Analysis of Students’ Performance in Chemistry in the West African Senior School Certificate Examination (WASSCE) and National Examination Council (NECO) from 2015-2018

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ABSTRACT: The study analysed the students’ performance in Chemistry in the West African Senior School Certificate Examination (WASSCE) and National Examination Council (NECO) from 2015-2018. An expo-facto design of research type was used for the study. The population for this study comprised of all secondary schools who presented chemistry students for WASSCE and NECO in Ekiti State within 2015-2018. The sample size of six thousand and seventy-two (6072) from WASSCE 2015-2018 and five thousand and forty-three (5043) chemistry students from NECO 2015-2018 were used for the study. The instrument for data collection for the study was WASSCE and NECO 2015-2018 results of chemistry students in secondary schools in Ekiti State. The formulated hypotheses were tested using inferential statistics of t-test. The findings of the study revealed that there is significant difference in the performance of students that sat for chemistry in 2015 WASSCE and NECO; there is no significant difference in the performance of students that sat for chemistry in 2016 WASSCE and NECO; that there is no significant difference in the performance of students that sat for chemistry in 2017 WASSCE and NECO; there is significant difference in the performance of students that sat for chemistry in 2018 WASSCE and NECO; and there is significant gender difference in the performance of students that sat for chemistry WASSCE and NECO Examinations between 2015 and 2018. Hence, based on the findings, appropriate recommendations were made.

Key Words: Chemistry, student’s performance, senior school, national examination

Introduction
Education is regarded as the key to success; as a result it is given huge attention by the society, politicians and other stakeholders in their attempt to promote societal norms, national philosophy and vision. Education can be described as the holistic process that characterized human learning, through which knowledge is imparted, pass across from one generation to another, faculties trained and skills developed. Secondary schools not only occupy a strategic place in the educational system in Nigeria, it is also the link between the primary and the university levels of education. Education is segregated into different level ranging from primary to secondary and tertiary education. All the levels are vital to human learning and academic prowess but very significant is the impact of secondary school education as it serves as the link between primary and tertiary education. Asikhai (2010) opined that education at secondary school level is supposed to be the bedrock and the foundation towards higher knowledge in tertiary institutions. It is an investment as well as an instrument that can be used to achieve a more rapid economic, social, political, technological, scientific and cultural development in a country. It is rather unfortunate that the secondary schools today are not measuring up to the standards expected of them.

Science and technology has proven to be the basic tools for industrial and national development. Effective teaching of science and students’ performance and effective harness of its potential could bring about economic and social happiness by providing and improving the welfares of the citizen. Consequently, the teaching and learning of science has become a great concern to scientists and researchers as this has brought about questionable doubt in terms of students performance in science oriented subject. There have been public outcries over the persistently poor performance of secondary school students in science oriented subject in public examinations such WAEC and NECO. It is because of the essential role accredited to education that a substantial portion of national resources is allocated for education. The extent of success in every examination situation is when the result gives a direction to the teaching and learning situation. A result oriented assessment for learning demands that after, the administration of a test instrument on students, feedback must be given and a detail analysis of the students’ performance.

Evaluation is the passing of decision or judgment on a particular trait in accordance with a test which validly and reliably measures the presence of that trait (Ololube, 2008). Evaluation involves both...
quantitative and qualitative description of a pupil’s behaviour, and the passing of value judgment concerning the desirability of that behaviour. Since evaluation remains indispensable in any academic programme, teaching and instructional duty are rendered incomplete or lacking until an evaluation of the outcome of instruction has been performed. Evaluation agencies, which also act as examining bodies, are tasked with maintaining a common standard in the development and administration of public examinations. Evaluation agencies were set up to promote education, to co-ordinate educational programmes, and to control and monitor the quality of education in educational institutions, the essence of which is the organization of public examinations so as to provide uniform standards to all test takers, irrespective of the type or method of instruction they have received. Some of these examination bodies in Nigeria include the West African Examinations Council (WAEC), the National Examination Council (NECO), the Joint Admission and Matriculation Board (JAMB), and the National Business and Technical Examination Board (NABTEB).

The West African Examination Council (WAEC) was established in 1952 to replace University of Cambridge Local Examination syndicate, the City and Guide London Institute, the London Chamber of Commerce and Royal Society of Arts. The certificate awarded has gained national and international recognition since its establishment. However, WAEC has been intensely criticized by scholars and parents for its deficiency. Some of the problems identified include examination malpractices, indiscriminate seizure of candidates’ results, monopoly, delay in the release of examination results, mass cancellation of results, leakages and corrupt staff, among others (Ayodele, 2004). To solve these problems, committees were set up in University of London, Institute of Education and they recommended that other examining bodies should be set up to reduce the lapses of the embattled WAEC. Based on this recommendation, the National Board for Educational Measurement (NBEM) was transformed to National Examinations Council (NECO) to conduct national examinations simultaneously with WAEC so as to break the monopoly of WAEC thus, enabling Nigerians to monitor and maintain their own educational standard, to reduce the work load of WAEC which many believed had been over stretched beyond capability (Kolawole, Oginni & Fayomi, 2011).

National Examination Council (NECO) was established in 2001 following the passage of an Act of the National Assembly. It was established as an alternative to West African School Certificate Examination (WASCE) for secondary schools. Consequently, students who are not opportune to register for the WAEC Senior School Certificate Examination (SSCE), could register for the NECO SSCE and ever since its establishment in 2001, it has prospered. The two O’ Level examination bodies in Nigeria were found to be similar considering the distribution of examination across the levels of the cognitive domain is concerned. Public examination for deciding movement on the ladder of educational pursue in Nigeria is generally accepted by Nigerian students (Longe & Ajike, 2014).

Academic performance of students is the yardstick for testing the educational quality of a nation. Hence, it is expedient to maintain a high performance in internal and mostly external examinations. For some years now, reports on the pages of newspapers and research findings have shown the abysmal performance of students of secondary schools in public examinations. The persistent decline in students’ performance in public examinations is not only frustrating to the students and the parents, its effects are equally grievous on the society.

This poor performance often resulted in poor enrolment of students in science subject like Chemistry at the secondary school. The poor performance of students could be attributed to a number of reasons including poor participation of students and poor level of exposure in the practical aspect of science especially Chemistry. Over the decade, the performance of students in the science subject like Chemistry was not encouraging in spite of the huge amount of money expended on the purchase of science materials and equipment. The setting of public examination is highly skilled and professional which involves not only the setting of questions and devising activities of testing the achievement of a comprehensive range of curriculum objectives, but also of ensuring that many different examiners and script markers work to the same standard. The standard of performance has to be established not only for each subject of paper, but care has to be taken to ensure that the levels expected in one curriculum subject are comparable with those of all other subjects (Bandele, 2013).

Concept of Academic Performance: Academic performance refers to the degree of a student’s accomplishment in his or her tasks and studies. The most well-known indicator of measuring academic performance is grades which reflect the student’s score for their subjects and overall tenure (Shehzad & Aziz, 2019). Narad & Abdullah (2016) conceptualized academic performance as the knowledge gained by students which is assessed by marks by a teacher and/or educational goals set by students and teachers to be achieved over a specific period of time. These goals are measured by using continuous assessment or examinations results. Academic performance is seen as the knowledge attained or skills, shown in the school subject. It is the school evaluation of the classroom work on the basis of the grades awarded. Academic
achievement may also refer to a person's strong performance in a given academic arena (Shehzad & Aziz, 2019). A student who earns good grades or awards in science has achieved in the academic field of science.

Anselmus (2011) asserted that academic performance is a cardinal concept in education. The centrality of this concept is derived from the goal of instructions which is to bring about desire changes in knowledge, skills and attitude of students. For example, people send their children to school in order to acquire certain competencies their preference on the attributes of interest provides an indication of the degree of efficiency of the machinery of education. In the formal school system, students’ academic performance can be assessed at the main points which give rise to three types of performance assessment and these are diagnostic, formative and summative evaluation or assessment.

The diagnostic assessment or evaluation take place as the course commences, formative evaluation are conditions where teachers gives periodic test for example continuous assessment exercise. While summative tests are used by classroom teachers and external examination bodies and grades are awarded. The grades of ABC and F are awarded to students according to students' performance by their teachers or examiner. The assessment competence of a teacher includes knowledge and skills which are critical to a teacher’s role as educator (Evie, 2016). Academic performance is designated by test and examination scores or marks assigned by the subject teachers. Student performance can be low, average or high. Performance of students can be affected by several factors, which can be student related factors, school related factors (teacher) and home related factors (Kimani, Kara & Njagi, 2013).

Students performance is driven by helping teachers construct learning scenario that are meaningful to individual students, relevant to their circumstances and cognizant of their prior learning and potential. Understanding what students have achieved, what they should need next and how to effectively reach their destination requires a coordinated effort, bringing together best of breed learning and assessment tools with engaging and effective content and instruction. Hamilton–Ekeke (2013) stated that the scope of teachers’ professional role and responsibilities for students’ assessments may be described in terms of the following activities; activities occurring prior to instruction, activities occurring during instruction and activities occurring after instruction.

**West African Examination Council (WAEC) and National Examination Council (NECO) as major examination bodies in Nigeria**

Nigerian students obtain their Senior School Certificate by passing examinations administered by either the Western African Examinations Council (WAEC) or the National Examinations Council (NECO) (Dibu & Ojerinde & Faleyin, 2005). Many universities have also begun to administer their own entrance examinations due to allegations that results in these external examinations have been manipulated (International Organization for Migration, [IOM], 2007).

Established in 1952, WAEC’s mandate is to determine examinations required in the public interest in West African Countries. WAEC has five member countries: the Gambia, Ghana, Liberia, Sierra Leone and Nigeria. From 1952 to 1968, WAEC performed its duties well without much criticism. Criticisms started becoming louder in 1967 as a result of massive failure plus other variables, which made the country Nigeria to hold a national conference in 1969. The conference held in 1969 heralded the development of yet another curriculum different from the one Nigerians were used to prior to independence. This curriculum conference was a turning point in the curriculum development history of Nigeria, mathematics inclusive. The outcome of this conference was what gave birth to a new curriculum which comprises some part of the pre-independence curriculum and some new aspects (like Modern Mathematics Curriculum) were introduced (Anibueze, 2015). Anibueze (2015) stated that the WAEC adopted the new curriculum in 1974 but the 1974 results were very poor.

However, from 1970s, some issues appeared to be getting too much for WAEC to handle such as timely release of results, massive failure, uncontrollable population explosion of candidates, overloading of works, cases of leakage of examination papers and increased rate of examination malpractice (Kolawole, 2007; Okoye & Nwafor, 2009). The massive leakage of question papers in 1977 was the climax which led the Federal Government of Nigeria to set up the Sogbetan Commission of Inquiry to investigate the situation. It was as a result of these that made the Federal Government of Nigeria to establish National Technical Examination Board (NABTEB) for technical and business subjects, National Teachers Institute (NTI) for teachers Grade two certificate examination and National Examinations Council (NECO) for Senior Secondary school Certificate Examination These were established based on the Sogbetan Commission’s recommendation to the Federal Government of Nigeria in April 1999. The Sogbetan Commission’s recommendation also brought about the transformation of the National Board for Educational Measurement (NBEM) that was established under degree no 69 of August 1993.
In 1999, the government of Nigeria created NECO, which was given the responsibility to administer Secondary School Certificate Examinations (SSCE) (NECO, 2005). NECO administered its first SSCE in 2000. Famakinwa (2009) revealed that NECO was an attempt to bridge the educational gap between the different geographical sections of the country. National Examinations Council (2005) revealed that its arrival was an opportunity for choice of examination body for candidates to patronize. Ahmed (2014) however augured that NECO had standard quality of question papers set and grades when compared to Broom’s principles of evaluating students which, according to him, has made NECO to be superior to WAEC.

WAEC and NECO administer the SSCE twice a year: internal or school candidates (i.e., those who are finishing their last year within the secondary school system) write the examination in the spring or early summer, while external or private candidates (i.e., those who are outside the school system) write the exam in late autumn (NECO, 2005, WAEC, 2009). Candidates are tested on a minimum of eight and a maximum of nine subjects. The SSCE grading system is as follows: A1 – Excellent, B2 – Very Good, B3 – Good, C4 – Credit, C5 – Credit, C6 – Credit, D7 – Pass, D8/E8 – Pass and P9 – Fail. The results of the SSCE are reportedly used to obtain employment, to qualify to run in elections and to gain admission into university or college (NECO, 2005). According to the NECO website, however, universities and colleges in Nigeria are required by law to recognize certificates awarded by both NECO and WAEC. Looking at studies that have attempted to compare WAEC and NECO, it would be observed that most of them were based on opinions. While recognizing the fact that opinions could serve as indicators, they are not the best to be used in taking decisions, when it is possible to obtain facts and those authors that did not rely on opinions attempted to compare grades obtained in the university by holders of the two certificates (Okoye & Nwafor, 2009).

Apart from the comparison of grades, Maiwada (2006) had called for a comparison of the question papers set by the two examination bodies to see if the variances in the performances of candidates possessing the two certificates could be explained using them. Daniel (2005) had made an attempt to do this comparison, but he merely asked teachers and students their opinions about the bodies.

**Factors affecting the academic performance of secondary school students’ in Chemistry**

Chemistry is the catalyst of sustainable national growth and development. Chemistry is offered at the senior secondary classes in order to help student learn important aspects of scientific concepts that would enable them live effectively in their immediate environment (Jimson, 2018). Despite the importance of chemistry and its education value which is relevant to the need of individual learner, economics and technological breakthrough of a nation and the effort of researchers to improve on its teaching and learning, the performance of students in the subjects is not still encouraging, this shows that the level of performance is still not good enough. Chemistry as a subject is universally accepted and realized not only by students but also people who are keen to know about chemicals. The subject provides broader knowledge about science in general which is compulsory to every individual that aim to study the environment or climate change related courses.

The variables which affect Chemistry teaching are not clear whether it is because of the negative attitudes of students towards Chemistry or the methodology used by teachers or because of absence of instructional materials in teaching Chemistry, absence of inspiration, and poor foundation particularly in the essential level when it was consolidated with other disciplines or otherwise. The issue of language seems to be another area of discussion (Shamhuna, Abdalla & Abdulla, 2014). In secondary schools, English is the medium of instruction and it is taught as a subject of its own according to the curriculum.

Studies have been conducted on causes and factors that influence students’ academic performance in different subjects such as chemistry (Hassan, Ali, Salum, Kassim, Elmoge & Amour, 2015). Their findings show that there are several causes and factors, which hinder smooth learning and teaching of Chemistry. Reports on learning and learner characteristics showed positive correlation between cognitive preferences and student’s performances in Chemistry. Schools inspection is vital as a means of monitoring the delivery of education adherence to the stipulated curriculum and standards. Studies on resources and laboratory work examined the relationship between laboratory strategies and student achievement in Chemistry and moreover, status study showed that laboratory activities in selected schools was still more or less an extension of the theoretical class rather than a place to carry out investigation (Hassan et al., 2015). A set of behaviours (manipulated apparatus observing activity, among others) correlated strongly with manipulative skills and conduct of the experiment, while students’ attitude to laboratory work correlated strongly with manipulation of apparatus (Fadzil & Saat, 2017).

Since teachers play a central role in improving the performance of the students in academic subjects, effective teaching is a major task to be emphasized, the two ways in which teachers can do to improve their teaching and help student improve on their learning linked causes of misconceptions of concepts in chemistry learning to teacher ineffectiveness, inadequate textbooks and poor applications of
Science skills (Hassan et al., 2015). Studies on variables of teaching compared different methods of teaching on ability grouping, cooperative learning and enhancement strategies and found poor performances of students as a result of poor classroom teaching and students’ attitude to school. Hassan et al. (2015) showed that project method improved achievements than lecture method while found that both inquiry-based and refined traditional approaches could be employed as viable alternatives in chemistry teaching.

Among the factors that have been identified to be responsible for poor performance in chemistry are poor methods of instruction, teacher attitude, laboratory inadequacy, poor science background and non-availability of effective teaching and learning resources in classrooms (Agoro, 2018). The poor achievement of student in chemistry has continued to be a major cause of concern to all, particularly those in the mainstream of chemical education in Nigeria (Olagunju, Adesoji, Iroegbu & Ige, 2018). Despite huge investment of the stakeholders in this sector, the performance of students continue to be generally poor.

Several factors have been advanced to affect students’ poor performance. It has been reported that such include the student factor, teacher factor, societal factor, the governmental infrastructural problem, language problem examination body related variables, curriculum related variables, test related variables, textbook related variables and home related variables (Nweze and Uzochukwu, 2019). Saage (2009) identified specific variables such as poor primary school background in science, lack of incentives for test, lack of interest on the part of students, students not interested in hard work, incompetent teachers in the primary school, large classes, fear of the subject psychologically among others. However, students do not perform well in Senior School Certificate Examination (SSCE) in chemistry (Eze, 2010).

The implication of a student failing Chemistry at the ordinary level is that he/she will not be enrolled for science based courses at institutions of higher learning. The WAEC Chief Examiner’s Reports between 1999 and 2005 also showed that the percentage of passes in Chemistry is low across Nigeria, thereby affecting the general performance of most candidates who sat for Senior School Certificate Examination over the years. WAEC Chief Examiner’s Reports (2016) also showed that Chemistry students’ poor performance in Chemistry paper 2 (theory) over the years, arises from students’ having difficulties in tackling questions which required explanation, making logical deductions, calculations, plotting of graph, energy profile diagrams, distinguishing between nuclear and ordinary chemical reactions, chemical symbols and formulae. They lost marks for among other reasons: Inability to write balanced equations with the state symbols; non-adherence to rubrics; poor knowledge of basic chemical principles; poor communication skills; wrong spellings.

Studies on variables of teaching found poor performances of students to be as a result of poor classroom teaching and students’ attitude to school and some topics have been identified in ‘O’ level Chemistry, which teachers perceived as difficult to teach and this difficulty correlated significantly with their professional qualifications and years of teaching experience. The implication of this is that they could not teach well because of lack of confidence, experience and qualification(Gero, 2011). According to Gero (2011), researchers have investigated the issue of teacher quality in terms of their qualifications, commitment to teaching and the nature and scope of support given to Chemistry teachers to enable them offer high quality Chemistry teaching at the classroom level and it was revealed that Chemistry is a dynamic subject and so teachers need to be continually retrained so as to keep abreast of new developments in Chemistry. Where this does not happen many Chemistry teachers will be teaching concepts that are obsolete or wrong to students.

**Students’ performance in Senior Secondary School Chemistry:** Academic performance is the level of attainment of the predetermined learning objectives by the learner. This is mainly shown by the results of either internal examinations in the school or external examinations like Senior School Certificate Examination (SSCE). Poor academic performance in senior secondary school Chemistry is alarming and disturbing. Reports of researchers and WAEC chief examiners show a continuous dwindling, and poor performances of candidates for over three decades in senior secondary school Chemistry (WAEC, 2016).

According to Njoku (2009), the trend in students’ performance in chemistry has been poor for some years. Warra, Utomo, Gunu & Babayemi (2009) opined that there is urgent need to improve on poor performance in both internal and external Chemistry examinations. Even in internal examination, performance in Chemistry could be as bad as 22.2% pass. Something urgent therefore needs to be done to salvage the situation of poor students’ achievement in Chemistry hence the need for this research work.

**Gender Influence and Secondary School Students’ Performance in Chemistry:** Gender simply represents the socially/culturally constructed characteristics and roles which are associated to males and females in any society (Nnamani and Oyibe, 2016). Gender is the outcome of cultural learning and socialization which continues throughout life because undue attention is paid to socialization during childhood. It is socially...
constructed and not biologically determined. Gender ascribes some unique characters to males and others to females. Such characterization is never genetical but social. Males are assigned such attributes as boldness, aggressiveness, logical in reasoning, intelligence, self-confidence, dominion/assertiveness, tactfulness, economic in use of words among others whereas females are assigned the opposite attributes such as fearfulness, submissiveness, tactlessness and talkativeness among others (Nnamani & Oyibe, 2016).

Nzewi (2010) revealed that there is gender disparity with females being disadvantaged in the teaching and learning of science subject like Chemistry. The recent move towards science education reform is based on the fact that the traditional education environment neither attracts nor retains sufficient number of women in science subjects like Chemistry (Nzekwe, 2018). Nzekwe (2018) further stated that boys perform better than girls in chemistry and that gender sensitization instructional approach is more effective in the achievement and interest of students in Chemistry than the conventional instructional approach. Nwachukwu (2008) reports that exposing female students to small group cooperative interaction learning style makes them attain high cognitive achievement in Chemistry. Nzewi (2010) opined that females prefer cooperative academic environment for optimal performance to competitive learning environment. While comparing boys and girls performances in science, it was reported that boys always dominate learning activities in coeducational schools, when the instructional strategy adopted is competitive. Results from literature reviewed showed inconsistency on the influence of gender on students' achievements in science (chemistry) (Nzekwe, 2018). Much work has not been done on the gender influence on the effects of instructional approach on students' achievement and interest in difficult secondary school Chemistry concepts.

**Teaching Method in Chemistry:** Teaching methods are the means for helping students to study effectively. Teaching methods concern the tactics teachers use to meet teaching objectives, including instructional organization and techniques, subject matter, and the use of teaching tools and materials. Ameh & Dantani (2010) observed that methodology is very vital in any teaching-learning situation and the method adopted by the teacher may promote or hinder learning. It may sharpen mental activities which are the bases of social power or may discourage initiatives and curiosity thus making self-reliance and survival difficult. Teachings should be involved in “formulating the goals and objectives for teaching procedures that will best achieve those objectives, carrying out procedures, evaluating the successes and failures”.

Teaching method is a product of the combination of strategies, tactics and techniques (Estew, 2011). Shymansky and Kyle (2014) were of the view that instructional strategy includes the materials, media, setting and behaviour the teacher uses to create an environment to produce an effect. As a result, the achievement of the instructional goals and the choice of suitable teaching strategies are not separate. Erdem (2012) emphasizes four features of teaching strategies. First, teaching strategies should improve a student’s predisposition to learning by increasing the desire for studying and understanding new situation. Second teaching strategies should be structured to help learners rapidly capture the information distributed through the instruction, and develop learner’s abilities in assimilating and using knowledge possessed. Third, teaching strategies should be sequenced in the most effective manner so that students can comprehend new knowledge by applying their prior experiences. Teaching strategies should be designed to allow students to genuinely engage in their learning. Different teaching strategies will lead to varied instructional outcomes and an instructor can choose for himself or herself strategies which are appropriate to his or her intension in teaching.

A particular strategy may be better than another one for a given purpose. Yet a single strategy may not be applicable for all students and all types of subject matter. Consequently, the selection of strategies should be in accord with an individual population of students and the particular subject matter (Akdemir, Kaya & Akdemir, 2016). The choice of strategies and tactics relies upon the selected learning activities and thus “the key to (teaching) method is to bring about the desired learning in students by selecting the proper strategies and tactics and consequently the proper content and techniques”. According to Nbina & Obamanu (2011) teachers should match how to teach with what and to whom to teach, in developing a variety of methods for facilitating student achievement of determined outcomes. For effective instruction, a science (chemistry) teacher must be able to use several science teaching methods and to implement them where they are applicable and most effective (Omwririren & Ibrahim, 2016).

The traditional lecture approach often consists of a teacher centered methodology in a face to face capacity. Omwririren & Ibrahim (2016) asserted that given the prevalence of this prescribed mode of instruction, there has been a shift in students attending classes with the intention of gaining new and meaningful knowledge. However, the incentive in attending lectures now is to get the current information needed to pass the assessment. In these types of lecture environments, the formal style of lecturing alone has not proven to be effective. However, researchers have instead found that combining traditional methods
of lecturing with learner centered methodologies can be a more productive approach. When instructors allow for a brief traditional lecture followed by discussions, group work, or application, students demonstrate a better understanding of the material. Omwirehren (2015) additionally sought to replace some lecture time with "interactive engagement and cooperative work". Indeed, as instructors have labored to accommodate learners, the structure of lectures has taken on more innovative techniques.

Chemistry as a science subject is bulky in nature. The subject teachers usually adopt lecture method in teaching in order to cover the syllabus within the stipulated time and this do not give room for proper understanding of the subject. Demonstration approach is a practical method of teaching. It involves showing, doing and telling something (Omwirehren & Ibrahim, 2016). The onus is therefore on the teacher to display the steps in the process and explain them accurately and clearly, while students are expected to practice by repeating the things the teacher has done. This method have been noted for bridging the gap between theory and practice. It controls the rate of breakages and accidents as students watch the teacher do it before attempting to do the same and enable the teacher to teach manipulative and operational skills. Students’ persistent poor performance has been partly ascribed to inadequate teaching and instructional methods adopted by science teachers (Bouchlaghem & Mansouri, 2018).

The deplorable performance of secondary school students in science subjects has been identified and related to persistent use of the traditional mode of instruction as one of the major short-coming affecting the learning and higher achievement in science subjects (Omwirehren & Ibrahim, 2016). The situation is further exacerbated by the abysmal performance recorded in NECO/WAEC Annual report for 2010-2014 (WAEC Report, 2014) for chemistry and other allied sciences. This therefore calls for the adoption of activity-based strategy that will not only be stimulating and motivating to the learners but should also have the potential of improving learning outcomes significantly.

Students’ Attitude towards Teaching and Learning of Chemistry: Attitude, motivation, and genuine interest are the most important student characteristics associated with successful studies. Attitude towards chemistry is essential; it denotes interests or feelings towards studying chemistry. Attitude and academic achievement are important outcomes of science education in secondary schools. Students’ attitude and interest could play substantial role in students’ decision to study science (Delmang & Gongden, 2016). Students’ attitudes towards learning chemistry fueled many study projects for a long time; in the late 1980s there was a significant decline in chemistry education, and towards the turn of the century, the issue of attitudes towards an interest in chemistry became an international concern; Recent publications presented a gloomy picture regarding students’ ignorance in chemistry, and decline in enrollment in science-based careers (Hofstein & Mamlok-Naaman, 2011).

Small percentage of students (about 4%) expressed the wish to study chemistry at the university level and over the years few studies that examined students’ attitudes towards chemistry taught in secondary schools (Najdi, 2017). Attitude to learn chemistry benefits all young students by fostering their chemical perceptive, which is the capability to recognize chemical concepts, define some key-concepts, identify important scientific questions, use their understanding of chemical concepts to explain phenomena, use their knowledge in chemistry to read a short article, or analyze information provided in commercial ads or internet resources (Najdi, 2017).

Attitude is a predisposition to respond in a favorable or unfavorable manner with respect to a given attitude object. Yara (2009) mode of defining attitude in science (chemistry) however, focuses on scientific approach assumed by an individual for solving problems, assessing ideas and making decisions. It is students’ beliefs and attitudes that have the potential to either facilitate or inhibit learning. Many factors could contribute to student’s attitude towards studying chemistry such as; age, career interest, social view of science and scientists, social implications of chemistry or cognitive styles of students (Uzum, 2018).

Salta & Koulougliotis (2011) identified the factors that could positively influence students’ attitude to learn chemistry; these factors could be organized into three main categories: teaching approaches, educational tools, and non-formal educational material and activities. Sirhan (2007) revealed that there is a negative attitude regarding the usefulness of the chemistry courses for the students’ future career, and a neutral attitude regarding the interest in the chemistry course itself. Science teachers bear on their shoulders a huge responsibility of promoting and developing students’ positive attitudes regarding science as a school subject (Delmang & Gongden, 2016). There is a relationship between attitude and methods of instruction, and also between attitude and achievement; and that it is possible to predict achievement from attitude scores reported Adesoji (2008), & Popoola (2008).

Surveys conducted in Europe (Osborne & Dillon, 2008) among large groups of young students clearly showed that girls and boys differ in their interest in science-related topics. A study guided by Chang...
(2009) indicated that boys showed higher learning interests in sustainability issues and scientific topics than girls. However, girls recalled more life experiences about science and technology in life than boys (Najdi, 2017).

Statement of the Problem

The level and extent at which students fail in Chemistry pose a lot of threat and raise questions about chemistry teaching and learning and overall students’ academic performance in the subject. Although a lot issues may be responsible for the massive failure of students in chemistry both in WAEC and NECO examinations. These factors could be in the area of man power needs, quality and quantity of staff; the nature of chemistry laboratories in terms of materials and equipment for effective teaching and learning of and extent to which practical are conducted. This therefore, calls for urgent attention and solutions by Government and all the stake holders in the chemistry education. At first, the main reason for creating NECO as examination body was to give respite to students on the consequent failure of students in WAEC but it is obvious today that students do not only perform poorly in WAEC but they do fail woefully in NECO. If this continues to be then there is what could have been responsible for this trend and which one of the examination is doing performing better? It is with this opinion that the researcher get motivated to carry out this study on the analysis of students’ performance in Chemistry in the West African Examination Council (WAEC) and National Examination Council (NECO) put into consideration year 2015-2018.

Research Questions

These research questions were raised to guide this study:
1. Is there any difference in the performance of students in chemistry WAEC and NECO in 2015?
2. Is there any difference in the performance of students in chemistry WAEC and NECO in 2016?
3. Is there any difference in the performance of students in chemistry WAEC and NECO in 2017?
4. Is there any difference in the performance of students in chemistry WAEC and NECO in 2018?

Hypotheses

The following hypotheses were tested at 0.05 level of significant:
1. There is no significant difference in the performance of students that sat for chemistry in 2015 WASSCE and NECO Examinations.
2. There is no significant difference in the performance of students that sat for chemistry in 2016 WASSCE and NECO Examinations.
3. There is no significant difference in the performance of students that sat for chemistry in 2017 WASSCE and NECO Examinations.
4. There is no significant difference in the performance of students that sat for chemistry in 2018 WASSCE and NECO Examinations.
5. There is no significant gender difference in the performance of students that sat for chemistry WASSCE and NECO Examinations between 2015 and 2018.

Methodology

An expo facto design of research was adopted for this study. The researcher conducted this study in Ekiti State, Nigeria. Since, all senior secondary school students in Ekiti State present candidates for both WASSCE and NECO, thus all the senior secondary schools across Ekiti State were used for the study.

The population for this study comprised of all secondary schools who presented chemistry students for WASSCE and NECO in Ekiti State within 2015-2018.

The sample size of six thousand and seventy-two (6072) from WASSCE 2015-2018 and five thousand and forty-three (5043) chemistry students from NECO 2015-2018 were used for the study.

One research instrument was used for this study. The instrument was grade and scores of students in Chemistry from 2015-2018WASSCE and NECO from the selected public and private secondary schools.

To ensure the face and content validity, the result was submitted to research supervisor for face and content validity.

The WASSCE and NECO results of Chemistry students in secondary schools were gathered and sort out the population into type of schools, gender, grade and performance students in chemistry for analysis.

In analyzing data gathered for this study, the researcher employed a descriptive statistic by the use of frequency count and percentage to analyze the demographic data collected while inferential statistic of t-test was used to test the hypotheses.
Results and Discussion

Question 1: Is there any difference in the performance of students in chemistry WAEC and NECO in 2015?

Table 5: Frequency and Percentage of Students’ Grade - 2015

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<tr>
<th>Grade</th>
<th>WAEC 2015</th>
<th>NECO 2015</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
</tr>
<tr>
<td>A1 – B3</td>
<td>1452</td>
<td>24.0%</td>
<td>1170</td>
</tr>
<tr>
<td>C4 – C6</td>
<td>3128</td>
<td>52.0%</td>
<td>2647</td>
</tr>
<tr>
<td>D7 – E8</td>
<td>912</td>
<td>15.0%</td>
<td>743</td>
</tr>
<tr>
<td>F9</td>
<td>580</td>
<td>9.0%</td>
<td>350</td>
</tr>
</tbody>
</table>

Source: Ekiti State Ministry of Education, Science and Technology, 2015

Table 5 above shows the frequency and percentage of students’ grades in WAEC and NECO examinations in Ekiti state for the year 2015. The table indicates that for WAEC; 1453 (24.0%) students obtained “A1 – B3”, 3128 (52.0%) students obtained “C4 – C6”, 912 (15.0%) students obtained “D7 – E8”, and 580 (9.0%) students obtained F9. Similarly, for NECO, 1170 (23.8%) students obtained ‘A1 – B3”, 2647 (53.9%) students obtained “C4 – C6”, 743 (15.1%) students obtained ‘D7 – E8” and 350 (7.2%) students obtained F9 in the examination.

Question 2: Is there any difference in the performance of students in chemistry WAEC and NECO in 2016?

Table 6: Frequency and Percentage of Students’ Grade - 2016

<table>
<thead>
<tr>
<th>Grade</th>
<th>WAEC 2016</th>
<th>NECO 2016</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
</tr>
<tr>
<td>A1 – B3</td>
<td>2222</td>
<td>42.8%</td>
<td>973</td>
</tr>
<tr>
<td>C4 – C6</td>
<td>2181</td>
<td>42.0%</td>
<td>2991</td>
</tr>
<tr>
<td>D7 – E8</td>
<td>341</td>
<td>6.6%</td>
<td>644</td>
</tr>
<tr>
<td>F9</td>
<td>445</td>
<td>8.6%</td>
<td>547</td>
</tr>
</tbody>
</table>


Table 6 above shows the frequency and percentage of students’ grades in WAEC and NECO examinations in Ekiti state for the year 2016. The table indicates that for WAEC; 2222 (42.8%) students obtained "A1 – B3”, 2181 (42.0%) students obtained "C4 – C6", 341 (6.6%) students obtained "D7 – E8", and 445 (8.6%) students obtained F9. Similarly, for NECO, 973 (19.0%) students obtained ‘A1 – B3”, 2991 (58.0%) students obtained "C4 – C6", 644 (12.0%) students obtained “D7 – E8” and 547 (11.0%) students obtained F9 in the examination.

Question 3: Is there any difference in the performance of students in chemistry WAEC and NECO in 2017?

Table 7: Frequency and Percentage of Students’ Grade - 2017

<table>
<thead>
<tr>
<th>Grade</th>
<th>WAEC 2017</th>
<th>NECO 2017</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
</tr>
<tr>
<td>A1 – B3</td>
<td>3524</td>
<td>67.0%</td>
<td>641</td>
</tr>
<tr>
<td>C4 – C6</td>
<td>1370</td>
<td>26.0%</td>
<td>2836</td>
</tr>
<tr>
<td>D7 – E8</td>
<td>120</td>
<td>2.0%</td>
<td>1478</td>
</tr>
<tr>
<td>F9</td>
<td>244</td>
<td>5.0%</td>
<td>874</td>
</tr>
</tbody>
</table>

Source: Ekiti State Ministry of Education, Science and Technology, 2017

Table 7 above shows the frequency and percentage of students’ grades in WAEC and NECO examinations in Ekiti state for the year 2017. The table indicates that for WAEC; 3524 (67.0%) students obtained "A1 – B3”, 1370 (26.0%) students obtained “C4 – C6”, 120 (2.0%) students obtained "D7 – E8”, and 244 (5.0%) students obtained F9. Similarly, for NECO, 641 (11.0%) students obtained ‘A1 – B3”, 2836 (48.8%) students obtained “C4 – C6”, 1478 (25.3%) students obtained “D7 – E8” and 874 (14.9%) students obtained F9 in the examination.

Question 4: Is there any difference in the performance of students in chemistry WAEC and NECO in 2018?

Table 8: Frequency and Percentage of Students’ Grade - 2018

<table>
<thead>
<tr>
<th>Grade</th>
<th>WAEC 2018</th>
<th>NECO 2018</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
</tr>
<tr>
<td>A1 – B3</td>
<td>600</td>
<td>26.0%</td>
<td>1452</td>
</tr>
<tr>
<td>C4 – C6</td>
<td>1134</td>
<td>49.0%</td>
<td>3128</td>
</tr>
<tr>
<td>D7 – E8</td>
<td>335</td>
<td>14.0%</td>
<td>912</td>
</tr>
<tr>
<td>F9</td>
<td>243</td>
<td>11.0%</td>
<td>580</td>
</tr>
</tbody>
</table>
Table 8 above shows the frequency and percentage of students’ grades in WAEC and NECO examinations in Ekiti state for the year 2018. The table indicates that for WAEC; 600 (26.0%) students obtained “A1 – B3”, 1134 (49.0%) students obtained “C4 – C6”, 335 (14.0%) students obtained “D7 – E8”, and 243 (11.0%) students obtained F9. Similarly, for NECO, 1452 (24.0%) students obtained “A1 – B3”, 3128 (52.0%) students obtained “C4 – C6”, 912 (15.0%) students obtained “D7 – E8” and 580 (9.0%) students obtained F9 in the examination.

Test of Hypotheses

Hypothesis 1: There is no significant difference in the performance of students that sat for chemistry in 2017 WASSCE and NECO. The table revealed that mean score for students’ performance in 2017 WASSCE (1314.5) was greater than the mean score of students who sat for 2017 NECO (1457.3) with a mean difference of (142.8). The t-test revealed that t-calculated (0.02) was less than the critical t-value (2.45) at the 0.05 significance level. Hence, the null hypothesis was not upheld. This means that there is significant difference in the performance of students that sat for chemistry in 2017 WASSCE and NECO.

Hypothesis 2: There is no significant difference in the performance of students that sat for chemistry in 2016 WASSCE and NECO. The table revealed that mean score for students’ performance in 2016 WASSCE (1297.3) was greater than the mean score of students who sat for 2016 NECO (1288.8) with a mean difference of (8.5). The t-test revealed that t-calculated (0.14) was less than the critical t-value (2.45) at the 0.05 significance level. Hence, the null hypothesis was not upheld. This means that there is significant difference in the performance of students that sat for chemistry in 2016 WASSCE and NECO.

Hypothesis 3: There is no significant difference in the performance of students that sat for chemistry in 2015 WASSCE and NECO. The table revealed that mean score for students’ performance in 2015 WASSCE (1518.0) was greater than the mean score of students who sat for 2015 NECO (1227.5) with a mean difference of (290.5). The t-test revealed that t-calculated (4.30) was greater than the critical t-value (2.45) at the 0.05 significance level. Hence, the null hypothesis was not upheld. This means that there is significant difference in the performance of students that sat for chemistry in 2015 WASSCE and NECO.

Hypothesis 4: There is no significant difference in the performance of students that sat for chemistry in 2018 WASSCE and NECO. The table revealed that mean score for students’ performance in 2018 WASSCE (578.0) was greater than the mean score of students who sat for 2018 NECO (400.0) with a mean difference of (178.0). The t-test revealed that t-calculated (2.56) was greater than the critical t-value (2.45) at the 0.05 significance level. Hence, the null hypothesis was not upheld. This means that there is significant difference in the performance of students that sat for chemistry in 2018 WASSCE and NECO.
than the mean score of students who sat for 2018 NECO (1518.0) with a mean difference of (940.0). The t-test revealed that t-calculated (2.56) was greater than the critical t-value (2.45) at the 0.05 significance level. Hence, the null hypothesis was not upheld. This means that there is significant difference in the performance of students that sat for chemistry in 2018 WASSE and NECO.

**Hypothesis 5:** There is no significant gender difference in the performance of students that sat for chemistry WASSE and NECO Examinations between 2015 and 2018.

**Table 13:** t-test analysis of students’ performance in WASSE and NECO by gender

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>df</th>
<th>t_cal.</th>
<th>t_val.</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>WASSE</td>
<td>8</td>
<td>2357.13</td>
<td>790.17</td>
<td>14</td>
<td>1.17</td>
<td>2.45</td>
<td>Not significant</td>
</tr>
<tr>
<td>NECO</td>
<td>8</td>
<td>2762.38</td>
<td>292.49</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

P > 0.05 significance level

Table 13 shows the result of analysis of performance of students in chemistry in WASSE and NECO based on gender. The table revealed that mean score for students’ performance in WASSE (23.57.13) was less than the mean score of students who sat for NECO (2762.38) with a mean difference of (405.25). The t-test revealed that t-calculated (1.17) was less than the critical t-value (2.45) at the 0.05 significance level. Hence, the null hypothesis was upheld. This means that there is no significant gender difference in the performance of students that sat for chemistry WASSE and NECO Examinations between 2015 and 2018.

**Discussion of Results**

The findings of the study in tested hypothesis 1 revealed that there is significant difference in the performance of students that sat for chemistry in 2015 WASSE and NECO. This was against the findings of Kolawole et al. (2011) that there is no significant difference between (NECO and WAEC) mode of entry, in the university academic performance at all levels. And further stated that there is little or no influence of the mode of entry on the academic performance at all levels. This means that NECO and WAEC are equivalent. Based on the findings of this study, the difference in students’ performance at WASSE and NECO could be as a result of students’ negative perception about the credibility and accessibility of NECO result mostly outside the shore of Nigeria. Although, the same students who sat for WASSE also sat for NECO but belief, perception and environmental factors like what people say about the examination, tertiary institutions consideration among others could likely be responsible for differences in the students’ performance in the two examinations.

The result of hypothesis 2 revealed that that there is no significant difference in the performance of students that sat for chemistry in 2016 WASSE and NECO. This was against the findings of Salako et al. (2017) who showed that WAEC and NECO successes in the selected science are not correlated, and that difference of means between the two groups are statistically significant. The analysis of research question 2 also validated this as it indicated that for WAEC; 2222 (42.8%) students obtained ‘A1 – B3’, 2181 (42.0%) students obtained ‘C4 – C6’, 341 (6.6%) students obtained ‘D7 – E8’, and 445 (8.6%) students obtained F9. Similarly, for NECO, 973 (19.0%) students obtained ‘A1 – B3’, 2991 (58.0%) students obtained ‘C4 – C6’, 644 (12.0%) students obtained ‘D7 – E8’ and 547 (11.0%) students obtained F9 in the examination. It is obvious that students’ performance in both examinations was less than 50% across all the distinction and credit grades. This also showed that students performance in both WASSE and NECO in 2016 was low and this could be as a result of different factors such as students variables (study habit, learning style, attitude among others), teacher variables (teaching method, qualification, attitude to teaching, teaching style among others), and other environmental variables like availability and accessibility of teaching materials, school discipline among others.

The analysis of hypothesis 3 indicated that there is no significant difference in the performance of students that sat for chemistry in 2017 WASSE and NECO. The findings also disagreed with the findings of Ogunbanwo (2014) that there was a significant difference between a student being a boarder and a day student. The low level performance could be attributed to congestion of students in classes, inadequate inspection by the State Ministry of Education, inadequacy of facilities and automatic promotion. Table 7 of the analysis indicated that for WAEC; 3524 (67.0%) students obtained “A1 – B3”, 1370 (26.0%) students obtained “C4 – C6”, 120 (2.0%) students obtained “D7 – E8”, and 244 (5.0%) students obtained F9. Similarly, for NECO, 641 (11.0%) students obtained “A1 – B3”, 2836 (48.8%) students obtained “C4 – C6”, 1478 (25.3%) students obtained “D7 – E8” and 874 (14.9%) students obtained F9 in the examination. When compared critically, it can observed that students with A1-B3 are more in WASSE, 3524 (67.0%) when compared to NECO, 641 (11.0%) with wide difference in percentage meanwhile on the other hand, rate of students who have C4-C6 were more in NECO than WASSE and this was an indication of the fact that...
students cannot perform at the same level but ranging the analysis of students who had the grades between A1-C6 showed 93% in WASSCE and NECO showed 59.8%. Although, there was margin between the two but the outcome in each case was more than half.

The findings of hypothesis 4 showed that there is significant difference in the performance of students that sat for chemistry in 2018 WASSCE and NECO. This was in agreement with Amuche et al. (2014) when they compared the academic performance of private and public secondary schools in Taraba state. The result of their study revealed that students who attended private secondary schools performed better in science subject examinations conducted by WAEC and NECO than those who attended public secondary schools. Agoro (2018) further stated that among the factors that have been identified to be responsible for poor performance in chemistry are poor methods of instruction, teacher attitude, laboratory inadequacy, poor science background and non-availability of effective teaching and learning resources in classrooms. As a result of difference in level of laboratory facilities, teacher attitude, students' attitude and many other factors which occur due to school type or school system that students are exposed to and they all have their influence on students' academic performance in chemistry.

The findings of the study in hypothesis 5 revealed that there is no significant gender difference in the performance of students that sat for chemistry WASSCE and NECO Examinations between 2015 and 2018. This disagreed with Nzewi (2010) that there is gender disparity with females being disadvantaged in the teaching and learning of science subject like Chemistry. It was also noted that boys perform better than girls in chemistry and that exposing female students to small group cooperative interaction learning style makes them attain high cognitive achievement in Chemistry. Also, the findings further disagreed with Nzewi (2010) opinion that females prefer cooperative academic environment for optimal performance to competitive learning environment while comparing boys and girls performances in science (chemistry). This implied that achievement in chemistry based on gender could be influenced by the method of teaching adopted by chemistry teacher as this could favour one particular gender than the other.

Conclusions

As regards the findings of the arrived at in this study, the researcher put the following conclusions forward:

Chemistry students performed well and high in 2015 WASSCE than 2015 NECO. Chemistry students’ performance in 2016 WASSCE and NECO was not far from one another and that students performance in chemistry was low in both examination for 2016. Also, students’ performance in chemistry in year 2017 showed no significant difference in WASSCE and NECO as students’ performance was parallel to one another WASSCE and NECO. In 2018, chemistry students' performance was higher in WASSCE than in NECO. There was gender influence and difference in the performance of students that sat for chemistry WASSCE and NECO Examinations between 2015 and 2018.

Recommendations

As a follow up, the following recommendations were made:

i. The principal of schools should ensure that chemistry students carry out their test of practical weekly. This will go a long way to enhance their knowledge during practical test and improve their academic performance.

ii. School Principals should ensure that theoretical aspect of the chemistry should not be handled with levity since it is as important as the aspect of practical.

iii. Government should provide educational facilities and learning materials especially laboratory equipment to meet the needs of students during their tests of theoretical and practical in Chemistry.

iv. The teachers should be aware of the frequent occurring topics set by WAEC and NECO to help them prepare the candidates adequately for the examination.

v. The teachers should endeavour to teach to cover all the topics in the syllabi of the examination bodies so that the students would not found wanting when answering the examination questions.

vi. Students should not only rely on what the teachers teach but they must endeavour to look through the subject curriculum and syllabus for them to develop independent reading.

vii. Students should develop more interest in sitting for either of the two examinations since they were found to be the same or equivalent.

viii. Parents should encourage their children to put more efforts in studying to reduce the high rate of failure in the two examinations.
References


