondary school teacher makes of the subject.

Therefore, the chemistry students for both the chemistry and related programme are largely the product of the secondary school chemistry. For the fact that some of these students do not have adequate exposure in chemical processes may find it difficult to cope or cope immediately and they eventually discharge their duties on graduation in a firm, research institution, government laboratory or as university teacher working with colleagues, laboratory technician, production men and as industrial workers. It, therefore, follows that in our own setting, a proper background in chemistry secondary school level coupled with the correct orientation is one of the prerequisite for industrial revolution as well as engagement in other related courses such as engineering, medicine, education science where chemistry is

still very relevant in their endeavors (Ikoku, 1973). Opportunities he continues that awaits those with knowledge of chemistry include applying the knowledge after secondary school, furthering of education, in both chemistry and related field. All these would not be possible if the curriculum is not functional, or if it is deficient in either the development or the implementation processes. For a good foundation to be laid, for the student to achieve maximally, and for chemistry education to meet worldôs standard, teachers must be skilful, innovative and well motivated. (Adikwu, 2008).The studentsô good or poor foundation in chemistry is expected to be reflected in their higher Educational achievement in other chemistry related courses as Industrial chemistry, Biochemistry, Electrical Electronics, Agricultural Economics, and Medicine. This relationship between the students University entrance scores in chemistry and their first year achievement in Chemistry-based courses in public university is the focus of this present study.

Public University and University Ownership

University education is only an education sub-sector in the nationôs entire system of education. It is generally defined according to (Adamu and Osaren, 1989) as the education offered at the tertiary level, for the award of the first degree, second and the third degrees. It can be said to have effectively began in Nigeria in 1948, when the university college was established as a campus of the University of London. Shortly after independence, there existed in Nigeria four Universities: University of Nigeria (1960), University of Ife (1961), Ahmadu Bello University Zaria (1962) and University of Lagos (1962). Ahmadu Bello University, University of Ife and University of Nigeria were financed by their regional governments. That is by the northern, western and eastern regions respectively (Emovon, 1989).The universities of Lagos and Ibadan were federal universities and, therefore, financed by the federal purse (Abdulkadir, 1988).

Prior to 1999, Universities in Nigeria were all entities of federal or state governments mainly established to meet societal demands. Both general and specialized Universities were established by both levels of governments. (Nnadozie and Nnadozie, 2008).The privately owned higher institutions were established following the mandate by decree 9 of 1993, as well as provision in the National Policy on Education for private participation in Education services delivery at all levels, for the establishment of all Universities, be it government

owned or privately owned, must follow a process of approval by the minister of Education, through her agency NUC. The first private university in Nigeria to secure a license from National University Commission (NUC) in 1999 was Madonna University. (Nnadozie and Nnadozie, 2008).These are mainly established to pursue their private interest, their societal obligation if any, may be fragmentary according to (Nwangwu, 1993). The tertiary education as a whole is established in order to achieve the following goals according to the National Policy on Education (2004): Contribute to national development through high level relevant manpower training; develop and inculcate proper values for the survival of the individual and society; develop the intellectual capability of individuals to understand and appreciate their local and external environments; acquire both physical and intellectual skills which will enable individuals to be self-reliant and useful members of the society; Promote and encourage scholarship and community services; Forge and cement national unity; Promote national and international understanding and interaction. These goals shall be pursued by the tertiary institutions through teaching, research and development, staff development programs, generation and dissemination of knowledge, a variety of modes of programs, including full-time, part-time, block-release, day-release, sandwich, access to training funds such as industrial training fund (ITF) students industrial work experience scheme (SIWES), maintenance of minimum educational standards through appropriate agencies, inter-institutional co-operation, dedicated services to the community through extra-mural and extension services.

The federal government in the process of ensuring the systematic development of the universities, set up the National University Commission (NUC) in 1962 with the responsibilities of sharing out funds from the government to the universities, approving programs of the universities in accordance with national needs, advising the government on establishment of other universities, serving as a buffer between the university system and the government and to constitute the medium of communication between them. (Sojo, Adeniran and Samaila, 1992) concurred by saying that in readiness to takeover of regional universities in 1975, the federal government reconstituted the National University Commission into a corporate body with the promulgation of degree no. 1 of 1974 to coordinate the activities of the universities. An added responsibility was further given to the Commission to lay down the minimum academic standard (MAS) for all universities and the power to enforce these standards by decree no. 16 of 1985 and its National University Commission (NUC)

amendment decree no. 49 of 1988. The minimum academic standard (MAS) documents according to (Okebukola, 2004) provides for minimum floor space for lecture, laboratory facilities per student, minimum staff/students ratio for effective teaching and learning in any given discipline. It also stipulates a curriculum as well as minimum entry and graduation requirement for each discipline. However, the establishment of the various regulatory bodies according to (Adebo, 1988) marked the genesis of centralized and coordinated university system. National University Commission (NUC) was one of the commissions set up to ensure the orderly development of university education in Nigeria, to maintain its standard and ensure adequate funding. Specifically, they help: in advising the head of the federal government through the minister of education on the creation of new universities and other degree granting institutions in Nigeria; to prepare after consultation with all the state governments, the universities, the national manpower board and such other bodies as it considers appropriate, periodic master-plans for the balance and coordinated development of universities in Nigeria; to make other investigations relating to higher education that the commission may consider necessary in the national interest; to inquire into and advise the federal government on the financial and material needs of the universities; to receive block grants and allocate them accordingly using the laid down formula by the federal executive council; to collate, analyze and publish information relating to university education in Nigeria; to undertake periodic reviews of the terms and conditions of service of university personnel and to make recommendations thereon; to act as the agency for channeling all external aids to the universities in Nigeria; to work out and lay down minimum academic standard for all universities in Nigeria as contained in decree no. 16 of 1985.

This centralization of funding and ownership by the federal government meant that all qualified Nigerians would have fairly equal access to university education. This eventually leads to certain controversial issues according to (Abdulkadir, (1993) such as creation of unequal balance in educational development of different states and quota system in admission which were carried out by different aggrieved states which challenged the entire process of centralization. Another controversy is the government incorporation of the universities into the unified public service structure after it had decreed their exclusive ownership. Accordingly, (Adebo, 1988) also observed that politically nationwide, the most talked about educational gap between one part of the country and another continues to exist and that educationally disadvantaged zones feel threatened by the economic implication of being left

behind educationally. This situation he continued was taken to a more ridiculous proportion when the establishment of tertiary institution returned to the original listing in the concurrent legislative list in the second republic in 1979 constitution and this lead to the establishment of about twenty-four open universities in 1983 which was to carry out its educational responsibility through a distant learning programme.

Taking advantage of this constitutional provision, many states government came out to establish their own universities as a result of deliberate policy of their sponsors to provide university facilities to their indigenes in addition to what is obtainable in federal universities. They equally argued that a large number of qualified state indigenes are not able to secure admission into the federal universities (Abdulkadir, 1993). Consequently, the university system is almost one hundred percent existing at the whims and caprices of the government. This corresponds with the popular saying that ñhe, who pays the piper, dictates the tune.ò This is because according to (Abdulkadir, 1993), the government is responsible for almost hundred percent of the financial well being of their universities. They are responsible for the appointment and or dismissal of the councils and the vice-chancellor, releasing or withholding the financial subventions and allocation as it feels financially expedient to do so. It issues out decrees and/or laws to dismiss staff, closes or opens universities as it deems fit. It was the same decree that abolished the creation of private universities in 1984 (Decree no. 19 of 1984) that further stipulate criteria for establishing institutions in the repealed decree 19 of 1984 as in the amendment decree 9 of 1993. Therefore, their fortunes he continued, rises and falls as the Socio-political and economic climates tumble or rise in the country.

This growth of the universities according to (Abdulkadir, 1993) without the corresponding financial, administrative and manpower supports have left so many universities in enormous financial, staffing and administrative problems. The unstable political and socio-economic conditions of the country and also the over-politicization of establishing universities by federal and state government have also contributed to this bad situation. (Nnadozie and Nnadozie, 2008) in accordance also reported that the global recession in recent decade has severely diminished the financial resources of Nigerian federal and state government while income decreased governmental responsibilities, increased exponentially and university budgets witnessed a steady decline. The result is a dysfunctional infrastructure for research,

insufficient classrooms and office accommodations, brain-drain, industrial disharmony, studentsô unrest, instability in the academic calendar, and erosion of academic standard. Furthermore, (Adeyemi, 2005) also identified a number of factors responsible for falling standard of education which have led to the production of graduates that can hardly communicate effectively and equally lack originality in thought. These factors include the sanctity and integrity of university education which he observed have been compromised to the extent that many students admitted into these schools are not supposed to be there. Secondly, poor infrastructure and poor services due to the increased population of students in schools. For instance, in Olabisi Onabanjo University (OOU), the library had in 1983 for 500 students was still in use in 2005 for the studentsô population over 60,000. Under which environment are students expected to learn? The same thing goes for other facilities and in other universities. Thirdly, the quality of research by the academics and finally the inability of the stakeholders to give education at the tertiary level all the seriousness it deserve. (Onyekakeyah, 2009) noted in support that there is nothing to write home about public universities in the country because academic endeavors are at their lowest level, libraries are empty. Lecture halls are overcrowded, the quality of lectures given is low and the general infrastructure is horrible.

The effect of all these has been the intervention of the trade union which has always lead to instability in the system characterized by the truncation of academic sessions and the epileptic closure and re-opening of university occasioned by recurring and sometimes protracted strike actions by staff and studentsô unrest as was observed in 2009. (Odidi, 2009) observed in agreement that the regular disruption of university academic calendar has created many more problems to the country; students are unable to graduate in time, half baked students are produced at the end, sudden rise of brain-drain among lecturers are all traced to frequent strike and lack of conducive environment for proactive and intellectual research. This recent (ASUU) strike embarked upon in (2009) by the university lecturers according to the Guardian Editorial (2009) was still on the old story. The problems have remained: failure of the federal government to honor agreements mutually entered into with the academic union as a result of ASUU strike embarked on in April 2001 to press for the improvement in a wide range of issues including emoluments. The editorial also reported that an agreement was reached and signed by the government officials which later reneged on the agreement and that led to a strike action which relieved forty-nine lecturers from university of Illorin of

their duties. Six years later, the federal government constituted a fresh negotiating team headed by Onosode to review the grievances. This lasted for more than two years with a collective agreement prepared which the federal authorities still refused to endorse. The issues addressed include adequate budgetary provision for education, improved condition of service that would check the problem of brain drain, university autonomy, academic freedom as well as other miscellaneous demands that include alternative funding and assurance that more Nigerians get access to quality university education as indicated by (Odidi, 2009).

The university funding on the budgetary allocation according to the editorial is that the negotiators agreed that a minimum of 26 percent of the annual budget of both state and federal government be allocated to education if the continuing decline of tertiary education and the growing inability of the children of the under privileged to get education is to be arrested. This was exactly according to UNESCOôs standard to invest 26 percent of national budget on education. General Abubakar was the first to allocate 11 percent but in 2009 budget, 2.2 percent was allocated to education and this calls for a question whether there is a clear understanding of the position, significance and role of education in future plans and projections including the vision 20:2020. Academic freedom and autonomy were among the issues agreed upon. The lima declaration according to (Adewusi, 2009) defined academic freedom as ñthe freedom of members of the academic community, individually or collectively, in the pursuant, development and transmission of knowledge through research, study, discussion, documentation, production, creation, teaching, lecturing and writing. All members of the academic community shall have the right and opportunity in conduct and administrative affairs including free election of the governing bodies of the institution.ò

The declaration further directs that no freedom can be protected for a section of the community if the rights and freedom of other sections of the community are not protected, and further recognizes the academic community as one entity within a given institutional framework, various sections of which have different but complementary roles in the processes of academic pursuit and functions. (Okafor, 1971) sees an academic freedom as a right claimed by the properly appointed educator as a teacher and an investigator, to interpret his findings and to communicate his conclusions without being subjected to any interference, molestation or penalization because these conclusions are unacceptable to some constituted authority within or beyond the institutions. This freedom he continued hinges on the

protection of the university teacher from dismissal should his views and actions become displeasing to the authorities of his university.

Autonomy according to the new Websterôs English dictionary is defined as a self governing political community. (Okafor, 1971) saw the autonomy as the crux of the matter and maintained that most universities now are run mainly on funds subscribed by some outside body, usually a government or state, occasionally, a religious body or even the alumni of the university. In all cases, those who pay the piper dictate the tune either directly or indirectly. This implies that autonomy in the modern university is nonexistent except as a corollary of academic freedom. Where for instance, there exists academic freedom then, the faculty is able to administer the courses as it considers fit to choose who should teach, and the area of research. It is in the actual act of deciding what, how, when and whom to teach that autonomy lies. University autonomy can also be viewed from the following perspectives according to (Njoku, 2010). These include: financial, academic and administrative. The financial aspect of the autonomy deals with the freedom or liberty of universities to generate resources, according to their strategic plan, without necessarily being encumbered by government regulations. In the case of Nigerian universities, this level of autonomy is highly impaired by several legislative dependable positions of universities on government allocation. This exercise of control by the government has restrained the universities from having absolute financial freedom to control the allocation and resources. Academic autonomy deals with the ability of the universities to design and deliver academic program in an internationally recognized standard. The universities in Nigeria have always enjoyed this freedom until a regulatory body was instituted to take charge of the activities of the system. Lastly, is the administrative autonomy, which deals with the power to appoint key administrative officers which is correspondingly charged with the management of the Universities. This curtails just like in Nigerian setting the freedom of the universities to exercise domineering powers over their administrative affairs without subject to endorsement by the authority providing funding for the development of the institution.

The consequential effect of this agitation as reported by (Adewusi, 2009) was partly led to the achievement of semi-autonomous method of universities appointing vice-chancellors rather than suffering outside imposition, improved funding and infrastructural development and restoration of at least a respectable level of academic freedom within the universities. These and other distractions in the campus either delay or hinder studentsô academic achievements

in the universities. Having generally noted these, one can conceptually state that in order to increase access, maintain standard and ensure stability in universities, the universities must diversify their financial bases through cost-recovery for non-academic services, the introduction of targeted fees and calculated expansion of income generating activities. Greater autonomy from the government particularly in financial administration is also required if they are to become more entrepreneurial and if they are to encourage quality performance and management efficiency. More professional management at all levels through staff training, strategic hiring and computerized management information strategy for freedom resources through improved efficiency to meet university needs.

Finally, while addressing the identified problems, the authorities should not forget to address the issue of quality and standardization of the aptitude tests and Examinations (post-UME) conducted by public universities. This is important in order to enhance the credibility and validity of the examinations, and also to maintain uniformity in standards.

Theoretical Framework

A theoretical framework according to Ezeh (2011) is described as a model showing how a set of theories within the discipline relate to a given study. It is a collection of interrelated concept that guides the researcher, to determine what to measure and what statistical relationship to look for. Borgatti, (1999).The researcher presents the theoretical framework to place this study within the perspectives of other studies in the same discipline. It uses facts, observations and theories from previous studies to focus on the ideas about new relationship among the variables or about new population of the study.

Prediction Theory

Prediction according to Wikipedia is a statement or claims that a particular event will occur in the future in more certain terms than a forecast. With regard to predicting the future, (Stevenson, 1998) states that ñprediction means at least two things: important and hard.ò Important, because we have to act, and hard because we have to realize the future we want and the best way to get there. (Obitko, 1999) similarly explained the term predicting as making claims about something that will happen; often based on information from the past and from current state. The empiricist philosophers had a view that made prediction the

crucial test of scientific validity. For them, the fundamental presupposition is that the fact justifying changes in scientific ideas are both intellectually prior to the theories that are in due course developed to explain them and also capable of being recognized independently and in advance of all theory constructions. Given this presupposition, they regard prediction and validation as the crucial and distinctive step in scientific procedure arguing that to establish the validity of any general scientific preposition, it is necessary to show that the theoretical generalization of which the validity is in question entails particular factual statements that are borne out by independent empirical observations (Somalia, 1975). This validation process then involves two essential steps. Firstly, the formal step of inferring novel predictions from the theory and secondly the empirical step of comparing those predictions with the facts and so confirming the theory or proving it false. Prediction is applied to so many areas of human endeavors such as opinion polls, weather, harvest, energy consumption, movement of forex, earthquake, finance, vision and prophecy, fiction and a lot of other stuff. And every one solves the problem of prediction everyday with various degrees of success. For instance, prediction is applied in opinion polls to predict the outcome of election via political forecasting techniques through the use of opinion polls.

In statistics as part of statistical inferences; in supernatural such as prophecy or by observing omen, the disciplines including water divining, astrology, numerology and fortune telling have been used for centuries to predict the future though heavily criticized by scientists and skeptics. In finance by stock investors to anticipate or predict stock market boom or fail to anticipate a stock market crash; in vision and prophecy, as literary devices used to present a possible timeline of future events. Example, in Charles Dickensô Christmas carol, he makes use of vision as a literary device, after Scrooge confronts the vision given to him by the ghosts of Christmas past, present and yet to come. We ask whether the future he has seen can be changed. In fiction, especially fantasy, forecasting and science fictions often feature instances of prediction achieved by unconventional means. For instance, in fantasy literature, predictions are obtained through magic or prophecy, sometimes referring back to old traditions. Examples, in J. R. R. Tolkienôs, the lord of the rings, many of the characters possess an awareness of events extending into the future. The character, Galadriel, employs a water ñmirrorò to show images, sometimes of possible future events. Also in the foundation series by Isaac Asimov, a mathematician finds out that historical events can be theoretically modeled using equations, and he spends years trying to put the theory in practice. In technical

domains, predictable parameters of a system can be often expressed and evaluated using equation. Thus prediction is then simply evaluation of solution of such equation.

The prediction type, according to (Obitko, 1999), can be classified according to various criteria. The basic criteria include: data that we have for teaching prediction and for prediction and what we want to predict ï value or trend when one wants to get exact value or more values of a variable in future, then, we are predicting value. Other possibility is to predict trend of a variable. That is whether the value will go up or down without considering size of the change. Predicting trend also implies classifying into two or three, up and down or no significant change. In data for prediction, for instance, for a time series predicting, we usually have values of a variable in equidistant intervals and then tries to predict the development of the value-based on historic values and time only. Other additional information to time series such as derivation can be used for more exact prediction. Other important information can be added using the interventional variables which represent information about time series or about the period of prediction. For example, when predicting energy consumption, having knowledge about the day or time of a prediction can improve the prediction, therefore, it is usually very helpful to use values of intervention variables or indicators when creating a mode for prediction. Neural network can be used for the prediction with various level of success. Their advantages include automatic learning of dependencies only from measured data without any need to add further information. This network is trained from the historical data with the hope of discovering hidden dependencies and thus will be able to use them for predicting into the future. Another advantage of the usage of neural networks for prediction is that they are able to learn from examples only and also able to catch hidden and strongly non-linear dependencies. It is also possible to predict various types of data such as prediction of time series which shows the development of a value in time (Retrieved from: http//www.obitko.com/tutorials/ neural-network-prediction/types-of-prediction.html).

A theory on the other hand is an established paradigm that explains all or many available data and offers a valid prediction that can be tested. (Langford, 2005) views prediction theory as a statement about the future error rate of learned classifiers. Classifiers are functions which partitions a set into two classes. It appears to be the most simple nontrivial decision making element. There are several aspects of prediction theory just as there are so many fields and

areas of lives. These include: Linear Prediction Theory, Memory Prediction Framework, Superwave Prediction Theory, Machine learning Theory, Chaos Theory, String Theory, Classical Test Theory and Item Response Theory. Of all the prediction theories mentioned, the study is anchored on Classical test theory and Item Response Theory.

Classical Test Theory

Classical test theory according to Wikipedia is a body of related psychometric theory that predicts the outcomes of psychological testing which includes the difficulty of items or ability of test-takers. The aim is to understand and improve the reliability of psychological tests. This theory assumes that each observed score (X) contains a true component (T) and an error component (E). When measuring a psychological construct, unsystematic error occurs which could be in form of distractions; physical well being of the candidate or good/bad luck. These may have either positive or negative effects on a candidates test result and therefore cause a range of error around the true scores. Other factors which affect the efficiency of a psychometric test include consistency of scores; validity of test scores, as well as the transferability of the test scores to real world. This could for instance imply a question like, how well did the test done during selection process predict success in his course of study or job? This, therefore, focused on the predictive power of a test for future performance such as school success or job success. The test scores used to compare the results of candidates that completed the same test or different tests must be standardized and fair. The candidatesô result will indirectly reflect on the quality of test scores used and the most appropriate predictor variable through the predictive index to be determined. This will go a long way to justify the need for the choice of the best criterion to use for selection of right candidates for the right courses in the universities. Candidatesô eligibility for admission into the university can be justified after evaluating the academic performance of undergraduate students admitted into the first year courses of the selected faculties in the public Universities in Enugu state.

Item Response Theory

Item Response Theory is a paradigm for the design, analysis and scoring of tests, questionnaire and similar instruments measuring abilities, attitude or other variables.

(Wikipedia).It does not assume that each item is equally difficult and treats the difficulty of each item as information to be incorporated in the scaling items. Its name item response theory came about due to the focus of the theory on the item, as opposed to the test-level focus of classical test theory. Thus it models the response of each examinee of a given ability to each item in the test. The usual approach taken according to (Baker, 2001) to measure ability is to develop a test consisting of a number of items (questions). Each of these items measures some facet of the particular ability of interest. Such items should be free response items for which the examinee can write any response that seems appropriate. The person scoring the test must then decide whether the response is correct or not, when the item response is correct, the examinee receives a score of one, and an incorrect answer receives a score of zero. That means that the item is dichotomously scored. Under classical test theory, the examineeôs raw test score would be the sum of the scores received on the items in the test. Under item response theory, the primary interest is whether an examinee got each item correct or not, rather than in the raw test scores. This is because the basic concept of item response theory rests upon the individual items of a test rather than upon some aggregate of the item responses such as a test score. According to Halin, Drasgow and Parsons (1983), item response theory (IRT) provides a model based linkage between item response and the unobservable characteristics assessed by a test or scale. Problems to be addressed are the issue of measurement bias. It is essential to ensure unbiased measurement when an organization or society allocates scarce resources, educational opportunities, jobs, promotions to individuals on the basis of test scores. IRT allows a rigorous evaluation of measurement bias. Once it has been demonstrated that scores on the tests are not systematically biased against protected groups, thus, test use can be implemented with some assurance that scores on the scales and tests are fair assessments of merit.

Item Response Theoryôs appropriateness indices, therefore offers a theory-based solution to the general problems of detecting inappropriate test such as that used in universityôs aptitude tests and scale scores. These methods are rigorous, efficient and practically useful. The appropriateness indices should be computed in both research and practical application and used as a theory based method for identifying mismeasured individuals in these tests. It tries to cover all kinds of informative item. They might be multiple choice questions that have both correct and incorrect responses; statements in questionnaires that allow respondent to indicate level of agreement; diagnostic information in complex system. It is based on the application of related mathematical models to testing data. It is generally regarded as superior

to classical test theory. It is the preferred method for developing scales, especially when optimal decisions are demanded such as in high stakes tests example, the graduate record examination, Graduate Management Admission Test, University Entrance Examination tests (UME, post UME) used for the admission of candidates in public universities.

The theory is based on the idea that the probability of a correct response to an item is a mathematical function of person and item parameters. The personôs parameter is construed as a single trait example which includes intelligence while the parameters which characterize the item include their difficulty, discrimination or correlation representing how steeply the rate of success of individuals varies with their ability and a pseudoquessing parameter, characterizing the score, a least able person, will get due to guessing. The purpose of item response theory is to provide a framework for evaluating how well assessments work, and how well individual items on assessment work. It is applied in education where psychometricians use it to develop and refine examinations (such as UME and PUME), maintaining banks of items for examinations and equating for the difficulties of successive versions of examinations. That is allowing comparisons between results over time. The major contribution of item response theory is the extension of the concept of reliability. Its index helps to characterize a testôs average reliability when two tests are to be compared and predicted.

Empirical Studies

Studies on Prediction

Studies on prediction is that where scores on one variable is used to predict performance on another variable. Predicting success of incoming students is typically based on performance on standardized tests, grades in introductory courses and high school performance according to (Hale, Johnson, and Perrins, 2004). Therefore, one would expect that performance in previous courses should have an impact on performance in upper level courses. (Hale *et al,* 2004) in support confirmed that pre-matriculation factors such as High School Grade Point Average (HSGPA) and American College Testing (ACT) scores are strong indicators of a studentôs potential in college, and are used for admission into the University of Arkansas. Generally, predictive studies have been found to differ in procedures studentsô characteristics

studied and some other ways. Some of these predictive studies carried out over the years on entry qualification as a predicator of studentsô academic achievement focused on the following variables: Continuous Assessment, General Certificate in Education (GCE), Senior School Certificate Examination (SSCE), University Matriculation Examination, first year university examination results and mock results. These were done at different educational levels and in different disciplines or field of studies either singly or jointly in order to find out the trends, compliance or disagreement and thereby creating opportunity for comparing the findings of the present with past studies.

A retrace of some of the previously carried out research in Nigeria at secondary school level is done in order to bring some of the studies to focus. These include those of [Olatoye and Afuwape, (2004); Adebola, (2004) and Ademola, (2004)]. The study of (Adebola, 2004) was carried out on the relationship between studentsôperformance in JSS mathematics and senior secondary mathematics, further mathematics and physics. He sampled a total number of two hundred and eighty-eight (288) senior secondary students in Eti-Oba, comprising of 164 boys and 124 girls from form four (4) public secondary schools. Four research questions were generated to guide the study. The data collected were analyzed using the pearson product moment correlation coefficient (PPMC) as well as the t-test of significance and the results of the analysis showed that a significant correlation exists between students performance in junior secondary mathematics and their performances in senior secondary mathematics, further mathematics and physics respectively with the correlation coefficient (r) of 0.50, 0.52 and 0.59 respectively. This he concluded revealed that the junior secondary mathematics provided a strong foundation for necessary skills and requirements for mathematics and other related science subjects at senior secondary levels. This was in agreement with the work of (Adebayo, 1998) who claimed that performance in separate science subject at senior secondary level is dependent on the foundation in mathematics at the junior secondary levels.

A similar study was carried out by (Ademola, 2004) on the studentsô performance in mathematics as a correlates of their performances in other basic science subjects such as biology, chemistry, physics and agricultural sciences. The researcher sampled a total number of seven hundred and sixty-six students from thirteen schools who are offered basic science subjects and sat for the consecutive promotional examination in Ijebu Ode local government of Ogun state. The generated data were subjected to Pearson correlation and multiple regression analysis. And the result showed low positive correlation between the dependent

variables. The predictor variable did not only influence studentsô performance in mathematics but also significantly predicted their performance in the subjects accounting for 45% of the total variance observed in performance (r = 0.672). The combined effect and contribution of each of the independent variables to studentsô performance in mathematics showed that chemistry was the best predictor of the performance in mathematics with a percentage of 29.3% out of the total performance of 33.0% assuming other variables are kept constant. Biology on the other hand contributed 17.0%, physics 18.7% and agriculture 29.2% of the total variance of 33%. This implies that performance in science subject is dependent on strong foundation and skills acquired in mathematics.

Another related study was done by (Olatoye and Afuwape, 2004). They investigated how achievement of students in integrated science predicted their achievement in the three basic science subjects at the senior secondary level using the scores of 280 students randomly selected from eight schools from two local government area of Ogun State. The data was analyzed using regression analysis, Pearson product moment and t-test and the result showed that studentsô performance in integrated science significantly predicts their achievement in basic sciences. The highest prediction was recorded in biology followed by chemistry and lastly physics. This was in agreement with the previous works of (Osokoye, 1999) and Eze (1997). Their findings revealed that their mean achievements showed that students are best in biology. Slight deviation was recorded by (Eze, 1997) who included agriculture together with the basic sciences and found out that integrated science scores did not significantly predict scores in physics.

Other related studies carried out over a decade ago at secondary school levels include those of [Hassan and Adeyanju, (1998); Okoro, (1995) and Obije, (1995)]. Hassan and Adeyanju (1998) studied the predictive validity of performance of students in continuous assessment in senior secondary certificate examinations. This work correlated continuous assessment scores and end of termôs scores of the senior school certificate examinations in English and Mathematics. Gender was also considered as one of the variables used. The population was made up of students who sat for the senior school certificate examination in November 1990 in thirteen government secondary schools in Kaduna were used with a population of 6,416 students. Out of this, a total number of 500 students were drawn for the study and regression analysis was used for the correlation. The result showed that there is no significant relationship between continuous assessment and SSCE scores in English and mathematics. It

was also found that correlations between continuous assessment scores and final school certificate examination score in English language were better in girlsô schools than in boysô schools. This implies according to the researchers that much is still needed to be done about tests and testing in schools. They suspected strongly that teachers did not thoroughly assess their students while the students did not take the assessment seriously. These may not reveal the true picture of the final examination results and therefore hinders effective predictability of the results in question. (Okoro, 1995) in agreement studied the relationship between academic achievement of students in mock and senior school certificate mathematics examinations. He used a total population of one thousand two hundred and fifty nine final year senior secondary schools from six randomly sampled schools for this study. The data which was generated from the result of both the mock and senior school certificate examination mathematics scores for the years 1990, 1991 and 1992 academic sessions was subjected to the point-biserial correlational statistics and the result revealed that all the coefficient were statistically very significant even for the overall at a probability level of five percent meaning that all the calculated t-values were greater than critical value in all the schools and for the years under investigation.

Therefore, a positive linear relation existed between mathematics scores in mock and scores in senior secondary certificate examination. This finding was also in consistent with the reports of (Obije, 1995) who sought to establish the relationship between electronic studentsô entry qualification and their performances in West African examination council technical examination. And also to determine whether there is any significant differences among the mean performances of different groups of electronics students. Those with science background and those with arts background at West African examination technology examination. The researcher sampled two hundred and nine (209) electronic students who passed out from delta state technical college in 1990, 1991 and 1992 including eighteen electronics teachers for this study. Studentsô entry qualification grade average point (gap) and their performance were collected and analyzed using Pearson Product Moment Correlation mean scores, Analysis of Variance (ANOVA) and Scheffeôs test. The result of the analysis revealed that there was positive significant relationship between the following: Electronic studentsô entry qualification grade average point and their performance at West African Examination Technical; Electronic studentsô performance at west African examination council technical and their last internal school examinations; The mean performance of the three categories of electronic students at West African examination council technical and

lastly, students with science background perform better than those with art subjects. This shows that students with good grade points in their school certificate will improve performance at these examinations.

Some other similar studies recorded by different courses or areas were those of [Abadon (1976), Anameje (1981), Agomuo (1984) and Durutolu (1994)]. In opposition with the above studies, some of the predictive studies done at higher education level such as college of education, polytechnics and universities were mostly negatively correlated studies. The most recent and related work was done by (Obioma, Nwufo, Salau and Omole, 2010).The study investigated the predictive validity of UME scores and post- UME scores with respect to students achievement in first year degree examinations. They sampled a total of 2637 students who sat for the UME and post-UME examinations and admitted into the universities in eight faculties using both stratified and systematic random sampling techniques. The data was analyzed using arithmetic mean, percentages, correlation and multiple regression analyses. The results showed, a relatively significant relationship of (0.4) and (0.3) were calculated, for the final year examination and UME scores respectively when correlated individually. Also, a correlation between UME and post-UME was found to be (0.2).The finding revealed a low correlation between UME/post-UME scores and the CGPA scores of the first year degree examination in all the universities sampled. Though this study is very much related with the present study, but the present study is particular about chemistry and chemistry based courses in the university. The raw scores of the students are used and the correlation done semester by semester before the final result.

(Obioma and Salau, 2007) studied the predictive validity of pubic Examinations in Nigerian Universities. A total number of 4904 candidates were sampled from 22 Nigerian Universities. The data was obtained from eight disciplines from those Universities. The data was analyzed by multiple regression analysis and the study revealed a low positive relationship between the variables. It was also established that the first year result accounted for 48.2% of the final year examination result indicating that formative evaluation plays a significant role in predicting the achievement of University undergraduate.

(Keskula, Sammarone and Rosenkrans, 2009) Carried out a similar study on the prediction of academic achievement in a national athletic trainers association (NATA) approved graduate athletic training education programme. They tried to determine which information used in the

applicant selection process would best predict the final grade point average of students in a national athletic trainers association (NATA) graduate athletic training education programme. The criterion variable used was the graduate grade-point average (GPA) calculated at the completion of the program of study. The predictor variables include graduate record examination quantitative (GRE-Q) scores, graduate record examination verbal (GRE-V) scores; preadmission grade point average (GPAP), total athletic training hour and curriculum of internship undergraduate athletic training education programme. Data from 55 graduate athletic training students of the university of Virginia during a 5 year period, from (1986 ï 1990) were evaluated. Stepwise multiple regression analysis indicated that GPAP was a significant predictor of GPAP, accounting for 34% of the variance. GRE-Q, GRE-V, hours and program did not significantly contribute individually or in combination to the prediction of GPAG. The results then suggest that of the variables examined, GPA-P is the best predictor of academic success in a NATA-approved, graduate athletic training education program. They, therefore, conclude that in order to select from the qualified candidates, program directors must determine how to predict the potential success of applicants. The selection of admission criteria that best predict academic success is an important precursor to the applicant selection process.

Another predictive study conducted by (Salahdeen and Murtala, 2005) seeks to determine the relationship between the quality of senior school certificate examination (SSCE) result, university matriculation examination (UME) scores and studentsô academic performance at Lagos state university college of medicine (LASUCOM), records of students admitted into medical school in 1998/99 were studied. Both the standard descriptive statistics and correlation coefficient were used to determine the correlation between the variables and the results showed no significant correlation between the SSCE and the JAMB scores. In addition, correlation between JAMB and the studentsô performance at 100 level and pre-clinical sciences also proved non-significant. The results equally indicate that SSCE is a better predictor of studentsô performance at pre-clinical sciences examination than JAMB scores.

(Omede, 2003) also studied on the entry qualification as a predictor of academic achievement of students in Kogi state college of educations Ankpa. The study tried to determine whether pre-NCE end of course result and PCE-JAMB scores predict the academic worth of students at KSCOE Ankpa in the school of science, arts and social sciences in the years 1998/1999

and 1999/2000 academic sessions. Out of one thousand one hundred and four students (1,104) students admitted into the school for the two academic sessions. Under study, five hundred and sixteen students graduated in these years were sampled for the study. The three instruments used for data collection including pre-NCE end of course and placement results for 1998/1999 and 1999/2000 sets were subjected to a Pearson Product Moment Correlational analysis and the result obtained generally showed that entry qualifications do not significantly predict the academic achievement of students in the sciences and also arts and social sciences of the college. The finding also revealed that there is still an apparent gap between expectations and realities in terms of relationship between the present and future academic achievement of students. This implies that a lot of home related, school related, teacher and students related factors that weaken predictive studies still feature prominently in the conduct of some of these examinations.

Similarly, the study of (Garton*, Ball and Walker,* 2002) was conducted to determine predictors of academic performance and degree completion of college agriculture students. The freshmen enrolled at the university of Missouriôs college of agriculture, food and natural resources learning and development course in the fall semesters of 1997 (n = 245) and 1998 (n = 197) were the accessible samples used for this study. American college testing, high school core grade point average, and high school class rank were investigated as a predictor of academic performance and degree completion. In addition to studentsô preferred learning styles, regression analysis was utilized to determine the variance in studentsô cumulative GPA at the completion of five academic years. Step-wise discriminate analysis was performed to build a predictive model that could determine whether a linear combination of learning style, act score, high school class rank and high school core GPA could be used to predict degree completion. They found out after the analysis that the field independent learners exhibited a tendency for greater academic performance than did their field-dependent peers. The best predictor of studentsô academic performance as determined by cumulative college GPA was their high school core GPA. Learning style was not a predictor of studentsô cumulative GPA. High school core GPA was found to have limited value in predicting agriculture studentsô degree completion rates.

Another predictive study done at this level was that of (Okoba, 2001). The researcher studied the predictive validity of polytechnics/college of education matriculation examination results

and final results of NCE students in federal college of education (technical) Asaba. A total population of fifty four (54) students who completed the Nigerian certificate in education for the following academic years: 1989, 1990, 1991 and 1992 was used for the study. The polytechnics college of education matriculation examination scores and the final cumulative grade point average of the population were collected and analyzed using spearman rank order correlation coefficient and students t-test for test of significant and it was observed according to the researcher that there was a negative predictive validity of students in polytechnics/college of education matriculation examination result and Nigerian certificates in education final results with the overall correlation coefficient for 1989 to 1992 of 0.08 while the overall students t-test yielded 0.58 which is less than the table value of 2.00 of 0.05 level of confidence at 52 degrees of freedom. This finding indicates that a polytechnics/college of education matriculation examination result is not an appropriate predictive certificate in education result. He concluded by accepting the fact that no educational system can rise above its teachers and advised that all hands must be on deck to ensure maintenance and encouragement of quality teachers.

(Madu, 1998) studied the remedial science programme and undergraduate performance in the tertiary institutions. A total number of 300 undergraduates, who passed through remedial programme were randomly sampled from 3 universities that are running this programme for this study. Questionnaires were distributed and information gathered was used to generate the data needed for the study. It was discovered accordingly and experience gained from this programme motivated them to pursue science based careers such as engineering, pharmacy, medicine and so many other related courses. He therefore remarked that the programme has succeeded enormously because it helped to generate and motivate the studentsô interest towards science oriented discipline.

Students' achievement in Chemistry and Related courses in Tertiary Institutions

The general decay in the education system, resulting to the poor performance of public examination is regrettable and constitutes an embarrassment to all concerned. Every year, the country is faced with, the below average performance of thousands of students in national examinations where only 20% of the candidates passed. Statistics released by JAMB revealed that from 2007-2009, a total of 2,993,197 candidates sat for UME, but only 427,777 were

admitted in the universities nation-wide. Similar report from WAEC indicates that only 20.04% of 310,077 candidates obtained five credits in core subjects in 2010 November /December GCE and 25% of 1,351,557 candidates passed with minimum requirement in 2010 May/June SSCE. [Otti, (2010) and Punch, (2011)].The story is not different with the past years where only 25.53% obtained five credits in core subjects in 2005; 15.56% passed in 2006; 25.54% passed in 2007; 13.76% passed in 2008 and 25.99% in 2009.(http://naijan.com/nigeria)

Evidence in literature over the years also revealed that studentsô performance in sciences is not encouraging [Ivowi, (1995); Ogunleye, (2000); Jimoh, (2004) and Njoku (2007)]. The situation especially at the senior secondary school level, worsen as years go by as many students seem to have negative attitude towards the subject [Oyedeji, (1992) and Betiku, (2002)]. For instance, the data shows that in Enugu state, between 1995 and 1999 in WASSCE, the percentage of students on the pass grade was generally on the decline. In 1995/96, the percentage of students with pass grade was 26.3% while 73.7% had failure grade; in 1996/97, 22.8% passed while 77.2% failed; in 1997/98, 12.8% passed while 87.2% failed; in 1998/99, 19.7% passed while 80.3% failed (Iloputaife, 2001). Specifically, the analysis of results of the performance of candidates in May/June WASSCE chemistry from 1999 ï 2010 (see appendix k, p. 246), statistics of WAEC school certificate examination results for science subjects from 1977-1999 and three-year results in 22 popular subjects in the May/June 2004-2006 WASSCE in Nigeria (WACE, 2006). WAEC (2010) also reported on the students performance in senior secondary school certificate examination from 2009-2010 as recorded by the chief examinerôs report. In the report, the mean performance score in chemistry (essay) was recorded as 35 in 2009, 36 in 2010. In practical, the chemistry mean scores in 2009, was 29 while that of 2010, was 24.Also included in the report were the candidatesô strength and weaknesses in some difficult topics, suggested remedies and detailed comments on each question. Hence the justification of WAEC for the review of their examination format by increasing the sections as well as the question items in the question paper (WAEC, 2004).

The literature on poor academic performance by school pupils reveal as causes, factors related to personal characteristics of pupils[Thompson and Standford, (1975); Belkin, (1981); Ali, (1983)]; the pupilsô environment, the school and the home (Little and Thompson, 1983).

In support of the pupilsô environment, Maclean (1966) and Little and Thompson (1983) noted that the difficulties in studentsô failure may not necessarily lie with the child but with the educational system and in particular the school. Furthermore, (Adeyegbe, 1993) points to instructional method as the most serious factor responsible in poor achievement. This study together with that of (Jegede, 1996) reported that instructional technique used in most schools in Nigeria is mostly lecture method. Concordantly, [Shulman (1990) and Tobin *et al,* (1994)] confirmed the teacher factor, including teachers teaching in accordance with their own learning techniques and advised teachers to consider studentsô approaches for better performance, for the students learn according to different techniques concluded (Heimlich and Norland, 1994). Several other researches as shown by many scholars included the following factors as having contributed to the poor academic achievement of chemistry students in schools. Such factors include: unpopular nature of chemistry teaching which makes it irrelevant in the eyes of students [Icase, (2003); Kracjik *et al*, (2001); Osborne and Collins, (20010; Sjoberg, (2001); WCS, (1999) and Pak, (1997)] not promote higher order cognitive skills [Zoller, (1993) and [Anderson et al, (1992); leads to gap between students wishes and teachers teaching (Holbrook and Rannikmae, 1999; Yager and weld, 2000) and finally unchanged pattern of chemistry teaching because teachers are afraid of change and need guidance [Rannikmae, (2001); Bell, (1998); Aikenhead, (1997)]. In conclusion, (Ozama and Osborne, (1999) reported that the research work in organic chemistry education conducted mainly in America and European universities relate to problem solving, misconceptions about the subject and assessment methodologies while the cause of poor performance of African students in science were found to be the absence of vocational incentive as the main cause. For all these, certain factors and activities apart from the above mentioned factors including the subject should also be taken into consideration in the measurement of studentsô achievement. Such include attitude and motivation [Convington, (2000); Dalgety *et al* (2003)].

The studies of [Schibeci and Riley, (1986) and Schibeci, (1989)] also examined the effect of studentsô background features and their perceptions of attitudes towards science on achievement and relates home environment as a considerable effect on science achievement. This was supported by so many other studies like [Martin *et al,* (1997); Friedel *et al* (1990); Chandaran *et al* (1987); Crosby, (1986); Gable (1983); Johnstone (1983); Bender and Milkotsky (1982)]. Also emphasized is the effect of studentsô attitude on science and

mathematics as indicated by [Weaver *et al* (1979); Osborne (1976); Rothman *et al* (1968)]. They generally maintained that attitude change is related to achievement. In addition to the above, (Yucel, 2007) analyzed the factors affecting studentsô achievement in chemistry lessons and examined the following variables: the average of both written and oral grades and socio-economic factors as attitude to home work, time devoted to home work and the numbers of siblings and also the determination of the significance of gender factors. 530 students were sampled from high school students within 16 ï 18 age groups who attend chemistry lessons for the study. The data collection tools were as follows: the attitude towards homework scale with a reliability coefficient of 0.9104, the attitude towards chemistry scale with a coefficient of 0.9200 and interviews which was carried out with chemistry teachers. The factors were statistically evaluated with the coefficient determined through regression analysis. After the analysis, the following results were recorded: No significant different between average of studentsô achievement and gender, there are significant connections between studentsô achievement, studentsô attitude towards chemistry homework and chemistry itself, and there is no significant relationship between chemistry achievement and without siblings and those with two siblings. However, there is a positive difference in case of students with one sibling. This indicates that as the number of siblings increases, the rate of chemistry success decreases. There is a positive relationship between chemistry achievement and the amount of time devoted to the homework. Increase in time also increases chemistry achievement and vice versa. He concludes that studentsô achievement should not be assessed and evaluated with the average of written and oral examination grade only but that socio-economic factors should also be considered.

(Mahajan and Singh, (2005) analyzed the perception of organic chemistry instructors from different universities in the southern African development community (SADC) region on the performance of students in this subject. Survey research methodology was used for their study using questionnaire as the main instrument for data collection. The data was analyzed using SPSS (statistical packages for social sciences) for windows. The findings indicate that tutorial and laboratory sessions are the most important factors that improve the performance in organic chemistry. Other factors and methods such as active learning method, use of demonstration models, lecture outlines, concept maps and diagrams also significantly helps to improve understanding in the subject. On the other hand, they noted that lack of time prior knowledge and insufficient writing and practice are among the factors responsible for the

poor performance in the subject and suggested on increasing tutorial sessions, advising on good studying pattern in organic chemistry and equally insisted on writing assignments regularly.

(Olaniyi, 1992) in his case study about the school-related factors affecting Nigerian secondary schools pupilsô academic performance, used a ten item questionnaire containing various descriptions of school-related characteristics which have been found to affect pupils academic performance was administered on 809 teachers and 1012 students from 10 randomly selected state secondary schools in Nigeria. The respondents ranked the characteristics in terms of their degree of effect on pupil academic performance. The result showed that lack of resource materials for teaching, instructional strategies, teacher shortages and teachersô attitude to work were rated more highly than other characteristics such as physical appearances and structure, location, class size, classroom space and workload. The result further showed that while the teachers considered lack of resource materials for teaching as having the greatest degree of effect on pupilsô academic performance the students on the other hand considered poor instructional strategies as having the greatest degree of effect on pupilsô academic performance.

(Talton and Simpson, 1987) also investigated the relationships of attitude towards an achievement in science among biology students. An attitude instrument was administered at three times during the school year to measure studentsô attitude towards science and classroom environment. The areas examined were emotional climate of the science classroom science curriculum, physical environment of the science classroom and friendsô attitude towards science studentsô achievement was measured by teachersô reporter semester grades. They sampled about 1,560 students for the study. For the analysis, Pearson product moment correlation was calculated in order to examine relationship between the components of classroom achievement and attitude towards science achievement. Multiple regression analysis was also performed in order to determine which component of the classroom environment variables were significant predictors of effective and cognitive learning outcome. The result of the study indicated that attitude towards science is related to achievement in science. There was also an important relationship between attitude towards science and attitude towards the classroom environment

Summary of the Literature Review

In summary, the researcher has carried out an in dept and exhaustive review of related literature from three areas of conceptual, theoretical and empirical frameworks. Conceptually, the review highlighted on the following issues: the need for the use of more than one instrument for the admission of students into different universities; the effect of university ownerships on academic standard and achievement; chemistry as an important science subject and its unique role as a transforming agent in so many aspect of human endeavor. Theoretically, many prediction theories are also highlighted including; classical test and multiple regression theories which explained the procedure involved in the analysis of this study. From the empirical studies, the researcher observed that various studies have been done in this area at both secondary and tertiary levels of education. Most of which were centered on the composite scores of such variables as, continuous assessment, mock examinations, UME, GCE, SSCE, but not actually subject based as in the case of this present study. The peculiarity of this study was based on the predictive validities of UME, PUME and the average of both UME and PUME scores in chemistry as predictors of studentsô first year results in chemistry-based courses. Therefore, the study was subject based. From the analysis, some of these studies carried out at secondary level were observed to be positively correlated, while some of those carried out in tertiary level were negatively correlated. This shows inconsistency in findings which might be attributed to some factors including: evaluation procedure, studentsô interest, mode of assessment, different variables, different university ownerships, examination malpractice, improper admission of students and so on. The implication of this is that the research on the relationship that exists between the previous and future academic achievements of students are not yet conclusive. There is therefore a need for more research on this subject as important decisions concerning admission, employment, selection, education achievement and job placement are facilitated by the predictive study of this kind.

CHAPTER THREE

RESEARCH METHOD

The methods adopted in carrying out the study include: design for the study, area of the study, population of the study, sample and sampling technique, instrument for data collection, method of data collection and method of data analysis.

Design for the Study

The design of the study is a correlational survey. A correlational survey studies the extent of relationship between two or more sets of scores (Uzoagulu, 2011). This study is a correlational survey because it is concerned with establishment of relationship between each of UME, post-UME and mean UME/post UME chemistry scores and their first year results in chemistry-based courses in the public universities.

Area of Study

This study is carried out in public universities in Enugu State. Enugu was the former headquarter of the then Eastern region now known as South-East geopolitical zone. Enugu state is one of the five states that make up the south-east geopolitical zone. Other states in the zone include: Anambra, Imo, Abia and Ebonyi. It houses both the first indigenous and autonomous University and the first state University of technology in Nigeria including, University of Nigeria, Nsukka (1960) and Enugu State University of Science and Technology, ESUT (1979) respectively. Both Universities are highly accessible from all parts of the country and it is expected that the findings applicable to these public Universities in Enugu state are likely to be applicable to other public Universities in the same geopolitical zone.

Population of Study

The population is 2,396, registered students who were admitted into the Public Universities, in Enugu State in 2007/8 and 2008/9 academic sessions, through UME and Post-UME to the courses in which chemistry is a pre requisite for admission. The population of the students

admitted into the chemistry-based courses in the University of Nigeria Nsukka and Enugu State University of Science and Technology in 2007/8 and 2008/9 sessions is distributed

as follows: 650 and 568 students were admitted into some chemistry-based courses in the University of Nigeria Nsukka, (UNN) for the two academic sessions respectively, bringing the total population to 1215 students for the two sessions. Similarly, in Enugu State University of Science and Technology, 521 and 660 students were admitted accordingly for the two sessions, with a total population of 1181 students for the two sessions.

The population of the registered students in UNN was further distributed according to the chemistry-based courses for 2007/8 and 2008/9 academic sessions as follows: Agricultural Economics, (45, 40); Biochmistry (179, 176); Electronics Engineering (110, 110); Industrial chemistry (120, 97) and Medicine (196, 142). Similarly, the population of the registered students in ESUT was also distributed as follows for 2007/8 and 2008/9 academic sessions: Agricultural Economics (109, 54); Biochemistry (122, 221); Electrical Electronics (136, 200); Industrial chemistry (108, 138) and Medicine (46, 47) see appendix (C, p. 139) for the summary of the distribution. 2007/8 and 2008/9 academic sessions were considered because the first two years, following the year of introduction of post-UME in 2005 were regarded as the trial testing period. This is because not all the Universities started the post-UME immediately. For instance, University of Nigeria, Nsukka started in 2006 while Enugu state University of Science and Technology started their own post-UME in 2007. These Universities are the two public Universities in Enugu State. The researcher also considered the possibility of the readiness of the studentsô first year result which eventually became the source of delay and obstacle to the prompt collection of the relevant data for the analysis.

Sample and Sampling Techniques

A total number of 1370 students were sampled from 10 departments each, from the University of Nigeria, Nsukka and ESUT for the 2007/8 and 2008/9 sessions, using a multi-stage, stratified, and purposive sampling techniques. Multi stage sampling was carried out in stages, starting from the faculty level, through the departments down to the students. Stratified sampling technique was used, because the students were obtained from different strata/Chemistry-based departments and faculties. A purposive sampling was thereafter used to obtain a total number of 1370 students used for the study. For the University of Nigeria, Nsukka, there are 15 faculties and 102 academic departments. Eight out of the 15 faculties

are science-based. Five chemistry-based faculties were purposively selected for consideration based on the availability of the following requirements: Chemistry must be (i) one of their entry requirements (ii) among the UME and post-UME subjects taken during the examinations and these faculties must be the same in the two Universities under study for uniformity purposes. Similarly, ESUT has nine faculties and 61 departments. Out of the nine faculties, five are chemistry-based and were considered. For the two Universities, a total of 10 departments were randomly sampled, one from each of the five faculties for each University.

With respect to the above, the total number of students sampled and the departments from the two Universities and for the two academic sessions were 1370 students and 20 departments. The further breakdown of the sampled students according to their departments was shown in (appendix D, pp.140). From the above breakdown, the total number of sampled students from the two Universities and for the two sessions was, 1370, out of the total population of, 2,396 students used for the study.

Instrument of Data Collection

The data for the study was the broadsheet or worksheet containing the studentsô UME; Post-UME scores as well as the studentôs first year results assessed from the studentsô records in their different universities. The format used for the collection and collation of data for each of the universities and programmes under study took cognizance of the students coded numbers; UME Chemistry scores; Post-UME Chemistry scores and their first year results. All the required data were collected through the heads of various departments and their examination officers from those departments. The format is shown in (appendix J, p. 165)

Method of Data Collection

The data for the study was obtained from documentary sources. That is, from the studentsô departmental records in each of the Universities. The researcher wrote a letter to the Registrars and Deputy vice chancellor Academics of these Universities, and an approval was given requesting each of the head of departments to assist the researcher with the relevant data for this study. (See Appendices E, F and G .pp. 141,142 and 143).

Method of Data Analysis

The data was analyzed using: Multiple regression analysis. This was used to respond to the research questions as well as the hypotheses. The first year chemistry results obtained from each of the sampled universities served as criteria variables while the university entrance scores in chemistry (UME, Post-UME and average UME and Post-UME scores served as predictor variables. These data were coded and entered into the computer and the analysis carried out using Statistical Package for Social Sciences (SPSS) version 6, for windows. The multiple regression coefficients were tested for significance using F-test at 0.05% level of significance. In responding to research questions 1, UME scores in chemistry served as predictor variable while the first year mean scores for each of the chemistry based courses was used as criterion variable. For the research question 2, Post-UME scores in chemistry served as predictor variable while the first year mean scores in chemistry based courses was used as the criterion variable. In research question 3, combined UME/Post-UME in chemistry served as predictor variables while the first year mean scores in chemistry-based courses was used as criterion variable. For research question 4, UME scores in chemistry served as predictor variable while Post-UME scores in chemistry served as criterion variable. The Regression coefficients showed the degree of relationship between UME scores, Post-UME scores, average UME/Post-UME scores and first year scores for each of the chemistry-based courses for the two Universities. It usually lies between,-1 and +1. $r = 0$, indicates no correlation, $r=1$, means perfect positive correlation. $r = -1$, shows, perfect negative correlation. If r lies between 0 and 1, it shows positive correlation and if, r lies between 0 and - 1, it shows negative correlation. However, the calculated correlation value for each of the research questions was converted to F-test, using the required table. This was eventually compared with the critical value, at 0.05% level of significance and a degree of freedom of N-1 for inferential decision to be made. In response to the hypotheses, step wise multiple regression analysis tested at 0.05% level of significance was adopted. The computer printout for the regression analysis is also seen in (appendix .I. p, 145). The summary of interpretation of level of relationship is given in Appendix (H, pp. 144)

CHAPTER FOUR

RESULTS

The results of the study are hereunder presented in tables according to the research questions and hypotheses guiding the study.

Research Question 1

What is the predictive validity index of UME scores for each of the following chemistry based courses across different types of universities: Agricultural Economics; Electrical-Electronics; pure and Industrial Chemistry; Biochemistry and Medicine and surgery.

Table 1: correlation coefficient (r) of UME chemistry scores for the Chemistry-based courses in public Universities in Enugu State

University type						
Federal University				State University		
Depts	r	N	Intptn*	r	N	Intptn *
Agric Econs	0.07	79	N.R	0.11	123	W.R (+)
Bio/chem	0.11	215	W.R (+)	0.18	70	W.R (+)
Elect/Elect	0.01	174	N. R	0.04	186	N. R
Ind/Chem	0.37	199	W.R (+)	0.02	134	N. R
Med & Surg	0.14	139	W.R (+)	0.13	62	W.R(+)

r= correlation coefficient, intptn. = interpretation, (*Source: Hamilton 1990: 481. see appendix H. p.144).N = number of cases. **Note**: N.R means no relationship; W.R (+) means weak (+) relationship.

As shown in Table 1 the predictive validity indices (r) for Agricultural-Economics in Federal and State Universities are 0.07 and 0.11; for Biochemistry, 0.11 and 0.18; Electrical-Electronics, 0.01 and 0.04; Industrial Chemistry, 0.37 and 0.02 and Medicine and Surgery, 0.14 and 0.13 respectively. These are interpreted to mean that, for Agricultural-Economics, while there is no relationship between studentsô UME scores in chemistry and their first year scores in the discipline, among the Federal University students, there is weak positive relationship between the sets of scores in State University. In Biochemistry, there is weak

positive relationship in both the Federal and State Universities between studentsô UME scores in Chemistry and their first year scores. For Electrical-Electronics, there is no relationship in both the Federal and State Universities between studentsô UME scores in Chemistry and their first year scores in Electrical-Electronics courses in the Universities. In Industrial Chemistry, while there is weak positive relationship between studentsô UME scores in Chemistry and University first year scores in Industrial Chemistry in Federal University, there is no relationship between the chemistry UME scores and their first year scores in State Universities. For Medicine and Surgery, in both the Federal and State Universities, there is weak positive relationship between UME scores in Chemistry and the studentsô first year scores in the discipline.

Therefore, it is observed that for Federal University, UME score in chemistry weakly predicted the studentsô first year results in Biochemistry, Industrial chemistry and Medicine & Surgery departments but did not predict their first year results in Agricultural-Economics and Electrical-Electronics departments. In State University, UME score in chemistry weakly predicted the studentsô first year results in Agricultural-Economics, Biochemistry and Medicine & Surgery but did not predict studentsô first year result in Electrical-Electronic and Industrial chemistry departments.

In other to further ascertain the direction and strength of the relationship, it was further subjected to hypothesis testing and the coefficient of determination R^2 determined as follows.

Hypothesis 1: Studentôs UME mean scores in chemistry do not significantly predict their mean achievement scores in the first year chemistry-based courses in public universities

Table 2 Regression analysis of UME chemistry on academic achievement in 1st year chemistry-based courses in the Federal University. *Table (2)*

University Type										
Federal University										
Depts	R	R^2	R^2 Change	B	BETA	Std error	%variance	F.obs.	F.crit.	d/f
Ag.Econs	0.07	0.00	0.01	0.06	0.07	7.60	1.00	0.35	3.96^{NS}	1,79
Bio.chem.	0.11	0.01	0.01	-0.17	-0.11	7.15	1.00	2.73	3.84^{NS}	1,215
E.E	0.01	0.00	0.01	0.01	0.01	10.15	1.00	0.10	3.84^{NS}	1,174
Ind.chm	0.37	0.14	0.14	0.49	0.37	7.48	14.00	48.22	3.84^{*}	1,199
Med.Surg	0.14	0.02	0.02	0.14	0.14	3.15	2.00	2.70	3.84^{NS}	1,139

Table (3) Multiple regression analysis of UME on achievement in 1st year chemistry-based courses in State University

State University										
Depts	Multiple R	R^2	R^2 Change	B	BETA	Std error	% Variance	F.obs.	F.Crit.	d/f
Ag.Econs	0.11	0.01	0.003	-0.03	-0.11	4.70	0.30	1.43	3.92^{NS}	1,123
Biochem	0.18	0.33	0.19	0.17	0.18	6.42	19.00	2.41	3.98^{NS}	1,70
E.E	0.04	0.00	0.01	-0.04	-0.04	6.01	1.00	0.11	3.84^{NS}	1,186
Ind.chm	0.02	0.00	0.01	-0.01	-0.02	5.40	1.00	0.04	3.92^{NS}	1,134
Med.surg	0.13	0.02	0.00	0.13	0.13	6.03	0.20	1.12	4.00^{NS}	1,62

NS means not significant, * means significant.

Evidence from Table 2, shows that students of Agricultural Economics course in the Federal university, their UME score in chemistry had R^2 change of 0.01. This means that UME scores in chemistry had a predictive power of 1.00% for their achievement in First year Agricultural Economics courses. The observed F-value for the UME score in chemistry is shown to be 0.35 while the critical F-value for 1 and 79 degree of freedom for the numerator and denominator respectively at 0.05% level of significance is 3.96. Since the observed F-value is less than the corresponding critical F-value, the aspect of the null hypothesis in respect of the prediction of performance in Agricultural Economics by UME chemistry scores is not rejected. In other words, the UME scores in chemistry do not significantly predict studentsô performance in Agricultural Economics. That is, the variance contribution of 1.00% of UME score to the students score in Agricultural Economics is not the actual contribution of the chemistry score but that attributed to error.

For Agricultural Economics students in the State University as shown in Table 3, above, their UME score in chemistry had R^2 change of 0.003. This indicates that the UME scores in chemistry had a predictive power of 0.30% for their achievement in the first year Agricultural Economics. The observed F-value for the UME score in chemistry is shown to be 1.43 while the critical F-value for 1 and 123 degrees of freedom at 0.05% level of significance is 3.92. Since the observed F-value is less than the corresponding critical F-value, the contribution variance of 0.30% to the achievement of students in first year Agricultural Economics is not significant. Therefore, the null hypothesis of no significant prediction in respect of the performance in Agricultural Economics by UME chemistry scores is not rejected. That is to say that UME chemistry scores do not significantly predict the result of students in Agricultural Economics department. This means that the variance contribution of 0.30% of UME score to the students score in Agricultural Economics is not the actual contribution of the chemistry score but may be due to error and other intervening variables.

For the students in Biochemistry department in the Federal University as indicated in Table 2, their UME score in chemistry had R^2 change of 0.01. This implies that UME scores in chemistry had a predictive power of 1.0% for their achievement in first year Biochemistry courses for combined 2007/8 and 2008/9 sessions. The observed F-value for the UME

score in chemistry is shown to be 2.73. While the critical F-value for 1 and 215 degrees of freedom for both the numerator and denominator at 0.05% level of significance 3.84. Since the observed F-value is less than the critical F-value, the contribution variance of 1.0% to the achievement of students in Biochemistry is not the actual contribution of chemistry but may be attributed to variance error and other intervening variables that could not be controlled. Therefore, the null hypothesis of no significant prediction in respect of the performance in Biochemistry by UME chemistry scores is not rejected. That is to say that UME chemistry scores is not a significant predictor of the result of students in Biochemistry department.

For the students in Biochemistry department in the state University according to Table 3, above, their UME scores in Chemistry had R^2 change of 0.19 which is an indication of a predictive power of 19.00% for their achievement in the first year Biochemistry. The observed F-Value for the UME scores in chemistry is shown to be 2.41. While the critical F-value for 1 and 70 degrees of freedom for the numerator and denominator at 0.05 level of significant is 3.98. Since the observed F-value is less than the critical F-value, the aspect of the null hypothesis in respect of the prediction performance in Biochemistry by UME chemistry scores is not rejected. That is to say that the UME scores in chemistry do not significantly predict studentsô performance in Biochemistry. That means that the variance contribution of 19.00% of UME scores to the studentsô score in Biochemistry is not the actual contribution of chemistry score but that attributed to error.

In the same Table 2, above, for the students in Electronics Department in the Federal University, their UME scores in chemistry had R^2 change of 0.01. This means that UME scores in chemistry had a predictive power of 1.0% for their achievement in first year results in Electronics courses. The observed F-value for UME scores in chemistry is shown to be 0.01. While the critical F-value for 1 and 174 degrees of freedom for both numerator and denominator respectively at 0.05% level of significance was 3.84. Since the observed F-value is less than the critical F-value, the contribution variance of 1.0% to the achievement of students in Electronics is not the actual contribution of chemistry scores but maybe due to error variance and other intervening variables. Therefore, the null

hypothesis of no significant prediction in respect of the performance in Electronics by UME chemistry scores is not rejected. This means that the UME chemistry is not a significant predictor of the studentsô performance in Electronics department.

For the studentsô in Electrical Electronic department in the state university as shown in Table 3, above, their UME scores in chemistry had R^2 change of 0.01. This implies that the UME scores in chemistry had a predictive power of 1.00% for their achievement in first year in Electrical Electronics Department. The observed F-value for the UME scores in chemistry is 0.11. While the critical F-value for 1 and 185 degrees of freedom for both numerator and denominator is 3.84. Since the observed F-value was less than the critical F-value, the null hypothesis of no significant prediction in respect of the performance in Electrical-Electronics by UME chemistry scores is not rejected. In other words, the UME chemistry does not significantly predict the result of students in Electrical-Electronics. This implies that the variance contribution of 1.00 % of UME scores to the studentsô scores in Electrical-Electronics is not the real contribution of the chemistry scores but that due to error variance. Hence, the UME chemistry is not significantly related to the result of the first year students of Electrical Electronics department.

For the students in Pure and Industrial Chemistry course in the Federal university as shown in Table 2, above, their UME scores in chemistry had the R^2 change of 0.14. This indicates that the UME scores in chemistry had a predictive power of 14.0% for their achievement in first year Industrial Chemistry for combined 2007/8 and 2008/9 sessions. The observed F-value for the UME scores in chemistry is shown to be 48.22 while the critical F-value for 1 and 199 degrees of freedom for the numerator and denominator at 0.05% level of significance is 3.84. Since the observed F-value is greater than the critical F-value, the contribution variance of 14.0 % to the achievement of students in industrial chemistry is the actual contribution of chemistry score and not due to chance error. Therefore, the null hypothesis of no significant prediction in respect of the performance in pure and industrial chemistry by UME chemistry scores is not accepted. This means that UME chemistry scores is a significant predictor of the result of students in Industrial chemistry department.

For the students in Pure and Industrial chemistry in the state University as shown in Table 3, above, their UME score in chemistry had R^2 change of 0.01. This indicates that UME

scores in chemistry had a predictive power of 1.0% for their achievement in first year Industrial chemistry course. The observed F-value for the UME score in chemistry is shown to be 0.04 while the critical F-value for 1 and 134 degrees of freedom for the numerator and denominator at 0.05% level of significant is 3.92. Since the observed F-value is less than the critical F-value, the aspect of the null hypothesis in respect of the prediction performance in pure and Industrial chemistry by UME chemistry scores is not rejected. In other words, the UME scores in chemistry do not significantly predict studentsô performance in Industrial chemistry. That means that the variance contribution of 1.0% of UME score to the students score in Pure and industrial chemistry is not the actual contribution of chemistry but that due to error and other intervening variables.

In Table 2, above, for the students in Medicine and Surgery course in the Federal University, their R^2 change for UME score in chemistry is shown to be 0.02. This shows that UME scores in chemistry had a predictive power of 2.00% for their achievement in first year medicine and surgery course for combined 2007/8 and 2008/9 sessions. The observed F- value for UME scores in chemistry is shown to be 2.70. While the critical F-value is 3.84 for 1 and 139 degrees of freedom for the numerator and denominator at 0.05% level of significance. Since the observed F-value is less than the critical F-value, the contribution variance of 2.00% to the achievement of students in Medicine and Surgery is not the real contribution of chemistry but due to error and other intervening variables. Thus, the null hypothesis of no significant prediction in respect of the performance in Medicine and Surgery by the UME scores in chemistry is not rejected. That means that UME chemistry scores do not significantly predict the result of students in Medicine and Surgery department**.**

In Table 3, for the students in Medicine and Surgery department in the State University**,** their UME scores in Chemistry had R^2 change of 0.002 with a predictive power of 0.20% for achievement in first year medicine and Surgery. The observed F-Value for the UME score in chemistry is shown to be 1.12 and the critical F-value for 1 and 62 degrees of freedom for both the numerator and denominator at 0.05% level of significance is 4.00. Since the observed F-value is less than the critical F-value, the null hypothesis of no

significant prediction in respect of the performance in Medicine and Surgery is not rejected. That means that UME chemistry does not significantly predict the result of students in Medicine and Surgery department. Therefore, the variance contribution of 0.20% of UME score to the studentsô scores in Medicine and Surgery is not the actual contribution of chemistry but that due to error. Thus, the UME scores in chemistry do not significantly predict studentsôperformance in Medicine and Surgery.

Therefore, it is observed that for Federal University, UME Chemistry significantly predicted the students first year results in Industrial chemistry programme indicating that the null hypothesis is rejected. But UME chemistry did not predict significantly the studentsô first year result in Agricultural Economics, Biochemistry, Electrical Electronic and Medicine & Surgery courses. Therefore the null hypothesis is accepted. For the State University, the UME chemistry did not predict the studentsô first year results in any of the departments. This implies that the null hypothesis is accepted for all the departments studied in state University.

Research Question 2

What is the predictive validity index of post-UME scores in chemistry for different chemistry-based courses in public Universities in Enugu State?

Table 4: The correlation coefficient (r) of post-UME chemistry scores for the chemistry based -courses.

	University Type					
	Federal University			State University		
Depts.	r	N	Intptn*	r	N	Intptn*
Ag.Econs	0.43	79	M. R (+)	0.08	123	N. R
B.chem	0.16	215	W. R (+)	0.14	70	W. R (+)
E.E	0.25	174	W. R (+)	0.28	186	W. R (+)
Ind.Chem	0.63	199	M. R (+)	0.04	134	N. R
Med.Surg	0.26	139	W.R (+)	0.00	62	N. R

r=correlation coefficient, intptn= interpretation (* source: Hamilton, 1990. 481. See appendix H .P. 144). N= number of cases. Note: M. R (+) means moderate (+) relationship; N.R means no relationship; W.R (+) means weak (+) relationship.

Evidence from Table 4, shows that the predictive validity indices for Agricultural Economics in Federal and State Universities are 0.43 and 0.08; for Biochemistry, 0.16 and 0.14; Electrical-Electronics, 0.25 and 0.28; Industrial Chemistry, 0.63 and 0.04 and Medicine and Surgery, 0.26 and 0.00 respectively. These are interpreted to mean that for Agricultural-Economics students, in the Federal University, there is moderate positive relationship between post-UME scores in chemistry and University first year scores as shown in Table 4. While in the State University, there is no relationship between post-UME scores in chemistry and University first year scores in the discipline. In Biochemistry, there are weak positive relationships in both the Federal and State Universities between post-UME scores in Chemistry and studentsô first year scores in Biochemistry courses in the Universities. For Electrical-Electronics, there are weak positive relationships in both the Federal and State Universities between post-UME scores in Chemistry and studentsô first year scores in Electrical-Electronics courses in the Universities. In Industrial Chemistry, while there is moderate positive relationship between post-UME scores in Chemistry and University first year scores in Industrial Chemistry in Federal University, there is no relationship between the chemistry post-UME scores and University first year scores in State University. For Medicine and Surgery in Federal University, while there is weak positive relationship between post-UME score in chemistry and first year University scores in Medicine and Surgery, there is no relationship between post-UME scores in chemistry and first year University scores in the discipline among the students in state University.

From the foregoing, it is observed that for Federal University, post-UME chemistry moderately predicted the studentsô first year results in Agricultural Economics and Industrial chemistry; weakly predicted the studentsô first year result in Biochemistry, Electrical Electronics and Medicine and Surgery programmes. In State University, post-UME chemistry weakly predicted the students first year result in Biochemistry and

Electrical Electronics but did not predict their first year result in Agricultural Economics, Industrial chemistry and Medicine & Surgery courses.

Hypothesis 2: Studentsô Post-UME mean scores in chemistry do not significantly predict their mean achievement scores in first year chemistry-based courses in public universities in Enugu State

Table 5: Regression analysis of post-UME chemistry on the academic achievement scores in 1st year chemistry-based courses in public Universities in Enugu State

University Type										
Federal University										
Depts	Multiple R	R^2	R^2 Change	B	BETA	Std error	%Variance	F.obs.	F.Crit.	d/f
Ag/Econs	0.43	0.18	0.17	0.40	0.43	6.88	17.00	17.75	3.96^{*}	1,79
B/chem	0.15	0.02	0.02	0.11	0.15	7.47	2.00	5.28	3.84^{*}	1,215
E/E	0.25	0.06	0.06	0.33	0.25	9.84	6.00	11.36	3.84^{*}	1,174
Ind/Chm	0.63	0.39	0.39	0.50	0.63	6.27	39.00	194.11	3.84^{*}	1,199
Med/Surg	0.26	0.07	0.06	0.12	0.26	3.42	6.00	10.06	3.84^{*}	1,139

Table 6. Regression analysis of post-UME Chemistry on academic achievement scores in Chemistry-based courses in Public Universities in Enugu State

State University										
Depts	Multiple R	R^2	R^2 Change	B	BETA	Std error	% Variance	F.obs	F.Crit.	d/f
Ag/Econs	0.08	0.01	0.002	-0.04	-0.79	4.71	0.20	0.77	3.92^{NS}	1,123
B/chem	0.1	0.002	0.01	0.01	0.07	6.53	1.00	0.01	4.00^{NS}	1,70
E/E	0.28	0.08	0.07	-0.19	0.05	6.31	7.00	15.46	3.84^{*}	1,186
Ind/Chm	0.04	0.001	0.01	-0.03	-0.38	5.39	1.00	0.19	3.92^{NS}	1,134
Med/Surg	0.002	0.000	0.02	0.002	0.002	6.09	2.00	0.00	4.00^{NS}	1,62

NS means not significant, * means significant

As indicated in Table 5, above, for the students in Agricultural Economics department in the Federal University, their Post-UME score in chemistry had R^2 change of 0.17, Indicating that Post-UME scores in chemistry had a predictive power of 17.00% for achievement in first year Agricultural Economics for combined 2007/08 and 2008/09 sessions. The observed F-value for Post-UME score in chemistry is shown to be 17.75. While the critical F-value for 1 and 79 degrees of freedom for the numerator and denominator at 0.05% level of significance is 3.96. Since the observed F-value is greater than the critical F-value, the null hypothesis of no significant prediction in respect of the performance in Agricultural-Economics by Post-UME chemistry scores is not accepted. That means that the Post-UME scores in chemistry significantly predict the results of students in Agricultural-Economics department. This also implies that the variance contribution of 17.00% of Post-UME to the studentsô scores in Agricultural-Economics is the actual contribution of chemistry and not due to error. Therefore the Post-UME chemistry is significantly related to the result of the first year students of Agricultural Economics department.

For the studentsô in Agricultural Economics department in the State University, as shown in Table 6, the studentsô Post-UME scores in chemistry had R^2 change of 0.002.This indicates that Post-UME score in chemistry had the predictive power of 0.2% for the achievement in the first year Agricultural Economics. The observed F-value for Post-UME scores in chemistry is shown to be 0.77 while the critical F-value for 1 and 123 degrees of freedom for both the numerator and denominator at 0.05 level of significant is 3.92. Since the observed F-value is less than the critical F-value, the variance contribution of 0.2% of Post-UME to the achievement of students in Agricultural Economics is not the actual contribution of chemistry but that due to error and other intervening variables. Therefore, the null hypothesis of no significant prediction in respect of the performance in Agricultural-Economics by Post-UME chemistry scores is not rejected. In other words, the Post-UME chemistry does not significantly predict the result of students in Agricultural-Economics.

For the students in Biochemistry department in the Federal University as indicated in Table 5, above, their Post-UME score in chemistry had R^2 change of 0.02. This implies that Post-UME scores in chemistry had a predictive power of 2.00% for their achievement in first year Biochemistry courses for combined 2007/8 and 2008/9 sessions. The observed F-value for the Post-UME score in chemistry is shown to be 5.28. While the critical F-value for 1 and 215 degrees of freedom for both the numerator and denominator at 0.05% level of significance 3.84. Since the observed F-value is greater than the critical F-value, the contribution variance of 2.00% to the achievement of students in Biochemistry is the actual contribution of chemistry and not due to error. Therefore, the null hypothesis of no significant prediction in respect of the performance in Biochemistry by Post-UME chemistry scores is not accepted. That is to say that Post-UME chemistry scores is a significant predictor of the result of students in Biochemistry department.

For the students in Biochemistry department in the state University according to Table 6 above, the Post-UME scores in Chemistry had R^2 change of 0.01 which is an indication of a predictive power of 1.00% for their achievement in the first year Biochemistry. The observed F-Value for the Post-UME scores in chemistry is shown to be 0.01. While the critical F-value for 1 and 70 degrees of freedom for the numerator and denominator at 0.05 level of significant is 3.98. Since the observed F-value is less than the critical F- value, the aspect of the null hypothesis in respect of the prediction performance in Biochemistry by Post-UME chemistry scores is not rejected. That is to say that the Post-UME scores in chemistry do not significantly predict studentsô performance in Biochemistry. That means that the variance contribution of 1.00% of Post-UME scores to the studentsôfirst year score in Biochemistry is not the actual contribution of chemistry but that due to error and other intervening variables.

In the same Table 5, above, for the students in Electronics Department in the Federal Universities, their Post-UME scores in chemistry had R^2 change of 0.06. This means that Post-UME scores in chemistry had a predictive power of 6.00% for their achievement in first year results in Electronics courses. The observed F-value for Post-UME scores in chemistry is shown to be 11.36. While the critical F-value for 1 and 174 degrees of

freedom for both numerator and denominator respectively at 0.05% level of significance was 3.84. Since the observed F-value is greater than the critical F-value, the contribution variance of 6.00% to the achievement of students in Electronics is the real contribution of chemistry and not due to error. Therefore, the null hypothesis of no significant prediction in respect of the performance in Electronics by Post-UME chemistry scores is not accepted. This means that the Post-UME chemistry is a significant predictor of the studentsô performance in Electronics department.

For students in Electrical Electronics department in the state university as shown in Table 6, above, the Post-UME scores in chemistry had R^2 change of 0.07. This implies that the Post-UME scores in chemistry had a predictive power of 7.00% for their achievement in first year in Electrical Electronics Department. The observed F-value for the Post-UME scores in chemistry is 15.46. While the critical F-value for 1 and 185 degrees of freedom for both numerator and denominator is 3.84. Since the observed F-value is greater than the critical F-value, the null hypothesis of no significant prediction in respect of the performance in Electrical-Electronics by Post-UME chemistry scores is not accepted. In other words, the Post-UME chemistry significantly predicts the result of students in Electrical-Electronics. This implies that the variance contribution of 7.00% of Post-UME scores to the studentsô scores in Electrical-Electronics is the actual contribution of chemistry and not due to error. Hence, the Post-UME chemistry is significantly related to the result of the first year students of Electrical Electronics department.

Information in Table 5, for the students in Pure and Industrial Chemistry course in the Federal universities shows their Post-UME scores in chemistry had the R^2 change of 0.39. This indicates that the studentsô Post-UME scores in chemistry had a predictive power of 39.00% for their achievement in first year Industrial Chemistry for combined 2007/8 and 2008/9 sessions. The observed F-value for the Post-UME scores in chemistry is shown to be 194.11 while the critical F-value for 1 and 199 degrees of freedom for the numerator and denominator at 0.05% level of significance is 3.84. Since the observed F-value is greater than the critical F-value, the contribution variance of 39.00% to the achievement of students in industrial chemistry is the actual contribution of chemistry and not due to error.

Therefore, the null hypothesis of no significant prediction in respect of the performance in pure and industrial chemistry by Post-UME chemistry scores is not accepted. This means that the studentsô Post-UME chemistry scores is a significant predictor of their first year result in Industrial chemistry department.

For the students in Pure and Industrial chemistry in the state University as shown in Table 6, above, the Post-UME score in chemistry had R^2 change of 0.01. This indicates that Post-UME scores in chemistry had a predictive power of 1.00% for their achievement in first year Industrial chemistry course. The observed F-value for the Post-UME score in chemistry is shown to be 0.19, while the critical F-value for 1 and 134 degrees of freedom for the numerator and denominator at 0.05% level of significant is 3.84. Since the observed F-value is less than the critical F-value, the aspect of the null hypothesis in respect of the prediction performance in pure and Industrial chemistry by Post-UME chemistry scores is not rejected. In other words, the Post-UME scores in chemistry do not significantly predict studentsôperformance in Industrial chemistry. That means that the variance contribution of 1.00% of UME score to the students score in Pure and industrial chemistry is not the actual contribution of chemistry but that due to error and other interfering variables.

In Table 5 above, for the students in Medicine and Surgery course in the federal university, the R^2 change for Post-UME score in chemistry is shown to be 0.06 This shows that Post-UME scores in chemistry had a predictive power of 6.00 % for their achievement in first year medicine and surgery courses for combined 2007/8 and 2008/9 sessions. The observed F-value for Post-UME scores in chemistry is shown to be 10.06. While the critical F-value is 3.84 for 1 and 139 degrees of freedom for the numerator and denominator at 0.05% level of significance. Since the observed F- value is greater than the critical F-value, the contribution variance of 6.00% to the achievement of students in Medicine and Surgery is the actual contribution of chemistry and not due to error. Thus, the null hypothesis of no significant prediction in respect of the performance in Medicine and Surgery by the Post-UME scores in chemistry is not accepted. That means that Post-UME score in chemistry significantly predicts the result of students in Medicine and Surgery department.

In Table 6, for the students in Medicine and Surgery department in the State University, the Post-UME scores in Chemistry had R^2 change of 0.02 with a predictive power of 2.00% for achievement in first year medicine and Surgery. The observed F-Value for the Post-UME score in chemistry is shown to be 0.000 and the critical F-value for 1 and 62 degrees of freedom for both the numerator and denominator at 0.05% level of significance 4.00. Since the observed F-value is less than the critical F-value, the null hypothesis of no significant prediction in respect of their performance in Medicine and Surgery is not rejected. That means that studentsô Post-UME chemistry does not significantly predict their result in Medicine and Surgery department. Therefore, the variance contribution of 2.00% of Post-UME score to the studentsôscores in Medicine and Surgery is not the actual contribution of chemistry but that due to other variables and error variance. Thus, the Post-UME scores in chemistry do not significantly predict studentsô performance in Medicine Surgery.

Hence, it is observed that for the Federal University, Post-UME chemistry score predicts significantly the studentsô first year result in all the departments studied, this implies that the null hypothesis is hence rejected. But for the State University, the post-UME chemistry score predicts the studentôs first year result in Electrical-Electronics only, therefore leading to rejection of the null hypothesis. While for Agricultural-Economics, Biochemistry, Industrial chemistry and Medicine and surgery departments, the post-UME does not predict significantly their first year result and this shows that null hypothesis is accepted for the affected departments.

Research Question 3

What is the predictive validity index of average of both UME and Post-UME Chemistry scores for each of the chemistry-based courses in public universities in Enugu State

Table 7: The correlation coefficient of the average of both UME and PUME chemistry scores for chemistry-based courses in public universities in Enugu State

University Type						
	Federal University			State University		
Depts	r	N	Intptn	r	N	Intptn
Ag.Econs	0.29	79	W.R (+)	0.03	123	N.R
B.chem	0.25	215	W.R(+)	0.09	70	N.R
E.E	0.23	174	W.R(+)	0.21	186	W.R(+)
Ind.Chm	0.60	199	M.R (+)	0.04	134	N.R
Med.Surg	0.29	139	W.R(+)	0.03	62	N.R

r = correlation coefficient, intptn = interpretation (source: Hamilton. I990. 481. (See appendix H .p. 144). N= no of cases. Note: M. R (+) means moderate (+) relationship. N.R means no relationship; W.R (+) means weak+ relationship.

As shown in Table 7, the predictive validity indices(r) for Agricultural-Economics students in Federal and State Universities are 0.29 and 0.03; for Biochemistry, 0.25 and 0.09; Electrical-Electronics, 0.23 and 0.21; Industrial Chemistry, 0.60 and 0.04 and Medicine and Surgery, 0.29 and 0.03 respectively. These are interpreted to mean that for Agricultural-Economics, in Federal University, there is weak positive relationship between average UME/Post-UME score in chemistry and University scores in Agricultural-Economics. While in State Universities, there is no relationship between the studentsô average UME/Post-UME scores in chemistry and their first year scores in the discipline. In Biochemistry, there is weak positive relationship in both the Federal and State Universities between average UME/Post-UME scores in Chemistry and studentsô first year scores in Biochemistry courses in the Universities. For Electrical-Electronics, there is weak positive relationship in both the Federal and State Universities between average UME/Post-UME score in Chemistry and studentsô first year scores in Electrical-Electronics courses in the Universities. In Industrial Chemistry, while there is moderate positive relationship between average UME/Post-UME scores in Chemistry and University first year scores in Industrial Chemistry in the Federal University, there is no relationship between the average UME/Post-UME score in chemistry and University first year scores in the State University. In Medicine and Surgery in the Federal University, while there is weak positive relationship between average UME/Post-UME scores in chemistry and University first

year scores in Medicine and Surgery, there is no relationship between average UME/Post-UME score in chemistry and University first year scores in the discipline in state University.

From the foregoing, it is observed that, for the Federal University, the average UME/post-UME chemistry weakly predicts the studentsô first year result in Agricultural-Economics, Biochemistry, Electrical-Electronics and Medicine and Surgery but moderately predicts their first year results in Industrial chemistry. For the State University, there weak prediction between the studentsô average UME/post-UME chemistry in Electrical-Electronics but for Agricultural Economics, Biochemistry, Industrial chemistry and Medicine, there is no relationship.

Hypothesis 3: The studentsô mean UME and Post-UME Scores in Chemistry does not significantly predict their mean performance in first year chemistry based coursed in Public Universities in Enugu State

Table 8: Regression Analysis of the average of both, UME/Post-UME chemistry scores on academic Achievement in 1st year chemistry based courses in public Universities in Enugu State

University Type										
Federal University										
Depts	Multiple R	R^2	R^2 Change	B	BETA	Std error	% Variance	F.obs	F.Crit.	d/f
Ag/Econs	0.29	0.09	0.07	0.38	0.29	7.28	7.00	7.38	3.96^{*}	1,79
B/chem	0.25	0.06	0.06	0.51	0.25	7.31	6.00	14.84	3.84^{*}	1,215
E/E	0.23	0.53	0.05	0.53	0.23	9.88	5.00	9.74	3.84^{*}	1,174
Ind/Chm	0.60	0.36	0.36	0.68	0.60	6.49	36.00	163.87	3.84^{*}	1,199
Med/Surg	0.29	0.08	0.78	0.24	0.29	3.44	78.00	12.07	3.84^{*}	1,139

Table 9: Regression analysis of average UME/post-UME chemistry scores on academic achievement in chemistry-based courses in public Universities

State University										
Depts	Multiple R	R^2	R^2 Change	B	BETA	Std error	%Variance	F. obs	F Crit	d/f
Ag/Econs	0.03	0.0007	0.01	-0.02	-0.03	4.72	1.00	0.09	3.92^{NS}	1,123
B/chem	0.09	0.01	0.01	0.08	0.09	6.51	1.00	0.59	4.00^{NS}	1,70
E/E	0.21	0.04	0.04	-0.20	-0.21	6.42	4.00	8.20	3.84^{*}	1,186
Ind/Chm	0.04	0.001	0.01	-0.36	-0.37	5.39	1.00	0.19	3.92^{NS}	1,134
Med/Surg	0.03	0.001	0.01	0.03	0.03	6.08	1.00	0.07	4.00^{NS}	1,62

NS means not significant, * means significant

The data in Table 8 as shown above for the students in Agricultural Economics course in the Federal university, their average UME/Post-UME score in chemistry had R^2 change of 0.07. This means that average UME/Post-UME scores in chemistry had a predictive power of 7.00% for their achievement in First year Agricultural Economics courses. The observed F-value for the average UME/Post-UME score in chemistry is shown to be 7.38 while the critical F-value for 1 and 79 degree of freedom for the numerator and denominator respectively at 0.05% level of significance is 3.96. Since the observed F-value is greater than the corresponding critical F-value, the aspect of the null hypothesis in respect of the prediction of performance in Agricultural Economics by average UME/Post-UME chemistry scores is not accepted. In other words, the average UME/Post-UME scores in chemistry significantly predict studentsô first year performance in Agricultural Economics. That is, the variance contribution of 7.00% of average UME/Post-UME score to the students score in Agricultural Economics is the actual contribution of chemistry and not due to error variance.

From Table 9, as indicated above, for the students in Agricultural Economics department in the State University, the average UME/Post-UME score in chemistry had R^2 change of 0.01. This indicates that the average UME/Post-UME scores in chemistry had a predictive power of 1.00% for their achievement in the first year Agricultural Economics. The observed F-value for the average UME/Post-UME score in chemistry is shown to be 0.09, while the critical F-value for 1 and 123 degrees of freedom at 0.05% level of significance is 3.92. Since the observed F-value is less than the corresponding critical F-value, the contribution variance of 1.00% of the average UME/Post-UME to the achievement of students in first year Agricultural Economics courses is not the actual contribution of chemistry but that due to error. Therefore, the null hypothesis of no significant prediction in respect of the performance in first year Agricultural Economics by average UME/Post-UME chemistry scores is not rejected. That is to say that UME chemistry did not significantly predict the result of students in Agricultural Economics department.

For the students in Biochemistry department in the Federal University as indicated in Table 8, their average UME/Post-UME score in chemistry had R^2 change of 0.06. This implies

that average UME/Post-UME scores in chemistry had a predictive power of 6.00% for their achievement in first year Biochemistry courses for combined 2007/8 and 2008/9 sessions. The observed F-value for the average UME/Post-UME score in chemistry is shown to be 14.84. While the critical F-value for 1 and 215 degrees of freedom for both the numerator and denominator at 0.05% level of significance 3.84. Since the observed F-value is greater than the critical F-value, the contribution variance of 6.00 % of the average UME/Post-UME to the achievement of students in Biochemistry is the actual contribution of chemistry and not due to error. Therefore, the null hypothesis of no significant prediction in respect of the studentsô performance in first year Biochemistry by average UME/Post-UME chemistry scores is not accepted. That is to say that the average UME/Post-UME chemistry scores is a significant predictor of the result of students in Biochemistry department.

For the students in Biochemistry department in the state University according to Table 9, their average UME/Post-UME score in chemistry had R^2 change of 0.01. This is an indication that average UME/Post-UME scores in chemistry had a predictive power of 1.00% for their achievement in first year Biochemistry courses for combined 2007/8 and 2008/9 sessions. The observed F-value for the average UME/Post-UME score in chemistry is shown to be 0.59. While the critical F-value for 1 and 70 degrees of freedom for both the numerator and denominator at 0.05% level of significance 3.98. Since the observed F-value is less than the critical F-value, the contribution variance of 1.00 % of the average UME/Post-UME to the achievement of students in first year Biochemistry is not the real contribution of chemistry but that due to error and other intervening variables. Thus, the null hypothesis of no significant prediction in respect of the performance in Biochemistry by average UME/Post-UME chemistry scores is not rejected. This implies that the average UME/Post-UME chemistry scores is not a significant predictor of the result of students in Biochemistry department.

In the same Table 8 above, for the students in Electronics Department in the Federal University, their average UME/Post-UME scores in chemistry had R^2 change of 0.05. This means that average UME/Post-UME scores in chemistry had a predictive power of 5.00%

for their achievement in first year results in Electronics courses. The observed F-value for average UME/Post-UME scores in chemistry is shown to be 9.74. While the critical F-value for 1 and 174 degrees of freedom for both numerator and denominator respectively at 0.05% level of significance was 3.84. Since the observed F-value is greater than the critical F-value, the contribution variance of 5.00% of the average UME/Post-UME to the achievement of students in first year Electronics is the actual contribution of chemistry and not due to error. Therefore, the null hypothesis of no significant prediction in respect of the performance in Electronics by average UME/Post-UME chemistry scores is not accepted. This means that the average UME/Post-UME chemistry is a significant predictor of the studentsô performance in first year Electronics courses.

For the students in Electrical Electronics department in the state university as shown in Table 9, above, the average UME/Post-UME scores in chemistry had R^2 change of 0.04. This implies that the average UME/Post-UME scores in chemistry had a predictive power of 4.00% for their achievement in first year result in Electrical Electronics Department. The observed F-value for the average UME/Post-UME scores in chemistry is 8.20. While the critical F-value for 1 and 186 degrees of freedom for both numerator and denominator is 3.84. Since the observed F-value is greater than the critical F-value, the null hypothesis of no significant prediction in respect of the performance in first year Electrical-Electronics by the average UME/Post-UME chemistry scores is not accepted. In other words, the average UME/Post-UME chemistry is a significant predictor of the result of students in Electrical-Electronics. This implies that the variance contribution of 4.00% of average UME/Post-UME scores to the studentsô first year scores in Electrical-Electronics is the true contribution of chemistry and not due to error. Hence, the average UME/Post-UME chemistry is significantly related to the result of the first year students of Electrical Electronics department.

For the students in Pure and Industrial Chemistry course in the Federal university as shown in Table 8, above, their average UME/Post-UME UME scores in chemistry had the R^2 change of 0.36. This indicates that the average UME/Post-UME scores in chemistry had a predictive power of 36.00% for their achievement in first year Industrial Chemistry for

combined 2007/8 and 2008/9 sessions. The observed F-value for the average UME/Post-UME scores in chemistry is shown to be 163.87 while the critical F-value for 1 and 199 degrees of freedom for the numerator and denominator at 0.05% level of significance is 3.84. Since the observed F-value is greater than the critical F-value, the contribution variance of 36.00% to the achievement of students in first year industrial chemistry is the actual contribution of chemistry and not due to error. Therefore, the null hypothesis of no significant prediction in respect of the performance in pure and industrial chemistry by average UME/Post-UME chemistry scores is not accepted. This means that average UME/Post-UME chemistry scores is a significant predictor of the result of students in first year Industrial chemistry department.

As indicated in Table 9, above, for the students in Pure and Industrial chemistry in the state University, the average UME/Post-UME score in chemistry had R^2 change of 0.01. This indicates that average UME/Post-UME scores in chemistry had a predictive power of 1.00% for their achievement in first year Industrial chemistry courses. The observed F-value for the average UME/Post-UME score in chemistry is shown to be 0.19 while the critical F-value for 1 and 134 degrees of freedom for the numerator and denominator at 0.05% level of significant is 3.92. Since the observed F-value is less than the critical F-value, the aspect of the null hypothesis in respect of the prediction performance in pure and Industrial chemistry by average UME/Post-UME chemistry scores is not rejected. In other words, the average UME/Post-UME scores in chemistry do not significantly predict studentsô performance in Industrial chemistry .That means that the variance contribution of 1.00 of the studentsô average UME/post-UME score in chemistry to their achievement in Industrial chemistry is not the actual contribution of chemistry but that due to error and other intervening variables.

In Table 8, above, for the students in Medicine and Surgery course in the Federal university, their R^2 change for average UME/Post-UME score in chemistry is shown to be 0.78. This shows that average UME/Post-UME scores in chemistry had a predictive power of 78.00% for their achievement in first year medicine and surgery course for combined 2007/8 and 2008/9 sessions. The observed F-value for average UME/Post-UME scores in chemistry is shown to be 12.07. While the critical F-value is 3.84 for 1 and 139 degrees of

freedom for the numerator and denominator at 0.05% level of significance. Since the observed F-value is greater than the critical F-value, the contribution variance of 78.00% to the achievement of students in first year Medicine and Surgery is the actual contribution of chemistry and not due to error. Thus, the null hypothesis of no significant prediction in respect of the performance in Medicine and Surgery by the average UME/Post-UME scores in chemistry is not accepted. That means that average UME/Post-UME chemistry scores is a significant predictor of the result of students in Medicine and Surgery department**.**

In Table 9, for the students in Medicine and Surgery department in the State University**,** their average UME/Post-UME scores in Chemistry had R^2 change of 0.01 with a predictive power of 1.00% for achievement in first year medicine and Surgery. The observed F-Value for the average UME /Post-UME score in chemistry is shown to be 0.07 and the critical F-value for 1 and 62 degrees of freedom for both the numerator and denominator at 0.05% level of significance 4.00. Since the observed F-value is less than the critical F-value, the null hypothesis of no significant prediction in respect of the performance in Medicine and Surgery is not rejected. That means that average UME/Post-UME chemistry do not significantly predict the result of students in first year Medicine and Surgery department. Therefore, the variance contribution of 1.00% of average UME/Post-UME score to the studentsô scores in Medicine and Surgery is not the real contribution of chemistry but that due to error and other intervening variables. Thus, the studentsô average UME/Post-UME scores in chemistry do not significantly predict their performance in Medicine and Surgery. Therefore, it is observed that for the Federal University, the studentsô average UME/post-UME Chemistry is a significant predictor of their first year scores in all the departments. This implies that the null hypothesis is rejected. For State University, the studentsô average UME/post-UME significantly predicts their first year result in Electrical Electronics, meaning that the null hypothesis is rejected. But there is no significant prediction between the students average UME/post-UME and their first year result in Agricultural Economics, Biochemistry, Industrial chemistry and Medicine. This implies that the null hypothesis is accepted for those departments.

Research Question 4

To what extent do UME Chemistry scores predict Post-UME chemistry scores in various chemistry-based courses in Public Universities in Enugu State

Table10: The correlation coefficient (r) of the effect of UME scores on PUME chemistry for the various chemistry-based courses

	University Type					
	Federal University			State University		
Depts	r	N	Intptn	r	N	Intptn
Ag.Econs	0.04	79	N.R	0.16	123	W. R(+)
B.chem	0.16	215	W.R(+)	0.28	70	W. R(+)
E.E	0.01	174	N.R	0.33	186	W.R(+)
Ind.Chm	0.52	199	M.R(+)	0.15	134	W. R(+)
Med.Surg	0.00	139	N. R	0.23	62	W. R(+)

r= correlation coefficient; intptn. = interpretation; (* source: Hamilton, 1990. 481. See appendix H. p.144); N= number of cases. Note: M. R (+) means moderate (+) relationship; N.R means no relationship; W. R (+) means weak (+) relationship.

Information in Table 10,above shows that, the predictive validity (r) indices for Agricultural-Economics students in Federal and State Universities are 0.04 and 0.16; for Biochemistry, 0.16 and 0.28; Electrical-Electronics, 0.01 and 033; Industrial Chemistry, 0.52 and 0.15 and Medicine and Surgery, 0.00 and 0.23 respectively. These are interpreted to mean that for Agricultural-Economics, in Federal University, there is no relationship between UME score in chemistry and Post-UME score in chemistry. While in the State University, there is weak positive relationship between UME scores in chemistry and Post-UME scores in the discipline. In Biochemistry, there is weak positive relationship in both the Federal and State Universities between UME scores in Chemistry and Post-UME scores in Biochemistry courses in the University. For Electrical-Electronics, there is no relationship between UME scores in chemistry and Post-UME score in chemistry. While in State University, there is weak positive relationship between UME scores in Chemistry and

Post-UME scores in Electrical-Electronics courses. In Industrial Chemistry, there is moderate positive relationship between UME scores in Chemistry and Post-UME scores in chemistry in Federal University, while there is weak positive relationship between UME chemistry score and post-UME scores in the discipline in State University. In Medicine and Surgery in the Federal University, there is no relationship between UME score in chemistry and post-UME score in chemistry. While in the State University, there is weak positive relationship between UME score in chemistry and post-UME scores in chemistry in the discipline.

From the above, for the Federal University, there is moderate positive relationship between Studentsô UME scores in chemistry and their post-UME chemistry scores in Industrial chemistry; weak positive relationship in Biochemistry and no relationship in Agricultural Economics, Electrical Electronics and Medicine. For state University, there is weak positive relationship between UME chemistry scores and post-UME chemistry scores in all the departments (Agricultural Economics, Biochemistry, Electrical Electronics, Industrial chemistry and Medicine).

Hypothesis 4: The studentsô UME Scores in Chemistry do not significantly predict their mean Post-UME score in chemistry for the chemistry based courses in Universities.

Table 11): Regression Analysis of UME chemistry on academic achievement on Post-UME chemistry for chemistry based courses in Public Universities in Enugu State

University Type										
Federal University										
Depts	Multiple R	R^2	R^2 Change	B	BETA	Std error	%Variance	F.obs	F Crit.	d/f
Ag/Econs	0.04	0.00	0.01	0.04	0.04	8.25	1.00	0.12	4.00^{NS}	1,79
B/chem	0.16	0.02	0.02	0.22	0.16	10.68	2.00	5.28	3.84^{*}	1,215
E/E	0.01	0.00	0.01	0.11	0.01	7.63	1.00	0.01	3.84^{NS}	1,174
Ind/ Chm	0.52	0.27	0.27	0.87	0.52	8.67	27.00	11.13	3.84^{*}	1,199
Med/Surg	0.002	0.00	0.01	-0.004	-0.002	7.90	1.00	0.00	3.84^{NS}	1,139

Table 12: Regression analysis of UME chemistry scores on academic achievement on post-UME chemistry for chemistry-based courses in public Universities

State University										
Depts	Multiple R	R^2	R^2 Change	B	BETA	Std error	% Variance	F.obs	F Crit.	d/f
Ag/Econs	0.16	0.03	0.02	0.1	0.16	10.05	2.00	3.27	3.92^{NS}	1,123
B/chm	0.28	0.08	0.06	0.47	0.28	11.18	6.00	5.2	4.00^{*}	1,70
E/E	0.33	0.11	0.11	0.50	0.33	9.14	11.00	22.94	3.84^{*}	1,186
Ind/Chm	0.15	0.00	0.01	0.18	0.15	7.87	1.00	3.00	3.92^{NS}	1,134
Med/Surg	0.23	0.05	0.04	-0.25	-0.23	6.69	4.00	3.34	4.00^{NS}	1,62

*NS means not significant, * means significant*

As indicated in Table 11 above, for the students in Agricultural Economics department in the Federal University, their UME score in chemistry had R^2 change of 0.01, Indicating that UME scores in chemistry had a predictive power of 1.00% for achievement in Post-UME chemistry in Agricultural Economics courses for combined 2007/08 and 2008/09 sessions. The observed F-value for UME score in chemistry is shown to be 0.12. While the critical F-value for 1 and 79 degrees of freedom for the numerator and denominator at 0.05% level of significance is 3.96. Since the observed F-value is less than the critical F-value, the null hypothesis of no significant prediction in respect of the performance in Post-UME score in chemistry by UME chemistry scores is not rejected. That means that the UME scores in chemistry is not a significant predictor of Post-UME chemistry results of students in Agricultural-Economics department. This also implies that the variance contribution of 1.00% of UME to the studentsô achievement in Post-UME in Agricultural-Economics is not the actual contribution of chemistry but that due to the intervening variables and error. Therefore the UME scores in chemistry do not significantly predict their Post-UME scores in Agricultural Economics department.

As shown in Table 12 above, for the studentsô in Agricultural Economics department in the state University, the students UME scores in chemistry had R^2 change of 0.02.This indicates that UME score in chemistry had the predictive power of 2.00% for the achievement in Post-UME scores in chemistry. The observed F-value for UME scores in chemistry is shown to be 3.97 while the critical F-value for 1 and 123 degrees of freedom for both the numerator and denominator at 0.05 level of significant is 3.92. Since the observed F-value is greater than the critical F-value, the variance contribution of 2.00% of UME score in chemistry to the students' achievement in Post-UME score in chemistry is the real contribution of chemistry and not due to error variance. Therefore, the null hypothesis of no significant prediction in respect of the performance in Post-UME score in chemistry by UME chemistry scores is not accepted. In other words, the studentsô UME chemistry scores do not significantly predict their Post-UME scores in chemistry in Agricultural-Economics.

For the students in Biochemistry department in the Federal University as indicated in Table 11 above, their UME score in chemistry had R^2 change of 0.02. This implies that UME scores in chemistry had a predictive power of 2.00% for their achievement Post-UME score in chemistry in Biochemistry courses for combined 2007/8 and 2008/9 sessions. The observed F-value for the UME score in chemistry is shown to be 5.28. While the critical F-value for 1 and 215 degrees of freedom for both the numerator and denominator at 0.05% level of significance 3.84. Since the observed F-value is greater than the critical F-value, the contribution variance of 2.00% of UME score in chemistry to their achievement in Post-UME score in chemistry is the actual contribution of chemistry and not due to error. Therefore, the null hypothesis of no significant prediction in respect of the performance in Post-UME score in chemistry by the UME score in chemistry is not accepted. That is to say that the studentsô UME chemistry scores is a significant predictor of their Post-UME result in Biochemistry department.

For the students in Biochemistry department in the state University according to Table 12 above, the UME scores in Chemistry had R^2 change of 0.06 which is an indication of a predictive power of 6.00% for their achievement in Post-UME score in chemistry. The observed F-Value for the UME scores in chemistry is shown to be 5.28. While the critical F-value for 1 and 70 degrees of freedom for the numerator and denominator at 0.05 level of significant is 3.98. Since the observed F-value is greater than the critical F-value, the aspect of the null hypothesis in respect of the prediction of Post-UME by UME chemistry scores is not accepted. That is to say that the UME scores in chemistry is a significant predictor of their Post-UME score in chemistry in Biochemistry department. That means that the variance contribution of 6.00% of UME scores to the studentsô achievement in Post-UME score in chemistry in Biochemistry is the actual contribution of chemistry and not due to error and other intervening variables.

In the same Table 11 above, for the students in Electronics Department in the Federal University, their UME score in chemistry had R^2 change of 0.01. This means that UME scores in chemistry had a predictive power of 1.00% for achievement in Post-UME chemistry in Electronics course for combined 2007/08 and 2008/09 sessions. The observed

F-value for UME score in chemistry is shown to be 0.0084. While the critical F-value for 1 and 174 degrees of freedom for the numerator and denominator at 0.05% level of significance is 3.84. Since the observed F-value is less than the critical F-value, the null hypothesis of no significant prediction in respect of the performance in Post-UME score in chemistry by UME chemistry scores is not rejected. That means that the UME scores in chemistry is not a significant predictor of Post-UME chemistry results of students in Electronics department. This also implies that the variance contribution of 1.00% of UME to the studentsô achievement in Post-UME in Electronics is not the actual contribution of chemistry but that due to error and other intervening variables. Therefore the UME scores in chemistry do not significantly predict their Post-UME scores in Electronics department.

For Electrical Electronics department in the state University, as indicated in 12 above, the students UME scores in chemistry had R^2 change of 0.11.This indicates that UME score in chemistry had the predictive power of 11.00% for the achievement in Post-UME scores in chemistry. The observed F-value for UME scores in chemistry is shown to be 22.94. While the critical F-value for 1 and 186 degrees of freedom for both the numerator and denominator at 0.05 level of significant is 3.84. Since the observed F-value is greater than the critical F-value, the variance contribution of 11.00% of UME score in chemistry to their achievement in Post-UME score in chemistry is the actual contribution of chemistry and not due to error. Therefore, the null hypothesis of no significant prediction in respect of the performance in Post-UME score in chemistry by UME chemistry scores is not accepted. In other words, the studentsô UME chemistry scores is a significant predictor of their Post-UME scores in chemistry in Electrical Electronics.

Information in Table 11, for the students in Pure and Industrial Chemistry course in the Federal University shows that their UME scores in chemistry had the R^2 change of 0.27. This indicates that the UME scores in chemistry had a predictive power of 27.00% for their achievement in Post-UME score in chemistry for combined 2007/8 and 2008/9 sessions. The observed F-value for the UME score in chemistry is shown to be 11.13. While the critical F-value for 1 and 199 degrees of freedom for both the numerator and denominator at 0.05% level of significance 3.84. Since the observed F-value is greater than the critical

F-value, the contribution variance of 27.00% of UME score in chemistry to their achievement in Post-UME score in chemistry is the actual contribution of chemistry and not due to error. Therefore, the null hypothesis of no significant prediction in respect of the performance in Post-UME score in chemistry by the UME score in chemistry is not accepted. That is to say that the studentsô UME chemistry scores is a significant predictor of their Post-UME result in Pure and Industrial Chemistry department.

For the students in Pure and Industrial Chemistry course in the State University as shown in Table 12 above, their UME scores in chemistry had the R^2 change of 0.01. This indicates that the UME scores in chemistry had a predictive power of 1.00% for their achievement in Post-UME score in chemistry for combined 2007/8 and 2008/9 sessions. The observed F-value for the UME score in chemistry is shown to be 3.00. While the critical F-value for 1 and 134 degrees of freedom for both the numerator and denominator at 0.05% level of significance 3.84. Since the observed F-value is less than the critical F-value, the contribution variance of 1.00% of UME score in chemistry to their achievement in Post-UME score in chemistry is not the actual contribution of chemistry but that due to other intervening variables. Therefore, the null hypothesis of no significant prediction in respect of the performance in Post-UME score in chemistry by the UME score in chemistry is not rejected. That is to say that the studentsô UME chemistry scores is not a significant predictor of their Post-UME result in Pure and Industrial Chemistry department.

As indicated in Table 11 above, for the students in Medicine and Surgery course in the federal university, the R^2 change for the UME score in chemistry is 0.01. This means that UME scores in chemistry had a predictive power of 1.00% for their achievement in Post-UME score in chemistry for combined 2007/8 and 2008/9 sessions. The observed F-value for the UME score in chemistry is shown to be 0.00. While the critical F-value for 1 and 139 degrees of freedom for both the numerator and denominator at 0.05% level of significance 3.84. Since the observed F-value is less than the critical F-value, the contribution variance of 1.00% of UME score in chemistry to their achievement in Post-UME score in chemistry is not the real contribution of chemistry but that due to other intervening variables. Therefore, the null hypothesis of no significant prediction in respect

of the performance in Post-UME score in chemistry by the UME score in chemistry is not rejected. That is to say that the studentsô UME chemistry scores is not a significant predictor of their Post-UME result in Medicine and Surgery course.

For the students in Medicine and Surgery department in the State University according to Table 12 above, the UME scores in Chemistry had R^2 change of 0.04 which is an indication of a predictive power of 4.00% for their achievement in Post-UME score in chemistry. The observed F-value for the UME scores in chemistry is shown to be 3.34. While the critical F-value for 1 and 62 degrees of freedom for the numerator and denominator at 0.05 level of significant is 4.00. Since the observed F-value is less than the critical F- value, the aspect of the null hypothesis in respect of the prediction of Post-UME by UME chemistry scores is not rejected. That is to say that the UME scores in chemistry is not a significant predictor of their Post-UME score in chemistry. That means that the variance contribution of 4.00% of UME scores to the studentsô achievement in Post-UME score in chemistry in Medicine and Surgery is not the actual contribution of chemistry but that due to error variance.

It is therefore observed that studentsô UME chemistry scores only predicted their post-UME chemistry in Biochemistry. This means that the null hypothesis is rejected. But UME chemistry does not predict their post-UME chemistry in Agricultural Economics, Electrical Electronics, Industrial Chemistry and Medicine in Federal University. This implies that the null hypothesis is accepted. For State University, studentsô UME chemistry scores significantly predicted their post-UME chemistry scores in Biochemistry and Electrical Electronics, indicating that the null hypothesis is rejected. But it does not significantly predict their post-UME in Agricultural Economics, Industrial chemistry and Medicine, indicating that the null hypothesis is accepted for those courses.

Summary of the Results

Summary of the findings of the study is presented below:

i. The relationships between studentsô UME chemistry and their first year results are as follows:
   - There is non significant relationship between studentsôUME chemistry and their first year result with Agricultural Economics in Federal University and there is a weak positive but no significant relationship in Agricultural Economics in State University.
   - There are weak positive but non significant relationships between studentsô UME chemistry and their first year result with Biochemistry in both Federal and State Universities.
   - There are non significant relationships between studentsô UME chemistry and their first year result with Electrical Electronics in both Universities.
   - Weak positive relationship exists between studentsô UME chemistry and their first year result with Industrial chemistry in Federal University but there is no relationship in State University.
   - There are weak positive but non significant relationships between UME chemistry and their first year result with Medicine in both Universities.

ii. The relationships between the studentsô Post-UME chemistry and their first year results include:
   - There is a moderate positive and significant relationship between the studentsô Post-UME chemistry and their first year results with Agricultural Economics in Federal University but there is non significant relationship in State University.
   - There is weak positive relationship between the studentsô Post-UME chemistry and their first year results with Biochemistry in Federal University and there is a weak positive but non significant relationship in State University.
   - There are weak positive and significant relationships between the studentsô Post-UME chemistry and their first year results with Electrical Electronics in both Federal and State Universities.

- A moderate positive and significant relationship exists between the studentsô Post-UME chemistry and their first year results with Industrial Chemistry in Federal university but there is non significant relationship in State University.
- A weak positive and significant relationship exists between the studentsô Post-UME chemistry and their first year results with Medicine and Surgery in Federal University but there is non significant relationship in State University.

iii. The following relationships exist between the studentsô average UME/PUME chemistry and their first year results:

- Weak positive relationship exists between the studentsô average UME/PUME chemistry and their first year results with Biochemistry in Federal University but there is no relationship in State University.
- Weak positive relationship exists between the studentsô average UME/PUME chemistry and their first year results with Electrical Electronics in both State and Federal Universities.
- Moderate positive and significtant relationship exist between the studentsô average UME/PUME chemistry and their first year results with Industrial chemistry in Federal University but there is no relationship in State University.
- Weak positive and significant relationship exists between the studentsô average UME/PUME chemistry and their first year results with Medicine in Federal University but there is no relationship in State University.

iv. The relationships between studentsô UME chemistry and their post-UME chemistry are as follows:

- There is non significant relationship between studentsô UME chemistry and their post-UME chemistry with Agricultural Economics in Federal University and a weak positive but non significant relationship in State University.
- Weak positive relationships exist between studentsô UME chemistry and their post-UME chemistry with Biochemistry in both Federal and State University.
- There is non significant relationship between studentsô UME chemistry and their post-UME chemistry with Electrical Electronics in Federal University but there is weak positive but significant relationship in State University.

- Moderate positive relationship exists between studentsô UME chemistry and their post-UME chemistry with Industrial chemistry in Federal University and there is weak positive but non significant relationship in State University.
- There is non significant relationship between studentsô UME chemistry and their post-UME chemistry with Medicine in Federal University and weak positive but non significant relationship exists with Medicine and Surgery in State University.

CHAPTER FIVE

DISCUSSION OF RESULTS, CONCLUSION, IMPLICATIONS AND RECOMMENDATIONS

In this chapter, the results of the study, conclusions, recommendations, limitations of the study, suggestion for further research and implications were presented and discussed.

Discussion of Results

The discussion of results was organized under the following:

- Prediction of first year chemistry based-courses by UME chemistry in Federal and state Universities.
- Post-UME chemistry scores as a predictor of first year chemistry-based courses in Federal and State Universities.
- Prediction of first year chemistry-based courses by combined UME/Post-UME chemistry in Federal and State Universities.
- Extent of prediction of Post-UME chemistry with UME chemistry in Federal and State Universities.

Prediction of first year chemistry based courses by UME chemistry in federal and state universities

The results of the study in respect of the relationship between UME-chemistry scores and first year result of studentsô in Agricultural Economics, Biochemistry, Electrical-Electronics and Medicine and Surgery courses in Federal & State Universities indicate no significant relationships. This means that studentsô performance in UME chemistry does not relate with their performance in their first year result in those departments. Contrarily, for the Industrial Chemistry course in Federal university, positive relationship exists between the UME scores in chemistry and the studentsô first year results in the course meaning that weak performance in studentsô UME result might leads to the corresponding weak performance in their first year result but in State university, there is no relationship found between UME chemistry scores and their first year result in Industrial Chemistry

department. This implies that increased performance in studentsô UME chemistry does not relate with their performance in their first year result and this implies inconsistency in the examination. This observed weak relationship that is recorded between the UME chemistry and the studentsô first year scores in Industrial chemistry, in state University is confirmed by the respective works of Adegboye (1997) and Nwokike (2003) both of which reported weak correlation between JAMB entrance scores and academics achievements at both NCE and Polytechnics levels. The results are also in conformity with the works of Obioma and Salau (2007) who observed that public examinations poorly predicted studentôs University achievement.

However, the result in respect of no relationships between UME and first year results of students in Agricultural Economics, Biochemistry, Electrical-Electronics and Medicine and Surgery departments was similar to the work of Aboma (2009) who observed that University entrance scores and aptitude test scores were not significant predictors of University GPA. The finding was also consistent with that of Salahdeen and Murtala (2005) who recorded non significant relationship between JAMB entrance scores and studentôs first year results. Similarly, Omede (2003) also reported that entrance qualifications do not significantly predict academic achievement in science. Contrary to this, Obioma, Nwufor, Salau and Omole (2010) discovered a relatively significant relationship between first year cumulative Grade Point average and UME scores.

The plausible explanation for the general poor relationship and no relationship recorded maybe indications of doubtful criteria used for admission of candidates as observed by (Ajaja, 2010; Alaneme, 2007 and Odogwu, 2005).The non-significant relationship between UME and University GPA could be attributed, according to Aboma (2009), to the fact that these examinations are one-shot-examinations being administered every year at one specific moment. The quality of invigilators used for the examinations at different venues used for the examinations and other prevailing environmental conditions may also interfere with the result. Obioma and Salau (2007) further indicated that this result might be an indicative of the fact that UME measured different abilities from the university examinations. Aboma (2009) is of the view that the predictive validity of standardized and high school GPA tends to be negligible especially when other variables are included in the

study. Thus, these examinations may lack proper testing quality which can hinder their predictive power. The low number of candidates in Nigeria being offered admission annually, has also resulted in desperation of both the candidates and parents in the bid to be among the few to be admitted. This created more anxiety and cheating during and after the examination and also during admission processes and this could have accounted for the result of the study Aboma (2009).

Egede (1993) in support noted that with malpractice, credit is awarded to wrong persons and the innocent candidates become affected because their performance is weighted against those of dishonest students, thereby giving some students undue advantage. As a result, students get admission into schools even without merit Adeyemi (2005). These students sometimes may withdraw in the first year due to their inability to cope, Okoye (2004) or they tend to exhibit their deviant behaviors and physical violence in school Adebayo (2011). In view of this, Awosiyan (2007) concluded that UME was not a true reflection of the candidateôs academic ability and would be a counterproductive to use it as ultimate pre requisite for University admission.

Post-UME chemistry scores as a predictor of first year chemistry based courses in federal and state universities

The result of the study on the relationships between post-UME chemistry scores on studentsô first year results in Agricultural Economics and Industrial Chemistry departments in Federal University shows a moderate positive relationship. This means that students from these courses who scored high marks in post-UME also espected to score highly in their first year results, while in State University no relationship is found to exist between Post-UME chemistry score and the studentsô first year results in the same course. This means that increased performance in Post-UME chemistry does not relate with their first year results. In other words, there is no relationship in performance between post-UME chemistry and studentsô first year courses in Agricultural Economics and Industrial Chemistry departments.

For Biochemistry and Medicine and Surgery programmes in Federal University, the result of the study in respect of the relationships between post-UME chemistry scores of studentsô first year result shows low positive relationships. This means that low performance in post-UME scores in chemistry might also lead to low performance in their first year results in those courses. For Biochemistry, and Medicine and surgery in state University, the relationships are not significant. This means that increased performance in post-UME does not relate with the studentsôperformance in those courses.

For the students in Electrical Electronics department in Federal and State Universities, Post-UME chemistry shows a low positive relationship with the studentsô first year results in both state and private Universities. This implies that low performance in Post-UME chemistry might be a reflection of low performance in studentsô first year results in Electrical Electronics in both State and Federal Universities.

These agree with the position held by Adebayo (2011) that Post-UME test was introduced in order to sanitize University admission system. The finding from Federal University tends to agree with Obioma et al (2010) who reported a relatively positive relationship between Post-UME and first year result. It is also in line with Kescula (2009) who found that pre-admission grade point average was a significant predictor accounting for 34 percent of the variance. The result also tends to disagree with the findings of Ajaja (2010) who reported that Post-UME cannot do better than UME in influencing studentsô achievement. The result in respect of no relationship found between post-UME and first year results of studentsô in Agricultural Economics, Biochemistry, Industrial Chemistry and Medicine and Surgery programmes was in agreement with Ajaja (2010). The low and no relationships observed mainly in state University seemed to be a manifestation of what Ebongabsi (2010) said about non-adherence of some State Universities to the regulations of JAMB, claiming that some State University have right to admit their State indigenes whose results could not offer them admission without reference to JAMBôs policy of admission. It was therefore observed that post-UME chemistry scores gave a better result than UME in predicting the studentsô first year results. With this, the problem of loss of credibility of these entrance examination results has not been properly addressed.

Based on the mismatch on the result of the present study, within the department in the same and different Universities, the researcher is of the view that certain factors might be responsible for that. Amongst which include; non uniformity of chemistry question used across the faculties and Universities, quality of invigilators, university type and other prevailing conditions as may be applicable to different examination venues across the faculties. Including the test anxieties and examination malpractice as was observed by Aboma (2007). Evidence of the cancellation of 2012/2013 post-UME as with the case of the University of Nigeria, because of irregularities could also have affected the result of this type of study.

Prediction of First Year Chemistry Based Courses by combined UME/Post-UME Chemistry in Federal and State Universities

The results of the study of the relationships between the studentsô combined UME/Post-UME chemistry and their first year scores in both Agricultural Economics and Biochemistry in Federal University are weakly related. This implies that low performance of students in combined UME/post-UME chemistry scores also leads to low attainment in first year results of students in Agricultural Economics and Biochemistry courses in Federal University. In State University, there are no relationships between the studentsô combined UME/Post-UME chemistry result and their first year results in both Agricultural Economics and Biochemistry. This means that students in Agricultural Economics and Biochemistry with increased performance in combined UME/Post-UME chemistry neither performed well nor poorly in their first year results.

For Electrical Electronics, the result of the analysis also shows weak relationship between the studentsô combined UME/Post-UME chemistry scores and their first year results in Electrical Electronics course in both State and Federal universities. This indicates that poor performance in combined UME/Post-UME chemistry, also leads to poor performance in first year result of studentsô in Electrical-Electronics department in both Federal and State Universities.

For Pure and Industrial chemistry course, a moderate positive relationship exists between combined UME/Post-UME scores of students in chemistry and their first year results in Federal university. This implies that high scores in average UME/Post-UME leads to high

score in their first year results. In state university, there is no significant relationship between the studentsô combined UME/Post-UME chemistry results and their first year results of in industrial chemistry. This indicates that high performance in combined UME/Post-UME chemistry neither decreases nor increases performance of students in their first year results in Industrial chemistry. For the medicine and surgery in Federal university, there is weak significant relationship between the studentsô average UME/Post-UME chemistry scores and their first year results. This means that low performance in combined UME/Post-UME chemistry score also leads to low achievement in their first year courses. In State University, there is no relationship between the studentsô average scores of UME/Post-UME in chemistry and their first year results in Medicine. This means that improved performance in average UME/Post-UME chemistry result neither leads to increase nor decrease performance in their first year scores. The predictive results of the combined UME/post-UME are weakly related in all the departments studied in the Federal University. This tends to agree with earlier findings of Obioma et al (2010) that reported low correlation between UME/Post-UME and first year CGPA scores. These reports also ran contrary to the findings in State University which recorded no relationship between combined UME/Post-UME chemistry scores and first year University achievement in all the courses except in Electrical Electronics.

In Federal University, the result of weak relationship recorded in respect of the study of the relationship between combined UME/post-UME and studentôs first year result agrees with that of the Ademola (2004) who observed a low positive relationship between the studentsô performance in Mathematics and other Basic sciences. Also in support is the work of Okoro (1995) who observed that positive relationship existed between Mathematics scores in mock and in Senior Secondary Certificate Examination.

Furthermore, the results in respect of no relationship between combined UME/post-UME Chemistry scores and the studentôs first year result in State University, agrees with those of Aboma (2009); Salahdeen and Murtala (2005) and Omede (2003), all of which identified no relationship between University entrance score and their academic achievement in different institutions. These reports ran contrarily to what was observed in this present

study in Federal University where low relationships were observed between studentsô combined UME/post-UME chemistry scores and their first year result in different courses. The observed no relationships recorded in several studies and in different institutions, might be a reflection of the argument put up by the Universities governing council according to Awosiyan (2007), that UME was not true reflection of candidatesô ability.Okoye (2004) also reported in support a case of JAMB candidates who got the highest score in UME but could not meet up with other examinations. Adeyemi (2005), therefore concludes that many of the students JAMBsô results are not real.

Extent of Prediction of Post-UME with UME in Federal and State Universities

The analyses of the relationships between UME and Post-UME chemistry for Agricultural-Economics and Medicine and Surgery students are not in both Federal and State Universities. This implies that increased performance in UME Chemistry does not relate with their performance in their Post-UME results in Agricultural Economics and Medicine and Surgery programmes in both Universities. For Biochemistry, the result of the study shows weak relationship between UME chemistry and Post-UME chemistry results of students in both State and Federal universities. This indicates that poor performance in UME chemistry also leads to poor performance in Post-UME chemistry for Biochemistry students in both Federal and State Universities.

This finding is consistent with the view of Hassan and Adeyanju (1998), who found no significant relationship between Continuous Assessment Scores and SSCE scores. Also in agreement were the works of Omede (2003) who established no relationship between entry qualification and studentsô academic achievement; Salahdeen and Murtala (2005) who observed a no significant relationship between JAMB scores and studentsô first year results and Aboma (2009) who also found no relationship between university entrance scores and their GPA scores. Also in agreement were the works of Okoro(1995), Ademola (2004); Adegboye (1997) and Nwokike (2003) all of which established low relationships in their different studies. In contrast, this finding disagrees with the works of Okoba (2001) who found a negative relationship between Polytechnic/Colleges of Education Matriculation

Examination results and Nigeria Certificate of Education final results and Obe(2004) who also reported a negative relationship between JAMB and screening scores.

For the Electrical Electronics in Federal university, there is no significant relationship between UME chemistry and Post-UME chemistry results of students. This indicates that improved performance in UME chemistry does not affect the performance of students in Post-UME chemistry results in the Electrical Electronics department. For Electrical Electronics in State University, the result of analysis shows a low significant relationship between UME chemistry and Post-UME chemistry result. This indicates that poor performance in UME chemistry, also leads to poor performance in Post-UME chemistry result of studentsô in Electrical-Electronics department in State University.

The low relationship recorded between UME Chemistry score and post-UME Chemistry result in Electrical Electronics and Industrial Chemistry in state universities, is in agreement with that of Okoro (1995), who found a positive relationship between Mathematics scores in both Mock and SSCE scores. Also in agreement were the works of Ademola(2004), Obioma and Salau (2007) and Obioma et al (2010) all of which observed a low positive relationship as indicated earlier in their respective studies.The above findings contradict with the works of Omede (2003) and Aboma(2009), both of which found no relationship between entry qualification and other subsequent examinations in their different institutions. Okoba (2001) and Obe (2004), also observed a negative relationship in disagreement with the above findings.

For the Industrial Chemistry in Federal University, the result of the relationship between UME chemistry and Post-UME chemistry result of students shows a moderate significant relationship. This means that students from this department who scored high marks in UME also performed well in their Post-UME chemistry results. In state university, there is no significant relationship between UME chemistry and Post-UME chemistry result, indicating that an increased performance in UME chemistry does not affect the studentsô performance in Post-UME chemistry results in Industrial chemistry in the state University.

The result of moderate relationship observed between UME and Post-UME Chemistry results in Industrial Chemistry in Federal Universities is consistent with the work of Obije (1995) who found an appreciable positive relationship between the Electronicsô students entry qualification and Studentsô Grade Point Average and their performance at West African Examination Technical. These findings contradict the reports of Omede (2003) and Aboma (2009) who observed a no relationship and Okobah (2001) and Obe (2004) who also observed negative relationships in disagreement. The trend of relationships observed in this section might be a reflection of what was advocated by Yola (2006), about non performance of JAMB, non-uniformity of standard across the universities as observed by Onyekakeyah (2012) and increasing rate of malpractice as indicated by Oyekanmi (2005).

In this study, three categories of relationships, namely, moderate positive relationship, low negative relationship and no relationships, were found to exist between the university entrance scores and students first year result in different institutions and programmes. These inconsistencies might generally be as a result of many factors and differences as may be applicable to these universities and programmes. These factors may include peculiarities in university test and testing process, differences in chemistry questions, different venues as may be obtainable in different university and examination venues etcetra. Therefore, much is still needed to be done about teaching and learning, test and testing/examination processes in schools.

Conclusion

On the basis of the findings of the study, the following conclusions are drawn:

i. UME chemistry does not relate with the studentôs first year results in Agricultural-Economics, Biochemistry, Electrical Electronics and Medicine and Surgery courses in both Federal and State Universities. It is a weak predictor of studentsô first year results in Industrial Chemistry course in Federal University but not a predictor of first year results in industrial Chemistry course in State University. Therefore, UME Chemistry is not a true reflection of the candidates first year courses in the universities because it does not play significant role in predicting studentsô first year courses and this

questions the credibility of UME results used in the admission of students into the affected departments in the public universities.

ii. Post-UME moderately predicts students first year results in each of Agricultural Economics and Industrial Chemistry courses in Federal University but in State University, it does not predict studentôs results in Agricultural Economics and Industrial Chemistry. Post-UME weakly predicted students first year results in Biochemistry and Electrical Electronics courses in both Federal and State Universities but not a significant predictor of studentsô result in Biochemistry in state university. Post-UME weakly predicts studentôs first year results in Medicine and Surgery in Federal University but does not predict students results in Medicine in State University. Therefore Post-UME has a better predictive quality than UME. Post-UME predicted studentsô results more in Federal University than in State University. This indicates inconsistencies in the conduct of the Post-UME, lack of uniformity of standard and differences in the peculiarities of the universities. Hence the processes of the Post-UME has to be looked into and streamlined across the Universities starting from the subjects to be taken, the uniformity of the questions and the mode of administering the examinations and other factors.

iii. Combined UME/Post-UME scores in chemistry weakly relate with the studentôs first year results in Agricultural Economics and Biochemistry courses in Federal university but not a predictor of first year results in Agricultural Economics and Biochemistry courses in State University. Combined UME/Post-UME weakly relates with the students first year results in Electrical Electronics course in both Federal and State Universities, it moderately predicted studentôs first year results in Industrial chemistry in Federal University but not a predictor of their result in State University. It weakly predicted of studentôs first year results in Medicine and surgery in Federal University but not a predictor of studentôs first year results in state university. The Predictive result is very similar to that of Post-UME. The average results of UME and Post-UME gave a better result in Federal University than in State University when compared to that of UME. Hence, the activities of these examinations should be restructured individually and unified so as to improve the quality of the average results for a better credibility.

iv. UME chemistry does not predict studentsô Post-UME chemistry scores in Electrical Electronics and Medicine and Surgery courses in both Federal and State Universities. It does not relate with Post-UME chemistry in Biochemistry course in both federal and State Universities. It is a moderate predictor of studentsô Post-UME chemistry score in Industrial chemistry in Federal University while in State University UME chemistry does not predict studentsô Post-UME score in Industrial chemistry course. Therefore, the inefficiencies identified against UME have to be urgently addressed by the JAMB so as to restore the past glory of JAMB and improve the credibility of the UME.

Educational Implications of the Study

The findings of the study have educational implications to science/chemistry Educators in secondary and tertiary institutions, students, school administrators, curriculum planners and examination bodies.

The study has brought to the knowledge of university management, lecturers and JAMB about the mismatch on the result of the present study for different departments in the same university and also in different universities. The result showed that UME chemistry results significantly predicted the academic achievement of studentsô in some departments but in other departments did not predict at all. This is an indication that UME chemistry was not a true reflection of the candidatesô ability in these chemistry based courses in the affected departments. It also indicates a doubtful criterion used for admission. This perhaps will require an urgent need for a collaborative effort by the JAMB and other stakeholders in order to bridge this gap already created between the variables for a sustainable improvement in relationship. An education summit should be suggested to include all the stakeholders in Education, JAMB officials, principals of schools, supervisors, examiners and invigilators in order to discuss extensively on the conduct of free and fair UME.

The study also revealed a low significant relationship between Post-UME chemistry and studentsô achievement in First year in Federal University. For the state university, the relationship was either poorly correlated or not correlated at all. This had exposed to the students and teachers the extent to which the students have acquired the required knowledge and skills needed for these chemistry based courses. It might be a reflection of

quality of assessment instrument used, malpractices in the process and difference in the chemistry questions used across the different departments and universities. On this regard, lecturers can use the result of this selection examination to assess and ascertain the quality of scores as well as identify students who need to be supported using tutorial classes and proper guidance.

Also exposed was the relevance of Post-UME in both Federal and State Universities studied. This calls for urgent need for stakeholders including administrators from different institution and heads of sciences to set up machinery for proper monitoring of the activities of this examination in different schools so as to have a basis for unifying this processes across the universities.

The findings of this study revealed that the prediction of academic achievement gave a better result with combined UME/Post-UME than when UME was used as predictor variable in Federal University but for state university the result of the predictor is worse than what was obtained when UME or Post-UME was singly used as predictor variable.

This result was an indication that even with the average of the UME/Post-UME, as predictors, the prediction results for the departments were still not encouraging. This requires that much effort should be committed to the present classroom teaching and learning by the teachers and students in order to remedy, sustain and improve both the backlog of academic deficiencies and excellence. There should also be a pressing need to embark on strategies for total overhaul and review of such practices which are responsible for the existing inconsistency between the past, present and future academic achievement of students.

National Examination bodies such as JAMB, Management and lecturers in these institutions should rise up to the challenges facing UME and Post-UME starting from reviewing the existing JAMB curriculum, developing uniform curriculum for Post-UME across the universities, quality of assessment instruments, validation of the test instrument, proper monitoring and supervision of the conduct of these examinations down to selection of students which should be strictly based on merit. JAMB and School authorities should be stern in checking of excesses by their staff who are involved in different irregularities as

were evident in recorded examinations malpractices, leakages of papers and so many other corrupt practices found in the institution of higher learning especially in state universities, where both fake and genuine admissions are offered to their indigenes without proper reference to JAMB policy of admission.

Most studies including the present study, could not establish a strong relationship between the present and future results of students in the universities. Therefore the decision to use these admission criteria for selection and placement purposes should not be a concluded one. This implies that there should be a cooperative effort by the JAMB, university authorities and other concerned stakeholders for more effective measures for selection and placement of candidates.

Recommendation

The following recommendations are made based on the findings of the study.

1. All the problems and irregularities associated with the process of UME have to be urgently addressed by Board and other interested stakeholders. An internal control unit should carry out an intensive and extensive review on the activities of the Board and UME so as to come out with the modalities on how to improve the quality and credibility of UME results used for admission.
2. The Board should also think of a review of their system of assessment to include both achievements and aptitude tests especially in science subjects where students ability to formulate problems and carry out investigation is unavoidably important, this is to improve the validity of chemistry questions.
3. Education Institutions should have direct interest in raising, maintaining and sustaining the standard of post-UME in schools. There should be a co-operative effort of all the people concerned in different institutions including experts in measurement and evaluation, to look into the activities of Post-UME starting from test development, validation and reliability down to administration and admission processes. This if judiciously carried out will help to improve the quality of the test so that the aim of this examination as a quality control measure in the universities will be a reality.

4. A follow-up policy should be made on Post-UME and an appropriate committee set up to look into the activities of Post-UME in Public Universities. The Post-UME chemistry questions should be standardized both within the Faculties and across the Public Universities so as to maintain Uniformity of standard.
5. In addition to the use of UME and Post-UME results for admission, the studentsô secondary school examinations records should be weighted and included in the scheme of this selection process so as to enhance their predictive quality and a better judgment.

Suggestion for Further studies

Other pertinent areas of the work which were not covered by this work includes

I. Analysis of factors that affect the predictive validities of university entrance scores in Nigerian universities.
II. The study should be replicated in other states with different cultural background.
III. Similar studies should be done in other science subjects such as Physics, Biology and Mathematics.
IV. Determining the relative performance of students admitted with UME only and those admitted with the combination of both UME/PUME in various science based courses.
V. Comparing the entrance scores of the science and artsô students with their cumulative Grade point average in the Universities.

Limitations of the Study

The generalizations made with respect to their study are however subjected to the following limitations:

Sample Size: In geographical scope, the study was limited to two institutions; one federal university and one state university from Enugu state-University of Nigeria, Nsukka and Enugu State University of Science and Technology. For time constraint, the study would

have been extended to include more schools in other geopolitical zones for more effective generalization of the result.

Only five science-based faculties were covered from each university for uniformity purposes. Therefore the generalization was limited to those science based faculties. The predictor variables used were also limited to one science subject that is chemistry.

The three predictor variables used for the study which include UME, Post-UME and Combined UME/Post-UME scores were limited to only chemistry scores. The scores of other subjects taken in UME and Post-UME were not included in the analysis. This was pure subject based and the generalization may also be affected if other science subjects were to be included in the analysis. In addition, the study only considered two academic sessions; 2007/2008 and 2008/2009 sessions. The consistency of this finding will be affected. The study should have been extended to about four to five sessions if the consistency were to be established.

Summary of the Study

The emphasis on UME and Post-UME with respect to their importance in the process of admission into Nigerian Universities has spurred the researcher to the need to ascertain the predictive validities of UME, PUME and combined UME/PUME scores with the first year result in chemistry based courses as criteria. This study therefore investigated the predictive validity of UME, PUME and average UME/PUME used for admission of candidates into universities.

The study was guided by four research questions and four null hypotheses. The population of the study comprised of 2396 year one students who were admitted through UME and Post-UME into the universities in Enugu state for 2007/8 and 2008/9 academic sessions. Simple random sampling was used to obtain five common departments from each Universities making total of ten departments. Stratified and accidental sampling techniques were thereafter implored to draw a total of 1370 students having complete records of UME, Post-UME and first year results from each of the departments in different Universities.

The data for the study was obtained from documentary sources: the past admission lists as well as the studentsô first year results gotten from the studentsô departmental records. Stepwise multiple regression techniques was used for the analysis. The regression coefficients were tested at 0.05% level of significance. The result obtained from the analysis showed that:

- UME score does not predict studentsô first year result in all the courses in State and Federal Universities except in industrial chemistry (r=0.37) where weak relationship was observed to exist between UME scores and studentsô first year result in Federal University.
- Post-UME chemistry scores predicted first year chemistry scores in all the courses studied in Federal University but in State University, it only predicted studentsô first year scores in Electrical Electronic(r=0.28) but in others, there are no relationships.
- Combined UME/post-UME chemistry scores predicted with students first year scores in all the courses studied in Federal University but in State University, it only predicted their scores in Electrical Electronics (r=0.21) but no relationship in others.
- UME predicted students post-UME scores in Biochemistry (r=0.16) and Industrial chemistry (r=0.52) in Federal University but no relationship in Agricultural Economics (r=0.04), Electrical Electronics (r=0.01) in Federal University. In State University, UME scores only predicted post-UME scores in Biochemistry (r=0.28) and Electrical Electronics (r=0.33) but did not predict in other courses studied.

Based on the findings, the educational implications and recommendations are highlighted among which include: that Board should be stern in checking all irregularities associated with UME so as to improve the quality and credibility of UME. A follow-up policy should be made for the modification of Post-UME and appropriate committee set up to look for a way of standardizing and unifying the chemistry questions used within the faculties and across the public Universities.

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APPENDICES

APPENDIX A

Chemistry-based faculties in University of Nigeria, Nsukka and their departments

Faculty of Agriculture:

Agricultural Economics, Agricultural Extension, Animal Science, Crop Science,
Food Science and Technology, Home Science, Nutrition and dietetics, Soil Sciences

Biological Sciences:

Biochemistry, Botany, Microbiology, zoology.

Faculty of Engineering:

Agricultural and Bioresourses Engineering, Civil Engineering, Electrical Engineering,
Electronics Engineering, Mechanical Engineering, Metallurgical and Material Engineering

Faculty of Environmental Studies:

Architecture, Estate Management, Geoinformatics and Surveying, Urban and Regional Planning

Health Science and Technology:

Medical Laboratory Sciences, Medical Radiography, Radiological Sciences, Medical Rehabilitation, Nursing Science

Medical Sciences and Dentistry:

Anatomy, Anaesthetics, Chemical pathology, Community Medicine, Dermatology, Hermatology and Immunology,
Medicine, Morbid Anatomy, Obstetrics and Gynecology, Opthamology, Pediatrics, Pharmacology, Surgery,
Therapeutic, Physiology, Radiation Medicine, Psychological Medicine, Child and Dental HealthOral Maxillofacial Surgery,
Preventive Dentistry, Restorative Dentistry.

Pharmaceutical Sciences:

Clinical Pharmacy and Pharmacy Management, Pharmaceutical Chemistry and Industrial Pharmacy,

Pharmaceutical Technology and Industrial Pharmacy, Pharmaceutics, Pharmacognosy,

Physical Sciences

Computer science, Geology, Mathematics, Physics and astronomy

Pure and Industrial chemistry, Statistics

APPENDIX B

Chemistry based faculties and their department in ESUT

Faculty of Applied Natural Sciences

Applied Biochemistry, Applied Biology and Biotechnology, Applied microbiology and brewing Geology and Mining, Industrial chemistry, Industrial Mathematics, Statistics and Demography industrial Physics

Faculty of Medicine and Health Science

Pediatrics, obstetrics and Gynecology, Internal Medicine; Surgery, Ophthalmology, ENT Anastasia, Accident and Emergency, Radiology, Histopathology, Microbiology, Hematology, Chemicalpathology, Anatomy, Biochemistry, Physiology.

Faculty of Agriculture

Agricultural Economics and Extension, Animal Science/ Fisheries Management

Agronomy and Ecological Management, Food Science and Technology

Engineering

Agriculturl and Bioresources Engineering, Civil Engineering, Chemical Engineering

Computer Engineering, Electrical Electronics Engineering, Material and Metalurgical Engineering, Mechanical and Producton Engineering

APPENDIX C

Population of the Students and their departments

	University Type				
	University A		University B		
Departments	2007/8	2008/9	2007/8	2008/9	Total
Agric Econs	45	40	109	54	248
Biochem	179	176	122	221	698
Elect/Elect	110	110	136	200	556
Pure & Ind Chem	120	97	108	138	463
Med & Surg	196	142	46	47	431
Total	650	565	521	660	2396

APPENDIX D

Sampled students and their departments

	University Type				
	University A		University B		
Department	Sampled Students for (2007/8 & 2008/9)		Sampled students for 2007 & 2008/9)		Total
Agric Econs	43	36	94	29	202
Biochem	109	106	30	40	285
Elect/Ele	89	85	108	78	360
Ind/Chem	115	84	96	38	333
Med & Surg	38	101	32	30	201
Total	**394**	**412**	**360**	**215**	**1381**

APPENDIX H

Interpretation of correlation coefficient

Correlation coefficient	Interpretation of relationship*
1.00	Perfect positive relationship
0.70-0.99	Strong positive relationship
0.40-0.69	Moderate positive relationship
0.10-0.39	Weak positive relationship
0.00-0.09	No relationship
-0.39- (-0.10)	Weak negative relationship
-0.69-(-0.40)	Moderate negative relationship
-0.99-(-0.07)	Strong negative relationship
-1.00	Perfect negative relationship

(Hamilton, 1990: 481)

APPENDIX J

Format for the collection of data

UME chemistry Scores	Post UME Chemistry Scores	Mean UME/ Post-UME Chemistry Scores	1st Year results

The Spread Sheets or Work Sheets containing the UME, post-UME, average UME/post-UME and First year results of students in the public universities and for the two sessions are here under attached according to the format.

List of Approved Universities in Nigeria

	Federal			State			Private	
1	University of Ibadan, Ibadan	1948	1	Rivers State University of Science And Technology, Port Harcourt	1979	1	Babcock University, Ilishan Remo	1999
2	University of Nigeria, Nsukka	1960	2	Ambrose Alli University, Ekpoma	1980	2	Madonna University Okija	1999
3	Obafemi Awolowo University, Ile-Ife	1962	3	Abia State University, Uturu	1981	3	Igbinedon University, Okada	1999
4	Ahmadu Bello University Zaria	1962	4	Enugu State University of Science and Technology, Enugu	1982	4	Bowen University, Iio	2001
5	University of Lagos, Lagos	1962	5	Olabisi Onabanjo University, Agoiwoye	1982	5	Covenant University, Ota	2002
6	University of Benin, Benin City	1970	6	Lagos State University, Ojo, Lagos	1983	6	Pan African University, Lagos	2002
7	Bayero University, Kano	1975	7	University Of Ado-Ekiti Ado-Ekiti	1983	7	Benson Idahosa University, Benin City	2002
8	University of Calabar, Calabar	1975	8	Ladoke Akintola University of Technology Ogbomosho	1990	8	Abti-American University, Yola	2003

	Federal			State			Private	
9	University of Illorine, Illorine	1975	9	Evan Enwerem University, Owerri	1992	9	Redeemers University, Mowe, Ogun State	2005
10	University of Jos, Jos	1975	10	Benue State University, Makurdi	1992	10	Ajayi Crowder University, Oyo	2005
11	University of Maiduguri, Maiduguri	1975	11	Delta State University, Abraka	1992	11	Al-Hikmah University, Illorin	2005
12	Usman Danfodiyo University, Sokoto	1975	12	Adekunle Ajasin University, Akungba-Akoko	1999	12	Caritas University, Amorji-Nike, Enugu	2005
13	University of Port-Harcourt, Port-Harcourt	1975	13	Kogi State University, Anyingba	1999	13	Cetep City University, Lagos	2005
14	Federal University of Technology, Owerri	1980	14	Niger-Delta University, Yenagoa	2000	14	Bingham University,Buta Balefi, Karu, Nasarawa State	2005
15	Federal University of Technology, Akure	1981	15	Anambra State University of Science And Technology	2000	15	Kastina University, Kastina	2005
16	Federal University of Technology Yola	1981	16	Kano State University of Technology, Wudil	2000	16	Renaissance Universityô Enugu	2005
17	Federal University of Technology Minna	1982	17	Ebonyi State University, Abakaliki	2000	17	Bells University of Technology, Ota, Ogun State	2005
18	Nigerin Defence Academy, Kaduna	1985	18	Nasarawa State University, Keffi	2002	18	Lead City University of Ibadan	2005

	Federal			State			Private	
19	University of Abuja	1988	19	Adamawa State University, Mubi	2002	19	Crawford University, Igbesa, Ogun State	2005
20	Abubakar Tafawa Balewa University, Bauchi	1988	20	Gombe State University, Gombe	2004	20	Wukari Jubilee University	2005
21	University of Agriculture, Makurdi	1988	21	Kaduna State University, Kaduna	2004	21	Crescent University, Abeokuta	2005
22	University of Agriculture, Abeokuta	1988	22	Cross River University of Technology, Calabar	2004	22	Novena University, Ogume, Delta State	2008
23	Nnamdi Azikiwe University, Awka	1992	23	Plateau State University, Bokkos	2005	23	University of Mmar	2005
24	University Ofuyo, Uyo	1991	24	Akwa Ibom State University of Technology	2005	24	Joseph Ayo Babalola University, Ikeji-	2006
25	Michael Okpala University of Agriculture,Umudike	1992	25	Ibrahim Babangida University, Lapai, Niger State	2005	25	Arakeji, Osun State	2007
26	National Open University, Abuja	2002	26	Taisolarin University of Education, Ijagun	2005	26	Caleb University, Lagos	2007
27	Federal, University of Petroleum Resources, Effurun	2007	27	Umaru Musa Yaȓradua University, Kastina	2006	27	Fountain University, Oshogbo	2007
28	Federal, University, Oye-Ekiti, Ekiti State		28	Bukar Abba Ibrahim University, Damaturu	2006	28	Obong University Obong Ntag	2007

	Federal			State			Private	
				Yobe State				
29	Federal, University Otuoke, Bayelsa State		29	Kebbi State University of Science And Technology, Aliero	2006	29	Salem University Lokoja	2007
30	Federal University,Dutse, Jigawa State		30	Osun State University, Osogbo	2006	30	Tansian University, Umunya	2007
31	Federal University, Dutsin-ma, Kastina state		31	University of Education, Ikere-Ekiti	2008	31	Veritas University, Abuja	2007
32	Federal University,Kashere, Gombe State		32	Ondo State University of Science And Technology, Okiti-Pupa	2008	32	Wesley University of Science And Technology, Ondo University	2007
33	Federal university, Wakari, Taraba State		33	Taraba State University,Alingo	2008	33	The Achievers University, Owo	2007
34	Federal University, Lafia, Nasarawa State			Kwara State University, Illorin	2009	34	African University of Science And Technology, Abuja	2007
35	Federal university, Lokoja, Kogi State			Sokoto State University, Sokoto	2009	35	Afe Babalola University, Ado Ekiti, Ekiti State	2009
36	Federal university, Ndufe-Alike, Ebonyi state	36		Ekiti State University of Science And Technology, Ifaki	2009		Godfrey Okoye University, Ugwuomu-Nike Enugu, State	2009
					37		Nigeria Turkish Nile, University Abuja	2009
					38		Oduduwa	2009

	Federal			State			Private	
							University, Ipetumodu, Osun State	
					39		Paul University, Awka Anambra State	2009
					40		Rhema University, Obeama-Asa, Rivers State	2009
					41	41	Wellspring University, Evbuobanosa, Edo State	2009

Sources: Nuc(2010), Monday Bulletin, February 1 and http//inwent-iij-lab.org/Weblog/2011/02/11é

APPENDIX B

APPENDIX C

Interpretation of correlation coefficient

Correlation coefficient	Interpretation of relationship*
1.00	Perfect positive relationship
0.70-0.99	Strong positive relationship
0.40-0.69	Moderate positive relationship
0.10-0.39	Weak positive relationship
-0.09-0.09	No relationship
-0.39- (-0.10)	Weak negative relationship
-0.69-(-0.40)	Moderate negative relationship
-0.99-(-0.07)	Strong negative relationship
-1.00	Perfect negative relationship

(Hamilton, 1990: 481)

APPENDIX D

Three-Year Results in Twenty-two (22) Popular Subjects in the May/June 2004-2006 WASSCE in Nigeria

Subject	**% of Passes at Credit Level (Grades 1-6)**			**% of Failure**		
	2004	**2005**	**2006**	**2004**	**2005**	**2006**
Commerce	36.66	47.81	56.77	35.38	30.33	24.81
Financial Accounting	23.14	24.81	18.47	46.20	41.98	48.90
Christian Religious Knowledge	32.30	46.48	36.45	35.26	23.58	33.45
Economics	37.59	36.24	49.45	22.26	20.20	15.71
Geography	18.98	28.62	45.84	47.31	44.17	29.29
Government	62.14	60.88	67.82	16.31	20.48	13.62
History	41.71	29.97	31.30	36.08	43.04	41.24
Islamic Studies	19.56	17.73	51.53	42.92	49.89	24.02
English language	29.59	25.63	32.48	37.61	36.93	29.65
French	42.82	33.36	51.55	45.84	30.66	22.57
Hausa Language	43.04	42.85	33.96	24.95	20.70	30.96
Igbo Language	55.53	50.26	34.52	13.73	17.09	37.93
Yoruba Language	36.21	18.97	34.40	36.62	66.41	46.07

Further Mathematics	23.99	29.57	43.69	37.40	38.05	27.15
General Mathematics	33.97	38.20	41.12	34.47	34.41	24.95
Agricultural science	23.48	15.51	35.01	43.87	53.46	35.42
Biology	29.68	35.74	49.23	34.68	32.18	22.96
Chemistry	37.86	50.94	44.90	32.76	27.28	30.11
Physics	49.40	41.50	58.06	19.26	25.88	16.52
Technical Drawing	49.43	46.01	31.86	21.16	23.85	39.14
Foods & Nutrition	54.74	58.08	61.47	12.15	14.04	7.93
Literature- in- English	14.31	18.68	32.20	43.49	41.67	24.99

Source: External Examinerôs Report (2006)

APPENDIX E

Statistics Of WAEC School Certificate Examination Results For Science Subjects (1977-1997) In Nigeria

Year	Subject	Total no that sat for exam	Total pass with grade 1-8	% Pass	Total Failure	% Failure
1977	Physics	22,144	12,985	58.8	9,129	41.2
	Chemistry	48,429	24,622	50.8	23,807	49.2
	Biology	85,543	56,483	55.0	29,060	34.0
1979	Physics	23,882	16,352	68.46	7,530	31.54
	Chemistry	61,314	35,687	58.2	25,627	41.38
	Biology	115,585	71,941	62.24	42,644	37.8
1980	Physics	27,875	17,201	61,7	10,674	38.3
	Chemistry	68,179	44,808	65.7	23,371	34.3
	Biology	134,691	75,690	56.2	56,001	43.8
1982	Physics	49,587	22,165	44.69	27,422	55.3
	Chemistry	107,826	40,361	37.45	67,443	62.5
	Biology	237,761	40,973	17.23	196,808	82.74
1983	Physics	60,531	21,162	34.96	39,369	65.04
	Chemistry	113,473	37,374	32.93	76,099	67.07
	Biology	276,990	57,659	20.81	219,333	79.19
1984	Physics	62,688	29,581	47.2	33,087	52.8
	Chemistry	112,729	45,895	40.71	66,834	59.29

Year	Subject	Total no that sat for exam	Total pass with grade 1-8	% Pass	Total Failure	% Failure
	Biology	299,034	91,725	30.67	207,308	69.33
1985	Physics	63,032	30,183	47.86	32,879	52.4
	Chemistry	114,380	44,487	38.89	69,893	61.11
	Biology	350,476	11,252	32.10	237,950	67.90
1986	Physics	79,746	39,773	49.9	39,975	50.1
	Chemistry	134,154	89,532	66.7	44,622	33.3
	Biology	392,075	144,947	38.2	242,128	61.8
1987	Physics	76,656	36,092	47.1	40,564	52.9
	Chemistry	120,765	74,088	61.3	46,677	38.7
	Biology	310,501	109,782	35.2	201,119	64.8
1989	Physics	28,524	10,398	36.45	18,126	63.55
	Chemistry	35,705	13,384	37.48	22,321	62.52
	Biology	87,710	29,931	34.12	57,779	65.88
1990	Physics	63,161	33,064	52.35	30,097	47.65
	Chemistry	80,059	19,964	24.94	60,095	75.06
	Biology	190,386	88,616	46.55	101,770	53.45
1991	Physics	96,742	45,638	47.37	51,104	52.83
	Chemistry	116,526	35,702	30.64	80,824	69.36
	Biology	285,690	155,258	54.34	130,432	45.66
1992	Physics	122,809	57,100	46.49	65,709	53.51
	Chemistry	140,856	67,673	48.04	73,183	51.96
	Biology	355,582	210,321	59.15	145,261	40.85
1993	Physics	152,275	77,544	50.93	74,731	49.07
	Chemistry	170,537	90,641	53.15	79,896	46.85
	Biology	481,034	249,721	51.91	231,313	48.09
1994	Physics	146,000	61,904	42.4	84,038	57.6
	Chemistry	161,232	84,659	52.5	76,573	47.5
	Biology	508,384	196,707	38.7	311,677	61.3
1995	Physics	120,768	64,185	53.3	56,383	46.7
	Chemistry	133,188	87,262	65.6	45,926	34.5
	Biology	453,353	222,891	49.2	230,462	50.8

Year	Subject	Total no that sat for exam	Total pass with grade 1-8	% Pass	Total Failure	% Failure
1996	Physics	132,768	57,321	43.2	75,446	56.8
	Chemistry	144,990	87,676	60.5	57,314	39.5
	Biology	506,628	208,231	41.2	297,789	58.8
1997	Physics	127,486	56,352	44.1	71,234	55.9
	Chemistry	138,572	64,923	46.9	73,649	53.1
	Biology	492,429	203,205	41.3	289,224	58.7

Sources: Ibrahim 2004: 15-18 and Ogunleye, 2000: 314

APPENDIX F

Performance of Candidates in The May/June WASSCE Chemistry 1999-2001 In Enugu State

SEX	ENTRY		GRADES		
	RAW FIGURE	NUMBER THAT SAT	A1-C6	P7 AND P8	F9
MALE	2599	2566	1239(19.96%)	679(10.94%)	577(9.3%)
FEMALE	3697	3641	1371(22.09%)	771(12.42%)	1397(22.51%)
TOTAL	6296	6202	2610(42.05%)	1450(23.36%)	1974(31.80%)
MALE	4469	4375	1773(21.96%)	1245(15.42%)	1357(16.81%)
FEMALE	3756	3699	1509(18.69%)	932(11.54%)	1258(15.58%)
TOTAL	8225	8074	3282(40.65%)	2177(26.96%)	2615(32.38%)
MALE	5956	5819	2836(25.38%)	1676(15%)	1387(12.41%)
FEMALE	5487	5354	2559(22.90%)	1340(11.99%)	1375(12.21%)
TOTAL	11443	11173	5395(48.28%)	3016(26.99%)	2762(24.72%)

APPENDIX G

Students Performance in SSCE O' Level Chemistry (1995-1998)

Year	Total Entry	Total D	Total C	Total P	Total F	Total D+C+P	Total D+C	% D+C	% D	A.R + N.A
1995	868	209	257	273	29	839	566	65	24	1
1996	1072	396	317	209	150	922	713	67	37	4
1997	898	162	253	241	242	656	415	46	18	11
1998	935	124	267	260	264	651	391	42	13	8

Source: Schoolôs Records ï Post primary Education Management Board, Nsukka Zone.

Key ⟶ D =Distinction

C =Credit

P =Pass

% =Percentage

A.R =Awaiting Result

N.A =Number Absent

UNIVERSITY OF NIGERIA, NSUKKA
SCHOOL OF POSTGRADUATE STUDIES

APPLICATIONS FOR APPROVAL OF TITLE OF THESIS/DISSERTATION

NAME OF STUDENT NWEZE, BERNADINE NGOZI
REGISTRATION NUMBER PG/Ph.D/05/39794
DEPARTMENT Science Education
FACULTY Education
DEGREE IN VIEW Ph.D

EXPECTED YEAR OF GRADUATION 2013

PROPOSED TITLE OF THESIS University Matriculation and Entrance Examination Scores as a Predictor of Achievement in Chemistry-Based Courses in Public Universities in Enugu State

SYNOPSIS

INTRODUCTION

The admission of candidates into the Nigerian Universities from the onset was done by different universities through entrance examinations and some laid down criteria as were obtained in these universities. This process of admission was uncoordinated, with some associated problems such as wastage of resources, offer of multiple admissions due to multiple applications and lack of uniform standard. The uncoordinated system of admission gave rise to the establishment of Joint Admision and Matriculation Board (JAMB) to take up the conduct of matriculation examinations, determine admission requirements and placement of successful candidates. The increased responsibility and scope of JAMB together with other inefficiencies and corrupt practices recorded against JAMB, such as leakages of examination papers, cancellation of results and centers, and examination malpractices confirmed the inefficiency and noncredibility of University Matriculation Examination (UME) and the results students present for admission. This necessitated the need for the introduction of the policy of post-UME by the Federal Government, mandating the universities to further screen their candidates before the final admission was given. Cetain problems were found to be associated with post-UME. These include variation in examination structure and question items, content coverage, peculiarities of different Universities, selection by recommendations and governmental interest. All these tried to cast doubt about the validity of these admission processes and therefore created problems that underscored the need for empirical investigation of the predictive validity of the UME, post-UME, and average UME/PUME as predictors of first year results in chemistry-based programmes. Specifically, the study sought to determine the predictive validities of (i) UME chemistry scores (ii) post-UME chemistry scores (iii) average UME/post-UME chemistry scores used in admission into the following chemistry-based courses in the Public Universities: Agricultural Economics, Biochemistry, Industrial chemistry, Electrical Electronics and Medicine. The study was guided by four research questions and four hypotheses.

METHODOLOGY

The study adopted the correlational survey research design. It was carried out in Enugu State, Nigeria. The population of the study was 2450 admitted in 2007/2008 and 2008/2009 academic sessions into the chemistry based faculties in Public universities. The multistage sampling technique was adopted. A total number of 1481 students were purposively selected based on the students with their complete record of the UME, post-UME chemistry scores.Stratified sampling was used based on the grouping of the students according to the faculties and simple random sampling used to draw 5 departments from each university, making a total of 10 departments. The instrument for data collection was a broard sheet containing the studentsô UME, post-UME, combined UME/post-UME chemistry results and their first year results.These were assessed from studentsô departmental records after presenting a letter of introduction obtained from the

Registrar and Vice-chancellor academics of the different universities. Multiple regression analysis was used to respond to the research questions as well as analyse the hypothesis. This was done with the help of statistical package for social sciences (SPSS) software, version 6. The regression coefficients were tested for significance using F-test at 0.05% level of significance.

RESULTS

There were no significant relationships (P<0.05) between studentsô UME chemistry and their first year results in Agricultural Economics (r = 0.07, F = 0.35); Biochemistry (r = 0.11, F=2.73) Electrical Electronics (r=0.01, F=0.10) Medicine and surgery (r=0.14, F=2.70) but significantly relates with their first year results in industrial chemistry (r=0.37, F=48.22) in Federal university. In state university, UME chemistry did not relate significantly (p<0.05) with students first year result in all the departments.

Post-UME chemistry, significantly relate (p<0.05) with students first year result in all the courses in Federal university, Agricultural Economics (r=0.43, F=17.75) Biochemistry (r=0.16, F=5.28); Electrical Electronics (r=0.25, F=11.36); Industrial chemistry (r=0.63, F=194.11); Medicine and surgery (r=0.26, F=10.06). In state university, post-UME chemistry scores, significantly predicted the studentsô first year result only in Electrical Electronics (r=0.28, F= 15.46). The combined UME/post-UME chemistry significantly predicted (p<0.05) students first year result in all the courses but in state university, combined UME/post-UME only predicted students first year result in Electrical Electronics (r=0.21,F=8.20) but did not predict in Agricultural Economics (r=0.03, F=0.09), Biochemistry (R=0.09,F=0.59), Industrial chemistry (r=0.04, F=0.19), and Medicine and surgery (r=0.03, F=0.07).

In Federal university, UME chemistry positively related (p<0.05) with Post-UME scores in Biochemistry (r=0.16, F=5.28) and Industrial chemistry (r=0.52, F=11.13) but did not relate significantly with post-UME scores in Agricultural Economics (r=0.04, F=0.12), Electrical Electronics (r=0.01, F=0.01) and Medicine (r=0.00, F=0.00). In state university, UME chemistry predicted with students post-UME chemistry in Biochemistry (r=0.28, F=5.2), Electrical Electronics (r=0.33, F=22.94) but did not predict with post-UME chemistry in Agricultural Economics (r=0.16, F=3.27), Industrial chemistry (r=0.15, F=3.00) and Medicine and surgery (r=0.23, F=3.34)

Nweze, Bernardine Ngozi Date Prof. D. N. Ezeh Date

(Student) (Supervisor)

Prof. D. N. Ezeh Date Prof. Ucheze

Date (Head of Department) (Faculty Rep, SPGS)