
FORMATIVE ASSESSMENT AND STUDENT'S ACADEMIC ACHIEVEMENT IN CHEMISTRY IN SENIOR SECONDARY SCHOOLS IN NSIT IBOM LOCAL GOVERNMENT AREA, AKWA IBOM STATE

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Abstract

This study determined the relationship between formative assessments and academic Performance in Chemistry among Students in Public Secondary Schools in Nsit Ibom Local Government Area, Akwa Ibom State. Three research questions and three null hypotheses were formulated for this study and tested at .05 alpha level of significance. The study adopted a correlational research design. The population of the study consisted of 1,871 Senior Secondary Two (SS2) students offering Chemistry in the nine public secondary schools in Nsit Local Government Area of Akwa Ibom State in 2024/2025 academic year. The study sample comprised of 329 SS2 Students derived using simple random sampling technique. A Researcher-made instrument titled: "Formative Assessment Rating Scale (FARS) and Chemistry Achievement Test (CAT) were used for data collection. The instruments were subjected to face validity by three experts. The reliability coefficient of FARS and CAT were .70 and .79, determined using Cronbach alpha reliability statistics. The data obtained from the instruments was analyzed using Pearson Product Moment Correlation (PPMC) statistic. The result showed that there is a significant relationship between class work, assignments, tests and academic Performance in Chemistry among Students in Public Secondary Schools in Nsit Ibom Local Government Area, Akwa Ibom State. It was recommended among others that, Teachers should design meaningful and engaging assessments that prompt students to actively apply Chemistry concepts during lessons, thereby strengthening their understanding.

Keywords: Formative assessment, relationship, academic achievement

Introduction

Chemistry is a science that systematically studies the composition, properties and activities of organic and inorganic substances and the various elementary forms of matter. Chemistry, by its nature, is the central science because diverse subjects share essential links with it. It is one of the core subjects offered at senior secondary schools. The teaching of Chemistry should develop in the students, manipulative and experimental skills to make them competent and confident in conducting experiments. In some countries, many students, from the secondary school to the university, struggle to understand Chemistry, and many do not succeed (Reid, 2018). Research has shown that many students do not correctly understand fundamental concepts in Chemistry (Kamisah and Nur, 2023) (Essien *et al*, 2026). Knowledge of chemistry enables students to understand the properties of matter, how it functions as well as equips them with skills in critical thinking, analytical reasoning and problem-solving. This knowledge is acquired through learning. Learning is a process that results in some change or modification in the learner's knowledge, attitudes, and behaviors. This change may be temporary or permanent. In the learning process, assessment plays a crucial role. It is an integral part of the educational process that helps evaluate the success of specific teaching strategies and measure students' progress.

Johnson (2021) defined assessment as the use of a variety of procedures to collect information about learning and instruction. There are different types of assessments but the most commonly used assessments are the formative and summative assessment. Formative assessment is commonly referred to as assessment for learning, in which the focus is on monitoring student response to, and progress with instruction. Formative assessment provides immediate feedback to both the teacher and the student regarding the learning process. Summative assessments are used to evaluate student learning, skill acquisition, and academic achievement at the conclusion of a defined instructional period typically at the end of a project, unit, course, semester, program, or school year.

Similarly, Shute (2020) asserted that formative feedback is information transmitted to students that allows or encourages them to organize their thoughts or behaviors in order to improve their learning. Luckett and Sutherland (2016) emphasize that feedback provided through formative assessment has significant benefits when motivating students, helping students improve their learning, reinforcing their work, and providing them with a learning profile. According to Anikweze (2019), formative assessment accesses and aids students' performance during the instruction process and is used for obtaining continuous feedback from both teachers and students to determine the progress of learning during a course of instruction and improve learning during a course instruction, as well as improve learners' performance through remediation. In an educational setting, the formative assessment might be the teacher, learner or both providing the feedback on students' work.

Academic achievement refers to how much knowledge pupils have obtained from a specific course of study. According to Okoyefi (2024), achievement refers to a student's academic position at any particular time. It has to do with achieving a goal successfully. Academic achievement is an apparent phenomenon in many developing countries like Nigeria, since it is measured in final examination (Senior Secondary School Examination) whereby success is measured by academic performance or how well students meet standards set out by the West African Examination Council and National Examination Council (WAEC, NECO) and the institute itself. Given the high stakes of these assessments, the effectiveness of formative assessment tools in reinforcing learning and preparing students for such examinations cannot be overlooked. Consequently, Essien, Ekim and Essien, (2024) posited that academic

achievement is a measure of knowledge gained in formal education usually indicated by test scores, grades, grade point average and degrees.

Class work is referred to as task given to students to carry out in the classroom after a lesson to measure the effectiveness of a lesson. Ajogbeje (2022) asserted that class work serves as an essential formative assessment tool that enhances students' engagement and understanding of concepts. It provides students with the opportunity to apply newly acquired knowledge in real-time under the guidance of their teacher. Class work activities, such as problem solving exercises, discussions, and group tasks, help reinforce classroom instruction and allow teachers to identify areas where students may struggle. Through immediate feedback, misconceptions can be addressed, leading to better comprehension. When effectively implemented, class work fosters active participation and critical thinking, which are crucial for mastery of concepts. However, if class work is not consistently monitored or lacks quality feedback, its potential impact on academic performance may be diminished, leading to gaps in knowledge that persist until summative assessments (Ajogbeje, 2022).

Assignment is tasks given to students by their teachers to be completed outside regular class hours. Okoyefi (2024) highlighted that assignments play a vital role in extending learning beyond the classroom and providing students with the opportunity to explore concepts independently. Assignments encourage students to develop research skills, problem-solving abilities, and self-discipline, which are critical for academic success. By working on assignments, students can deepen their understanding of theories and apply them to real-world scenarios. Furthermore, assignments enable teachers to assess students' grasp of topics over time and adjust instructional strategies accordingly. However, the effectiveness of assignments in improving academic performance depends on factors such as the quality of the tasks given, timely feedback, and students' commitment to completing them. When students merely copy answers or fail to engage meaningfully with their assignments, the intended learning outcomes may not be achieved.

Test is an assessment instrument used to elicit responses that can be evaluated to determine a learner's level of proficiency in a given domain. Anikweze (2019) emphasized that tests serve as a fundamental method of assessing students' knowledge retention, application, and overall academic progress in teaching and learning. Regular testing enables teachers to measure how well students understand key concepts and identify areas that require additional reinforcement. Tests also help in developing students' ability to recall information, analyze data, and think critically under timed conditions, which is crucial for success in standardized examinations. The purpose of formative assessment is to track student learning in real time and provide ongoing feedback, enabling teachers to adjust instruction and students to improve their learning. It does not contribute to the final mark given for the students; instead it contributes to learning through providing feedback.

Sunday and Ganiyu (2023) investigated the effects of classroom exercise and home assignment on the academic performance of students in Mathematics in Nigerian Senior Secondary Schools. Random sampling technique was used for the purpose of the study. Three secondary schools were randomly picked for this study. Data for the study were collected from the selected schools through the use questionnaires, pre-test and post test. One hundred and twenty (120) students consisting both boys and girls were selected at random from each school. The data was analyzed using Pearson's Product Moment Correlation, Analysis of Variance and t-test. Analysis of the result shows that there is significant relationship between class work and home assignment and students' academic performance in Mathematics. Also,

students taught using home assignment performed significantly better than students in the other groups who were not exposed to home assignment.

On the other hand, MacNaul, et al (2021) carried out a study on the Effect of Assignment Choice on Student Academic Performance in an Online Class. Using simplified procedures, the study employed a repeated-measure with an alternating-treatments design to evaluate the effects of assignment choice (flash cards, study guide) on the academic outcomes of 42 graduate students in an online, asynchronous course. Result revealed a statistically significant that Choice of assignment has been shown to increase student engagement, improve academic outcomes, and promote student satisfaction in higher education courses

Singh and Raphael (2025) carried out a study on the impact of homework on students' academic performance and mental health. The research explores the relationship between homework quantity, quality, and its influence on academic achievement, as well as the mental well-being of students across various educational levels. Through a combination of literature review, surveys, and interviews with students, parents, and educators, the finding revealed that a well-structured homework positively correlates with improved performance

Patricia and Rapheal (2019) conducted a study on the influence of administering tests on students' performance in public secondary schools in Nandi North Sub County. The study adopted descriptive survey design. The target population was 355 teachers and principals in 34 public secondary schools. The researcher used the mathematical sampling approach given by Miller and Brewer to establish the sample size. From the selected 17 schools, all the principals were purposively selected and 104 teachers were selected using simple random sampling. The structured data were analyzed using descriptive statistics; frequencies and percentages. Pearson moment of Correlations was used to establish the influence of administering test on academic performance Correlation analysis indicated that there is a positive relationship between administration of test and academic performance.

Statement of the Problem

Students' academic performance in Chemistry, a subject essential for developing resource management skills has increasingly raised concerns in senior secondary schools. Despite the integration of formative assessment practices, such as class work, assignments, and tests, which are designed to monitor progress and provide feedback, students' performance in chemistry remains suboptimal. This raises questions about the effectiveness of these formative assessment tools in enhancing learning outcomes. In Nsit Ibom Local Government Area, Akwa Ibom State, teachers often rely on formative assessments to identify gaps in students' understanding and to tailor instruction to meet their needs. However, anecdotal evidence and examination reports suggest that students continue to struggle with key concepts in Chemistry. It is unclear whether the implementation of class work, assignments, and tests is achieving its intended purpose of fostering academic success. Furthermore, factors such as inconsistent feedback, inadequate monitoring, and a lack of student engagement may limit the potential impact of formative assessments on academic achievement. This study is therefore necessitated to examine the relationship between formative assessment and students' academic achievement in Chemistry.

Purpose of the Study

The main purpose of the study is to determine the relationship between formative assessments and Academic Performance in Chemistry among Students in Public Secondary

Schools in Nsit Ibom Local Government Area, Akwa Ibom State. Specifically the study seeks:

1. To examine the relationship between class work and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State.
2. To determine the relationship between assignments and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State.
3. To ascertain the relationship between test and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State.

Research Questions

The following research questions guided the study.

1. What is the relationship between class work and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State?
2. What is the relationship between assignment and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State?
3. What is the relationship between test and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State?

Research Hypotheses

The following hypotheses will guide the study:

1. There is no significant relationship between Class work and academic performance in Chemistry among students in public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State.
2. There is no significant relationship between Assignments and academic performance in Chemistry among students in public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State.
3. There is no significant relationship between Tests and academic performance in Chemistry among students in public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State.

Research methods

This study adopted the correlational research design. Correlational design was appropriate because the study sought to determine the extent of the relationship between formative assessment strategies (class work, assignments, and feedback) and students' academic achievement in Chemistry in Nsit Ibom Local Government Area, Akwa Ibom State. This design was considered suitable because it allows the researcher to collect data on the two variables as they exist in the school system and statistically determine the magnitude of the relationship between the variables. The population of the study comprised of 1,871 Senior Secondary Two (SS2) students offering chemistry in public secondary schools in the Nine (9) public secondary schools in Nsit Ibom Local Government Area, during the 2024/2025

academic session. The sample for the study comprised of 329 SS2 Students determined using Taro Yamene formula from the five randomly selected schools. Simple random sampling technique was employed to ensure equal chance of selection. Two instruments titled “Formative Assessment Rating Scale (FARS)” and Chemistry Achievement Test (CAT) were used to generate data for the study. The FARS was used to measure formative assessment. The FARS consisted of 15 closed-ended items on a 4-point likert scale; Strongly Agree (SA) -4 points, Agree (A) - 3 points, Disagree (D) - 2 points and Strongly Disagree (SD) -1 point, covering three dimensions of formative assessment: class work, assignments and test. Chemistry Achievement Test (CAT) had 20 multiple choice test items with three distracters and one correct option lettered A – D. Each correct answer was scored two points and wrong answer was scored zero. Three experts in Measurement and Evaluation in the University of Uyo, validated the instruments. , the instruments were trial tested on 25 SS2 in a public secondary schools in the Nsit Ibom Local Government Area of Akwa Ibom State who were part of the population but not part of the study sample . Data generated were subjected to inter-item analysis using Cronbach Alpha Statistics for reliability coefficient determination. The reliability coefficients of FARS and CAT were .70 and .79 respectively. Pearson’s Product Moment Correlation (PPMC) statistics was used to answer the research questions and for testing the null hypothesis at 0.5alpha level of significance.

Results

Research Question One

What is the relationship between class work and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State?

Table1: Pearson Product Moment Correlation between class work and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State

Variables	N	R	Remark
Class work	329	.842	Very Strong Positive Relationship
Students’ engagement	329		

Source: Computed by the Researcher using data from the respondents.

Result (Table1), revealed that r-value is .842. This implied that there is a very strong positive relationship between class work and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State. This means that as class work increases, academic performance in Chemistry increases very strongly. Therefore, class work enhances academic performance in Chemistry.

Research Question Two

What is the relationship between assignments and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State?

Table 2: Pearson Product Moment Correlation between assignment and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State

Variables	N	R	Remark
Assignments	329	.440	Moderate Positive Relationship
Students’ engagement	329		

Source: Computed by the Researcher using data from the respondents.

Result (Table 2) revealed that r-value is .440. This implied that there is a moderate positive relationship between assignments and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State. This means that as assignments increases, academic performance in Chemistry increases moderately. Therefore, assignments enhance academic performance in Chemistry.

Research Question Three

What is the relationship between tests and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State?

Table 3: Pearson Product Moment Correlation between tests and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State

Variables	N	R	Remark
Tests	329	.796	Strong Positive Relationship
Students' engagement	329		

Source: Computed by the Researcher using data from the respondents.

Result (Table 3) revealed that r-value is .796. This implied that there is a strong positive relationship between tests and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State. This means that as tests increases, academic performance in Chemistry increases strongly. Therefore, tests enhance academic performance in Chemistry.

Hypothesis One (H_{01})

There is no significant relationship between class work and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State.

Table 4: Result of Pearson Product Moment Correlation for class work and academic performance in chemistry among Students

Variables	N	p-cal	p-crit	Remark
Class work	329	.000	.05	Significant. H_{01} Rejected
Academic performance	329			

df=327

Source: Computed by the Researcher using data from the respondents.

Result (Table 4) revealed that the p-cal of .000 is less than .05 alpha level of significance with 327 degrees of freedom. This showed that the formulated null hypothesis was rejected. Therefore, there is a significant relationship between class work and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State.

Null Hypothesis Two (H_{02})

There is no significant relationship between assignments and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State.

Table 5: Result of Pearson Product Moment Correlation for assignments and academic performance in Chemistry among Students

Variables	N	p-cal	p-crit	Remark
Assignments	329	.000	.05	Significant. Ho2 Rejected
Academic performance	329			

df=327

Source: Computed by the Researcher using data from the respondents.

Result (Table 5) revealed that the p-cal of .000 is less than the .05 alpha level of significance with 327 degrees of freedom. This showed that the formulated null hypothesis was rejected. Therefore, there is a significant relationship between assignments and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State.

Null Hypothesis Three (H₀₃)

There is no significant relationship between tests and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State.

Table 6: Result of Pearson Product Moment Correlation for tests and academic performance in Chemistry among Students

Variables	n	p-cal	p-crit	Remark
Tests	329	.000	.05	Significant. Ho3 Rejected
Academic performance	329			

df=327

Source: Computed by the Researcher using data from the respondents.

From the result in Table 4.6, it is revealed that the p-cal of .000 is less than the .05 alpha level of significance with 327 degrees of freedom. This showed that the formulated null hypothesis was rejected. Therefore, there is a significant relationship between tests and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State.

Discussion of Findings

The findings based on Hypothesis one revealed that there is a significant relationship between class work and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State. The result also shows that there is a very strong positive relationship between class work and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State. This finding indicates that academic performance in Chemistry among Students depends on class work. The result could be attributed to the fact that class work provides students with the opportunity to actively engage with concepts learned in class. By working through problems, exercises, and applications, students reinforce their understanding and develop critical thinking skills needed to analyze Chemistry principles. Class work also promotes consistency in learning, as it encourages students to revise and apply knowledge immediately after instruction, reducing forgetfulness. Moreover, it allows teachers to identify areas of weakness and provide timely feedback, helping students to improve before formal assessments. Through regular practice, students build confidence,

retain information better, and cultivate the discipline required to approach Chemistry with greater interest and competence, which ultimately translates into improved academic performance. The findings of this study agreed with the findings of Sunday and Ganiyu (2023) on the effects of classroom exercise and home assignment on the academic performance of students in Mathematics in Nigerian senior secondary schools. Their findings revealed that there is significant relationship between class work and home assignment and students' academic performance in Mathematics.

The findings based on Hypothesis two revealed that there is a significant relationship between assignments and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State. The result also shows that there is a moderate positive relationship between class work and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State. This finding indicates that academic performance in Chemistry among Students depends on assignments. The result could be attributed to the fact that when students work on assignments, they revisit and apply the knowledge gained during lessons, which deepens their understanding of key Chemistry concepts. Assignments also train students to research, analyze information, and solve problems on their own, thereby strengthening their critical thinking and problem-solving skills. In addition, completing assignments within set deadlines helps students develop time management and a sense of responsibility, qualities that support overall academic success. The findings of this study conform with the findings of MacNaul, et al, (2021) on the Effect of Assignment Choice on Student Academic Performance in an Online Class. The findings revealed a statistically significant, that Choice of assignment has been shown to increase student engagement, improve academic outcomes, and promote student satisfaction in higher education courses. The study of Singh and Raphael (2025) on the impact of homework on students' academic performance and mental health also agreed with the findings of this study. Their findings revealed that a well-structured homework positively correlates with improved performance.

The findings based on Hypothesis three revealed that there is a significant relationship between tests and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State. The result also shows that there is a moderate positive relationship between tests and academic performance in Chemistry among Students in Public secondary schools in Nsit Ibom Local Government Area, Akwa Ibom State. This finding indicates that academic performance in Chemistry among Students depends on tests. The result could be attributed to the fact that tests serve as an effective tool for assessing students' understanding and retention of concepts. By preparing for tests, students are motivated to revise thoroughly, which strengthens their grasp of economic principles and improves long-term memory. Tests also help students identify their strengths and weaknesses, allowing them to focus on areas that require more attention. For teachers, tests provide valuable feedback on the effectiveness of instruction and highlight topics that may need further clarification. In addition, regular testing fosters discipline, builds confidence, and reduces examination anxiety, as students become accustomed to applying their knowledge under time constraints. The findings of this study agreed with the findings of Patricia and Rapheal (2019) on the influence of administering tests on students' performance in public secondary schools in Nandi North Sub County. Their findings showed that, there is a positive relationship between administration of test and academic performance.

Conclusion

From the result of the findings of the study, it was concluded that class work, assignments, and tests play a vital role in enhancing students' academic performance in Chemistry. Their

significant relationship with achievement shows that continuous assessment not only reinforces learning but also promotes discipline, responsibility, and deeper understanding of Chemistry concepts. Therefore, active engagement in these academic activities is essential for improving students' success in Chemistry.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Teachers should design meaningful and engaging assessments that prompt students to actively apply Chemistry concepts during lessons, thereby strengthening their understanding
2. Teachers should provide thought-provoking tasks that promote independent research and critical thinking, while also giving timely feedback to guide students' learning.
3. Teachers should administer regular formative tests that not only assess knowledge but also help students build confidence and identify areas needing improvement.

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