Construction and Standardization of Multiple Choice Tests for Senior Secondary Two (SS II) Students on Economics in Rivers State: The Traditional Approach

[1]Ebiye CHARLES, PhD., [2]Eloho Roseline EKAKITIE, PhD

[1]Research and Programme Development, National Agency for the Prohibition of Trafficking in Persons, Uyo Zonal Command

[2]Department of Guidance and Counseling, Delta State University, Abraka

DOI: https://doi.org/10.47772/IJRISS.2025.91100555

Received: 02 December 2025; Accepted: 09 December 2025; Published: 23 December 2025

ABSTRACT

The study problem was construction and standardization of achievement test on Economics for Senior Secondary two (SSII) students in Rivers State. The main purpose of the study was to construct 100 test items and determine the difficulty level and calculating the discrimination index of the test items. Two statistical techniques were used for item analysis, the Item Difficulty and Item Discrimination Index. The Item Difficulty and the Item Discrimination Index values of 0.4 to 0.6 for each index per test item were used to select 50 out of 100 items. After which the validity and reliability of the test were estimated on the selected fifty (50) items. The test was subjected for content validity and yielded a reliability index of 0.93 using split half reliability technique. In the process of standardizing the test, the 50 item test, the test was administered based on the following norms; Gender, Location, School Ownership and School Type and it was limited to a representative sample of 250 students from five senior secondary schools in Rivers State. The analysis for standardization was done using frequency count, mean and independent sample t-test from the final scores. From the results, there were differences for some norms while for some, there were no difference.

Keywords: Construction, Standardization, Multiple Choice Test, Senior Secondary Two (SS2) Students, Traditional Approach

INTRODUCTION

Assessment plays a crucial role in the education system as it helps measure students' learning outcomes, guides instructional practices, and evaluates the effectiveness of the curriculum. One of the most widely used assessment methods in secondary schools is the test. Test can be seen as specific instrument or tool, a question, sets of questions, an examination which uses to measure a particular characteristic of an individual or a group of individuals. According to Gilbert as cited in Faremi (2016), testing plays a crucial role in advancing the science of measurement, often referred to as psychometrics. It involves analyzing how various groups of individuals respond to different types of tests to evaluate the difficulty level, discriminative power, validity, and reliability of test items (Gilbert in Faremi, 2016). Among various assessment techniques, multiple-choice tests (MCTs) are widely used due to their objectivity, ease of administration, and efficiency in evaluating a broad range of content.

Multiple-choice tests are valued for their objectivity, efficiency, and ability to cover a wide range of content within a short period. However, for these tests to be reliable and valid, they must be carefully constructed and standardized. In many secondary schools, particularly at the senior secondary, students are assessed through various forms of examinations, including essays, short-answer tests, and multiple-choice tests. However, concerns have been raised regarding the validity, reliability, and fairness of some of these tests due to inconsistencies in their construction and administration. A poorly constructed multiple-choice test may fail to accurately measure students' knowledge, leading to unfair grading and misleading interpretations of students' abilities. Standardization of multiple-choice tests ensures uniformity in test administration, scoring, and interpretation, thereby enhancing the credibility of assessment results. It involves developing test items that align

with the curriculum objectives, evaluating the difficulty level of questions, and ensuring that the test fairly represents different cognitive domains—such as knowledge, comprehension, application, and analysis. A standardized test also undergoes rigorous validation processes, including pilot testing and item analysis, to improve its reliability.

However, the construction and standardization of multiple-choice tests require a systematic approach to ensure validity, reliability and fairness in assessing students' understanding of a subject. In this study, the traditional approach to test construction is adopted. The traditional approach to test construction involves developing test items based on the syllabus, subject content, and cognitive levels of students. This process includes defining objectives, drafting items, reviewing for content accuracy, conducting pilot testing, and analyzing test performance using statistical methods. Standardization ensures that the test maintains a high level of validity and reliability, making it a fair and effective tool for assessing students' knowledge.

Despite the importance of standardized multiple-choice tests, there has been limited research on their development and validation in Economics for SS2 students in Rivers State. This study, therefore, seeks to construct and standardize a multiple-choice test for Economics using the traditional approach, ensuring it meets acceptable psychometric properties.

LITERATURE REVIEW

Conceptual Review

Test Construction an Overview

The term test construction is sometimes refers to as test development. Test construction or development is the set of activities involved in developing and evaluating a test of some psychological function (Franzen, 2011). The process involves several key steps: first, defining the specific construct to be measured; next, determining the test's purpose, whether for diagnostic assessment, skill-level description, or predictive analysis. Following this, an appropriate method is selected, such as performance-based evaluation, behavioral observation, or self-reports. The next phase entails designing test items that align with the intended objectives. Subsequently, the test's reliability and validity are assessed to ensure accuracy and consistency. Finally, necessary modifications are made to enhance the test's overall effectiveness and practical application (Franzen, 2011). For the purpose of this study, the procedures for constructing test, take the following steps;

Test Planning

Item Writing

Trial Testing

Item Analysis

Item Selection

Standardized Test

A standardized test is a test that is administered and scored in a consistent, or "standard", manner. Standardized tests are designed in such a way that the questions, conditions for administering, scoring procedures, and interpretations are consistent Popham, (2016) and are administered and scored in a predetermined, standard manner (Popham, 1999). According to AERA, APA, and NCME (2014), a standardized test is test designed to be administered, scored, and interpreted according to a prescribed set of rules or instructions. The instructions for administration require that the testing conditions are the same for all examinees so that the results can be interpreted through comparisons to a specific reference group (norm group) who were administered the test under the same conditions. Thus, this paper standardization of test was based the reference group of;

- Gender Norm

- Location
- School Ownership and
- School Type

Characteristics of Standardized Test

Obagah and Inko-Tariah, (2014) listed some of the following as characteristics of standardized tests;

- It involves all students to answer the questions from the same content on a larger scale without the interference of an examiners or teachers.
- Its objectives based on large area of knowledge and skill must be common to many schools in the country.
- The items which must be tried out, analyzed and revised should be developed by professionals.
- Its reliability must be high with norms for representative group of performance.

Test Standardization

In the process of standardizing the test, the selected items which have been validated and tested for reliability was administered to a group of representative sample of two hundred and fifty (250) senior secondary two (SSII) students after the test scripts were printed. The administration was done based on the following norms;

- Gender
- Location
- School Ownership
- School Type

Empirical Review

The above listed norms for the present study were briefly reviewed empirically based on the norms of students as shown below;

Gender

Adebule and James (2014) investigated the comparison of male and female Senior Secondary School students' attitude towards mathematics. They employed the survey type of descriptive research design. Their study population consisted of all senior secondary school students in Ekiti state, which a sample of 600 senior secondary school students consisting of 300 males and 300 females drawn from 12 senior secondary schools using multistage, stratified and purposive random sampling techniques. The data for their study was gathered using Mathematics Attitude Scale (MAS) which was constructed and validated by the researchers. Their study revealed that the attitude of students towards mathematics did not depend upon gender. Therefore, it was recommended that gender should not be considered as a factor influencing the attitude of students towards mathematics and those teachers should teach mathematics freely among the students of different genders.

Mutai (2016) focused his study on gender differences in performance in mathematics among form three secondary school students in Bureti Sub-County. His aimed was on the influence of students' perception, parental expectations, teachers' characteristics and perceptions and school environment on the learning of mathematics. The study employed the cross sectional descriptive survey using correlation methods to investigate gender differences in Mathematics achievement levels of girls and boys. The study population was all the mathematics students and all the form three students from selected secondary schools in Bureti Sub-County,

Kenya. A stratified sampling technique was used to select 8 secondary schools; 2 for boys, 2 for girls and 4 for mixed from 54 secondary schools in Bureti Sub-County, Kenya. 430 form three students from the 8 stratified and randomly selected secondary schools while 18 mathematics teachers teaching the study classes were purposively sampled. The instruments were piloted to enhance their validity and reliability. Data obtained from the study were analyzed using SPSS statistical software. The study revealed the following findings; gender was strongly associated with mathematics achievement ($r= 0.9880$, $p< 0.05$). As a result, boys' schools performed better than girls schools. Boys had a stronger affinity and interest towards mathematics. Teacher and school factors were of little effect on mathematics achievement with respect to gender. The key recommendation was that measures are needed to be taken as early as possible, probably already in primary education, which aim at the suppression of socialization factors known to lead to the establishment of gender differences in mathematics achievement. It would be desirable to implement strategies in the curriculum as well as in the pre and in-service training which would help moderate gender differences in students' achievement in mathematics.

Wangu (2014) also investigated the Impact of Gender Differences on Student's Academic Performance in Secondary Schools in Ndumberi Division, Kiambu County, Kenya in Science Subjects and Languages. His study purpose was to find out the impact of gender difference on the students' academic performance in Ndumberi Division, Kiambu County. The study was carried out on five secondary schools which were randomly drawn from all the secondary school in Kiambu County. The study involved (40) students, (30) teachers (5) directors, (5) head teachers making a total sample size of 80 respondents. The teachers and students were randomly selected while the head teachers and directors were purposively selected. The data was collected using questionnaires for students, teachers and head teachers and interview guides for directors. Findings revealed that in general performance, male students performed much better as compared to their female counterparts. At subject level, girls outperformed boys in the languages, while boys led the girls in the sciences. The majority views of students (56%), male teachers (65%), head teachers (76%), and directors (82%) agreed and strongly so that, boys perform better than girls, only a total of 51% of female teachers disagreed and strongly so with this view. There were significant gender differences by overall performance with more boys passing in form 1 and 2 as compared to the girls in the same divisions. At subject level girls attained a higher mean average mark in the languages as compared to the boys. Conversely, boys scored higher mean average in the sciences than girls. There were no gender differences in the views of students although majority agreed on the superior performance of boys, just like the head teachers and directors female and male teachers showed gender differences in their views. Based on the findings, the study recommends that; Training in gender sensitive techniques through workshops for to teachers to change their attitudes and behaviours, Parental involvement, Girls should be taught time management techniques, Government should help schools acquire basic learning facilities.

Location

Ellah and Ita (2017) study was to determine the correlational relationship between school location and students' academic performance in English language in secondary schools in Ogoja Local Government Area. They adopted a survey research design with a population comprising of 836 senior secondary two (SS2) students of the 2016/2017 academic session in all the 46 public and private secondary schools in Ogoja Local Government Area. They used stratified random sampling technique to draw a sample of 200 students for the study, out of which 124 representing 62% were males; while 75 students representing 38% were females. The instrument used for data collection was an achievement test titled English Language Achievement Test (ELAT) carved from 2015 English Language Mock Examination. The data they obtained was analysed using independent sample t-test. Their results revealed that; there is a significant difference in students' academic performance in English language on the basis of school location. They recommended that; government should close the gap between the rural and urban location through the provision of social amenities to rural populace which will enhances better academic performance of students in their final examination like SSCE.

Adebule and James (2013) investigated the Influence of Study Interest and School Location on the Attitude of Secondary School Students towards Mathematics in Ekiti State. Their aim was whether the study interest and school location of students have significant influence on the attitudes of secondary school students towards Mathematics. Their study population consisted of all secondary school students in Ekiti State. A sample of 600 students comprising of 300 male and 300 female secondary school students were randomly selected from 12

secondary schools in ten out of the 16 local government areas in Ekiti State. The instrument for their study, was a 28 -item attitude scale in Mathematics constructed and validated by the researchers. The items in the scale have discriminating power of 0.72 and above and item total correlation coefficients of 0.23 and above. The scale used has a construct validity coefficient of 0.29 using discriminant analysis and reliability coefficient of 0.81 using Cronbach reliability method. Two hypotheses were tested at 0.05 level of significance. Hypothesis one was tested using Students' t-test while hypothesis two was tested using Analysis of Variance (ANOVA) and Scheffe's post-hoc test for pair wise comparison. The results of the analysis showed that there was no significant difference in the attitude of students from rural and urban setting towards Mathematics and that location did not influence the attitude of secondary school students towards Mathematics. Their results also showed that study interest has significant difference on the attitude of students towards Mathematics and that study interest has influence on the attitude of secondary school students towards Mathematics. Therefore, it is recommended that efforts should be made by the teachers, parents and government to inculcate positive attitude of students towards Mathematics irrespective of their study interest.

Umar and Samuel (2018), they investigated school location as correlate of students' achievement in Basic Science. The study adopted a descriptive survey research design. One research hypothesis was formulated and tested at alpha=0.05. Two hundred and thirty-six (236) Junior Secondary School (JSS III) students formed the sample size. The researcher instrument for the study was titled, "Students' Location questionnaire" (SLQ). Their result showed significant difference in Basic Science achievements between urban and rural students. Students in urban schools had better achievement than those at rural settings. They recommended that; educators should fill the urban/rural dichotomy in students' achievement in Basic Science and parents in rural areas should help their children to maintain interest in Basic Science.

School Ownership

Olasehinde and Olatoye (2014), their study compared senior secondary school students' science achievement in public and private schools in Katsina State. They employed the descriptive survey research. Two hundred and four students (204) senior secondary school students were randomly selected for the study from the target population. One instrument, Science Achievement Test (SAT) was used to collect data for the study. Data were analysed using t-test statistic. The results showed that there is a significant difference between public and private secondary school students' science achievement ($t = -3.537$, $p < 0.05$). Private schools students performed significantly better than their public school counterparts ($t = -3.537$, $p<0.05$). There is no significant difference between public and private senior secondary school students' achievement in biology and chemistry ($t = 2.789$ and -1.149, $p>0.05$ respectively); there is a significant difference in physics achievement between public and private school students ($t = -3.158$, $p<0.05$) and there is no significant difference between male and female students in science achievement in public and private schools ($t = -0.124$ and -0.158, $p<0.05$ respectively). It was recommended among others that more supervisory roles be played on public schools teachers to make them work better on their science students.

Okon and Archibong (2015) in their study on School Type and Students' Academic Performance in Social Studies in Junior Secondary Certificate Examination (JSCE), they determine the level of performance in social studies by students at the junior secondary certificate examination (JSCE). They examined the difference in academic achievement of students in both private and public secondary schools in Akwa Ibom State. Research question was formulated to guide the study. Their study sample size was 940 respondents drawn from both private and public schools. They adopted the Ex-post facto design and t-test analysis was used to analyze the data. Their findings revealed that students in private secondary schools performed better in Social Studies than those in public schools. Based on the result, conclusions were drawn, recommendations made and suggestions for further research offered.

School Type

Nnenna and Adukwu (2018) examined the influence of gender and school location on senior secondary school student's achievement in biology in Agbani Education Zone of Enugu State. They sampled 328 students (164 males and 164 females respectively) from Four (4) co-education schools and four intact SS3 classes both from rural and urban schools were used. The sampling technique they used was multiple stage sampling technique.

The research design used was ex-post facto design since the students used for the study has been assigned to appropriate tends of gender (male and female) and school location (rural and urban) and cannot be manipulated by the researcher. Biology Achievement Test (BAT) was used as the instrument for data collection. Two research questions and two research hypotheses were formulated. Research questions were answered using mean, simple percentage while the hypotheses were answered using z-test at 0.05 level of significance. Their findings showed that there was a significant difference in the mean achievement score of male and female students. Male students achieved higher than their female counterparts in Biology Achievement Test. Findings further revealed that there was significant difference in the achievement mean scores of students in rural and urban school located areas. The urban students achieved higher than rural students. Based on the findings, it was recommended that government should recruit more qualified biology teachers and distribute them equitably to schools irrespective of location and also females should be provided with adequate motivation to make them perform better in sciences.

Musibau and Johnson (2010) studied the influence of school type, sex and location on students' academic performance in Ekiti state secondary schools. Their study sample consisted of forty (40) secondary schools and four (4) Government colleges (State Unity colleges) which were purposively selected while thirty six (36) public secondary schools were randomly selected. The school sampled had presented candidates for both West Africa Examination Council (WAEC) and National Examination Council (NECO) respectively. An instrument, school type, sex, location and students' academic performance inventory was used to collect data for the study. Data collected were analyzed using percentage scores and t- test statistics. Three null hypotheses were generated and tested at 0.05 level of significance. Findings from the study showed that the level of students' academic performance was low. It was also revealed that school type, sex and location had no significant influence on students' academic performance. Based on the finding it was recommended that educational planners, administrators and evaluators should appreciate the fact that the Parent Teacher Association; Guidance and Counselors, philanthropists, students and society at large have crucial role to play in improving students' academic performance and solicit their supports in this regard.

METHODOLOGY

The study adopted the survey research design. The population for the study comprised of 268 Senior Secondary Schools and 7,425 SS II students. First, the simple random sampling technique was used to select two schools from each LGA in the three senatorial districts of Rivers State, which gave a total of 46 schools. The choice of using two schools was based on the premise that, some of the LGA has at most three senior secondary schools across the three Senatorial Districts of Rivers State. In each of the two selected schools, the simple random sampling technique was again used to select 10 students from each sampled schools, which gave a sample size of 460 students; thus the application of test construction and standardization.

Test Construction

The procedures for constructing the test, take the following steps;

Test Planning

Item Writing

Trial Testing

Item Analysis

Item Selection

Test Planning

The test planning includes the following:

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue XI November 2025

i) Stating and defining the objectives

ii) Outlining the content covered during instruction and

iii) Developing a test blue print or table of specifications.

Stating the Objectives

Stating the behavioural or process objectives play important roles in test construction as well as the teaching – learning encounter. The essence of stating the objectives is to determine the extent to which the instructional objectives have been achieved. The objectives should be stated in specific behaviours that the students are expected to exhibit at the end of the lesson. They are usually stated using action verbs which clearly indicate specific and directly observable behaviours. Blooms in Asuru (2015), listed six taxonomies of educational objectives in the cognitive domain as; knowledge, comprehension, application, analysis, synthesis and evaluation (KCAASE). Knowledge, comprehension and application are the lower cognitive domain and analysis, synthesis and evaluation for higher cognitive domain (Zimmaro, 2004).

As a multiple choice test items which are aimed at testing the student's levels of cognitive domains of learning. The lower cognitive domains were used, which are knowledge, comprehensive and application. According to Zimmaro (2004), they are the most widely used cognitive domains for measuring multiple choice test items outcomes. Therefore, the test was designed for SSII student's only. In other for the test to cover what it was designed to cover during instruction, the subject content were outlined to facilitate the development of the Table of Specification or Test Blue Print to fit in the 100 items.

Outlining the Content

The context encompasses the various teaching content areas, units, topics, and sub-topics that constitute the course or subject as specified in the scheme of work. To ensure that a test adequately samples the topics and sub-topics covered in the content, an outline of the content to be covered were made to facilitate the Test Blue Print or Table of Specification that fit in the 100 items.

Developing a Test Blue Print or Table of Specification

This is a two dimensional grid that shows the content and the objectives. It also specifies the proportion of questions allotted to each of the behavioural objectives and topics of the content.

Table 1 Multiple Choice Test Blue Print on Economics for SS II Scheme of Work

Contents		Objectives			
	Weeks	Knowledge	Comprehension	Application	Total
Basic Tools of Economic Analysis	2	6		4	10
Concepts of Demand & Supply	2	1	4		5
Cost Concepts	2	4	1		5
Revenue Concepts	1	2	3		5
Types & Features of Economy System	2	4	1		5

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue XI November 2025

Labour Market	2	5	3		8
Elementary Treatment of Utility Theory	1		4		4
Price Determination	3	5	6	2	13
Market Structures	2	6	3		9
Industries in Nigeria	3	2	5		7
Agriculture	2	2	3		5
Elementary Treatment of Fiscal Policy	3	5	5		10
Types of Financial Institutions & their Functions	1		2		2
Money: Demand for Money and Supply of Money	2	6	2		8
Money: Inflation & Deflation	2	2	2		4
	30	50 (50%)	44 (44%)	6 (6%)	100 (100%)

The test blue print shows how the 100 multiple choice objectives test items were drawn. It shows the number of topics and number of questions that was drawn from a particular topic. It also shows the number of questions that measure each level of the cognitive domains; after which, the items were written.

Item Writing

The 100 test item were clearly written in simple and clear language, reducing the reading difficulty level to the tastes level, while paying attention to the behavioural objectives, negative and double worded questions were avoided as well as placing the right options or alternatives randomly (see Appendix A). In addition, the answer keys for the 100 test item questions were also provided (see Appendix B).

Trial Testing

The pool of 100 items was produced for Trial Testing. The test was trial tested on 30 (thirty) SSII students in Community Secondary School Rumoulumeni. The time for trial-testing test was not stipulated, because the essence of trial testing is to generate empirical data about the individual adequacy of each item and thus provide information for item analysis. In other words, time is between when the first student and the last student submitted. The first student submitted at 1 hour and the last submitted at 30 minutes later. This indicated that 1 hour 30 minutes was used for the trial testing.

The instruction for the test was given that;

Students should answer all the 100 questions.

Each question carries 1 mark

After administration and scoring the test, the scripts were then arranged according to the order of their scores. The scorers of 27% higher and lowest 27% scorers were adopted. This gave 27% of 30 (8.1), in which 8 scripts were counted out from the top and another 8 scripts from the bottom and the middle ones were discarded. The top 8 scripts and the bottom 8 scripts were used for item analysis.

Item Analysis

This is used to evaluate the psychometric performance of each question to identify which item should be improved or scrap. According to SCOREPAK (2005), item analysis is a process which examines student

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue XI November 2025

responses to individual test items (questions) in order to assess the quality of those items and of the test as a whole. The Item analysis involved;

Item Difficulty

Item Discrimination and

The Effectiveness of the Distractor

Item Difficulty: It is the percentage of students that correctly answered the item. The range is from 0% to 100%, or more typically written as a proportion as 0.0 to 1.00. The higher the item difficulty value, the easier the item. It is calculated by using the formula;

$$D = \frac{RH+RL}{Total}$$

Item Discrimination: Item discrimination describes the extent to which a test item discriminates or differentiates between students who do well on the overall test and those who do not. It is calculated by using the formula;

$$D_x = \frac{RH-RL}{½Total}$$

Effectiveness of Distracters: For the effectiveness of the distracters, it was designed to trap students who have not actually achieved the objective of the learning content but not to be calculated to determine effectiveness of the distracters.

In summary, the objectives of item analysis are;

1. To discriminate between high and low scoring group.

2. To select the items that are valid for the final test and

3. To arrange the selected items according to their levels of difficulty in the final test.

Item Selection

The Item Selection was the final stage of item analysis. The criteria for item selection were done based on the Item Difficulty and the Item Discrimination Index values of 0.4 to 0.6 for each index per test item (see Appendix C). Which 53 out of 100 items from the rigorous item analysis were found adequate (see Appendix D). However, for the purpose of this paper, the last three items were removed and only 50 were used for standardization. After which the validity and reliability of the test were estimated on the selected fifty (50) items.

Estimating Validity and Reliability of the Test

The validity and reliability of the test items was done based on the item selection of fifty (50) items from the item statistics, that were gotten from the top 8 scripts and the bottom 8 scripts (which gave a total of 16 script) that was used for item analysis.

Test Validity: Is the extend which a test measures accurately the purpose it was design for. Test validity tells us whether the test is measuring what it purports to measure. And there are different types of test validity. For the purpose of this paper, the content validity was used. The test was validated by two teachers who teaches Economics in secondary school and two experts in test construction from two different universities, Department of Educational Psychology, Guidance and Counseling, Ignatius Ajuru University of Education, Port-Harcourt and Department of Educational Psychology, Guidance and Counseling, University of Port Harcourt. The essence of the test validity was to avoid ambiguity, grammatical errors etc.

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue XI November 2025

Test Reliability: Is the extent to which a test procedure yields the same score for the same person consistently. Test reliability tells us how likely it is that a student would obtain the same score when he/she takes the test again. This index can hold a value between 0 and 1. Higher test reliability indicates that the test measures whatever it measures in a consistent manner. The reliability estimate of the test was estimated using Split Half Reliability technique or method.

Split Half Reliability: In estimating the reliability, the Split Half Reliability Technique was used to the check the reliability of the test. The test items were split into two halves (odd and even). This was done by categorizing all the items into odd numbers (1, 3, 5, 7, 9….) as odd (X) and even numbers (2, 4, 6, 8, 10….) as even (Y). Then 1 assigned to correct options and 0 to wrong options and so on for both odd and even, then all the correct options assigned 1 for both odd and even were summed to have their separate scores. The two separate scores from odd (X) and even (Y) were correlated using Pearson *r*, which yield a reliability coefficient of 0.87. This represented the half test length, to get the reliability coefficient of the full test length, the application of Spearman Brown Prophesy formula was applied; and yield the reliability index of 0.93 (see Appendix F), and Hernandez (n.d.), listed the ideal values of reliability index for objective tests choice answers for;

- Two answer choices (true and false) = .75
- Three answer choices = .67
- Four answer choices = .63
- Five answer choices = .60

And the options or alternative for this present test is a four options or answer choices, which has reliability index of 0.93. This indicated that, the reliability index for the present study is very high. That is, the test is very reliable.

Test Standardization

The process of test standardization or standardization of the test in this paper is divided into two parts; Test Administration and Analysis. This is so because, the test must be administered to the representative norm before analysis can be done for standardization.

Administration of the Test

The administration of the test was not stressful because, most of the students were aware of the testing exercise, as a result of permission granted from the various schools principals and the co-operation from their classroom teachers. The seating arrangements were spacious in ventilated classrooms. The administration was done in five schools in Rivers State, namely;

Community Secondary School, Aluu	= Rural-Public & Co-Edu	= 50
Degema National High School, Degema	= Rural-Public & Co-Edu	= 50
Government Girls Secondary School, Oromineke	= Urban-Public & Single Sex	= 50
Royal Girls Academic, Ozuoba	= Urban-Private & Single Sex	= 50
Alpha Comprehensive College, Rumoulumeni	= Urban-Private & Co-Edu	= 50
Total		= 250

The administration was on fifty (50) students per school, which gave a total administration of two hundred and fifty (250) scripts.

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue XI November 2025

Instruction: The students were asked to answer all questions. They were asked to tick the column for demographic data about their gender, school type, school ownership and location of the school.

Timing: The timing of the test dependent on the time it took the test takers to complete the test during trial testing. Sixty minutes (60 minutes) was allotted for the test. 1 minute was given to respond each item = 1 min =1 question as the rule of thumb, states that a testee requires between 30-45 seconds answering a recall question. However, 10 minutes was given to read instructions and for some quantitative aspect of the test.

Scoring: The scoring of the test scripts was two marks to one question. This was done based on the examiner.

Grading: The scores for the two hundred and fifty (250) senior secondary two (SSII) students were graded as shown below;

Table 3.2.1 Grading of Scores

Scores	**Grades**
0-39	Fail
40-49	Poor
50-59	Good
60-69	Very Good
70-100	Excellent

In the grading of the scores, 50 marks were considered to be the average (good) performance of every student who took part in the test.

Analysis

Based on the administration of the fifty (50) items to the two hundred and fifty (250) senior secondary two (SSII) students from the five listed senior secondary schools in Rivers State; the analysis was done using frequency count, mean and independent sample t-test from the final scores that had been arranged based on the norms.

The independent sample t-test was used to test that;

1. There is no significant difference between the scores of boys and girls.

2. There is no significant difference between the scores of students in urban and rural schools.

3. There is no significant difference between the scores of students in co-educational and single sex schools.

4. There is no significant difference between the scores of students in public and private schools.

The analysis was done based on the scores retrieved from the representative sample. Their analyses are presented in tables as shown below.

Gender Norms

To study the effect of gender on the test, the sample consists of boys and girls. The gender wise frequency distribution and means of the test score are shown in table and graph below:

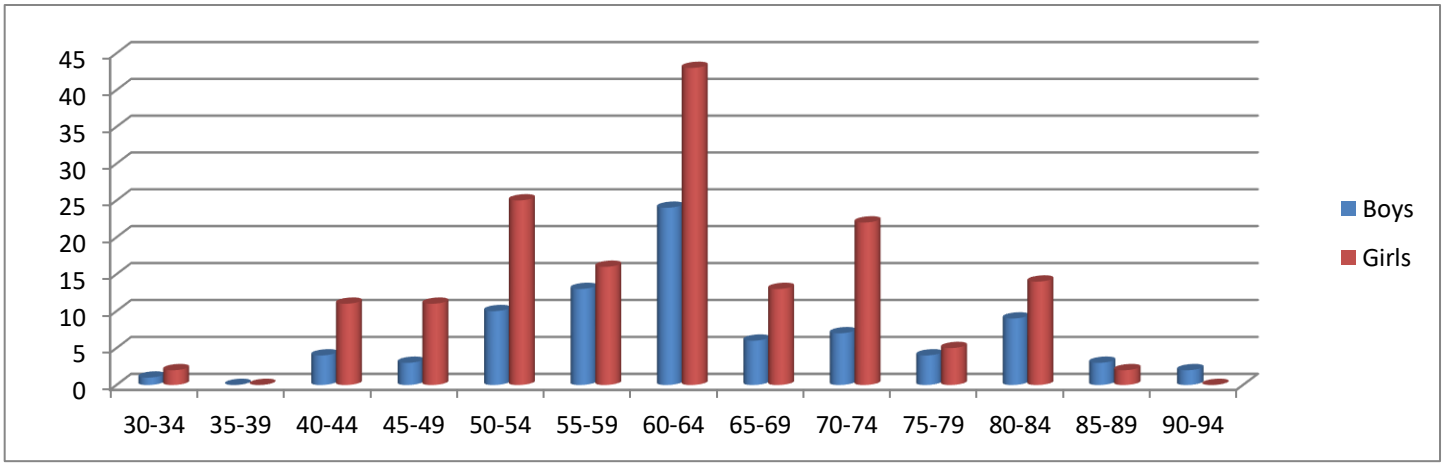
Table 3.2.2.1 Gender Wise Frequency Distribution of the Test Scores

Class Interval (Scores)	**Boys**	**Girls**	**Total**
30-34	1	2	3
35-39	0	0	0
40-44	4	11	15
45-49	3	11	14
50-54	10	25	35
55-59	13	16	29
60-64	24	43	67
65-69	6	13	19
70-74	7	22	29
75-79	4	5	9
80-84	9	14	23
85-89	3	2	5
90-94	2	0	2
Total	**86**	**164**	**250**
Mean	**63.58**	**60.95**	

The mean score for boys is 63.58 as against that of girls' score which is 60.95. This shows that boys performed better than the girls.

The bar chart of boys and girls scores is shown in figure 3.2.2.1 below.

Figure 3.2.2.1 Bar Chart of Boys and Girls Scores



Location

The location or area wise frequency distribution and means of the test score are shown in table and graph below:

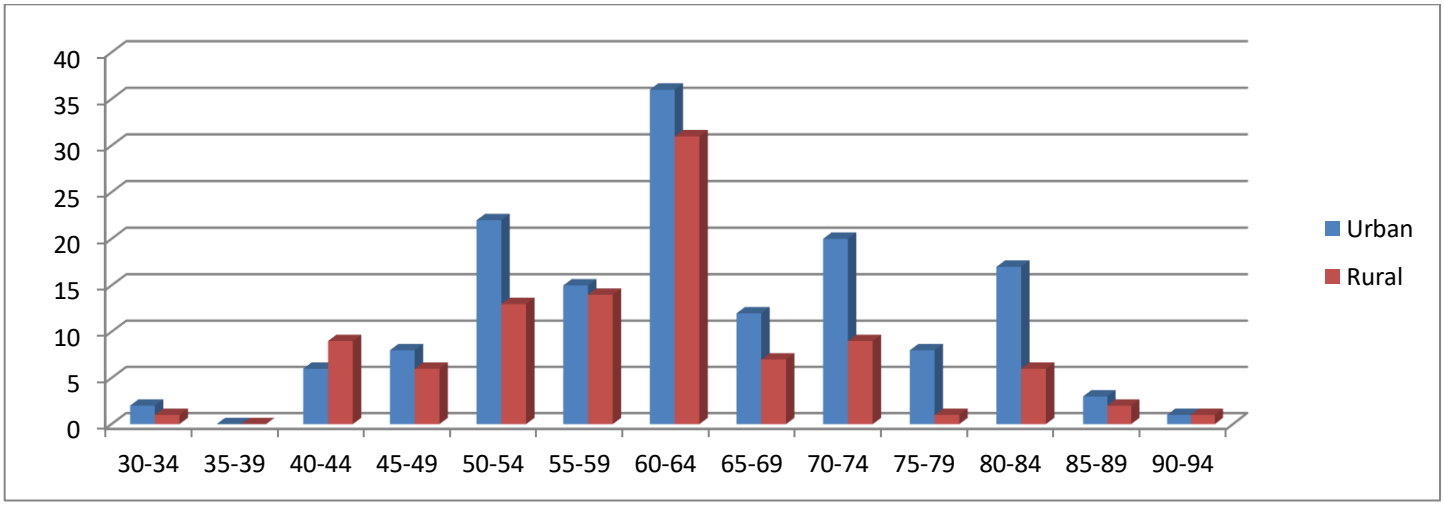
Table 3.2.2.2 Location Wise Frequency Distribution of the Test Scores

Class Interval (Scores)	Urban	Rural	Total
30-34	2	1	3
35-39	0	0	0
40-44	6	9	15
45-49	8	6	14
50-54	22	13	35
55-59	15	14	29
60-64	36	31	67
65-69	12	7	19
70-74	20	9	29
75-79	8	1	9
80-84	17	6	23
85-89	3	2	5
90-94	1	1	2
Total	**150**	**100**	**250**
Mean	**63.11**	**59.98**	

The mean score for urban schools is 63.11 as against that of rural schools score which is 59.98. This shows that urban schools performed better than the rural schools.

The bar chart of scores in urban and rural school is shown in figure 3.2.2.2 below.

Figure 3.2.2.2 Bar Chart of Urban and Rural Schools



School Ownership

The school ownership wise frequency distribution and means of the test score are shown in table and graph below:

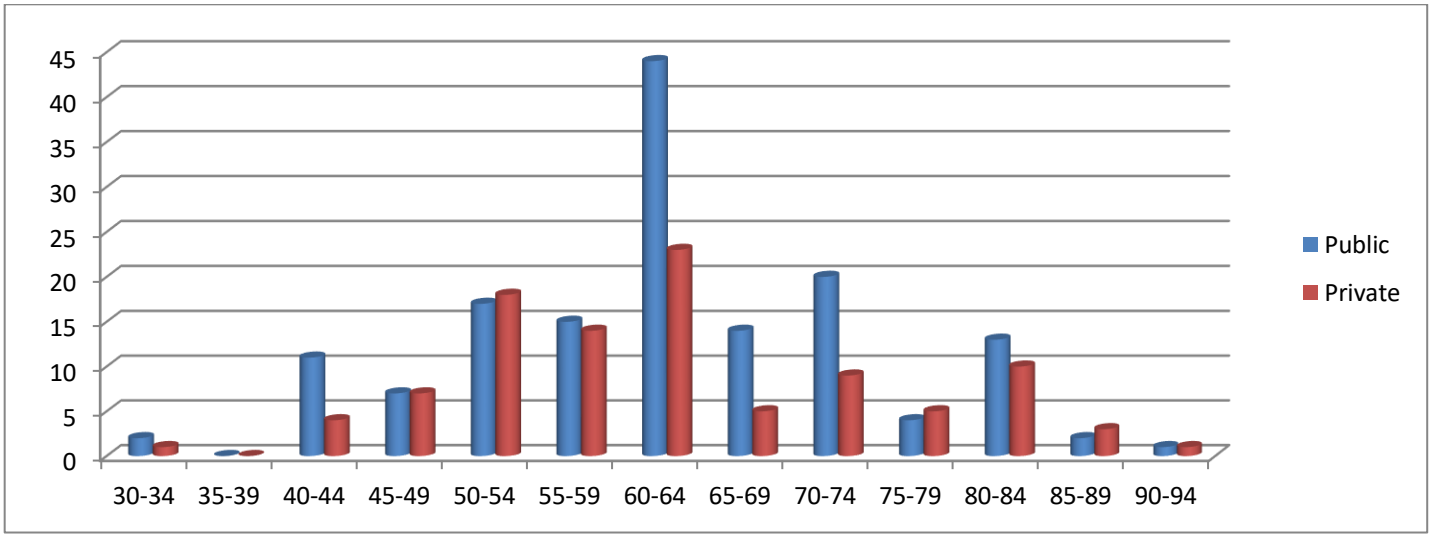
Table 3.2.2.3 School Ownership Wise Frequency Distribution of the Test Scores

Class Interval (Scores)	Public	Private	Total
30-34	2	1	3
35-39	0	0	0
40-44	11	4	15
45-49	7	7	14
50-54	17	18	35
55-59	15	14	29
60-64	44	23	67
65-69	14	5	19
70-74	20	9	29
75-79	4	5	9
80-84	13	10	23
85-89	2	3	5
90-94	1	1	2
Total	**150**	**100**	**250**
Mean	**61.79**	**61.96**	

The mean score for private schools is 61.96 as against that of public schools score which is 61.79. This shows that there is no difference in the performance of private and public schools.

The bar chart of public and private schools is shown in figure 3.2.2.3 below.

Figure 3.2.2.3 Bar Chart of Public and Private Schools



School Type

The school type wise frequency distribution and means of the test score are shown in table and graph below:

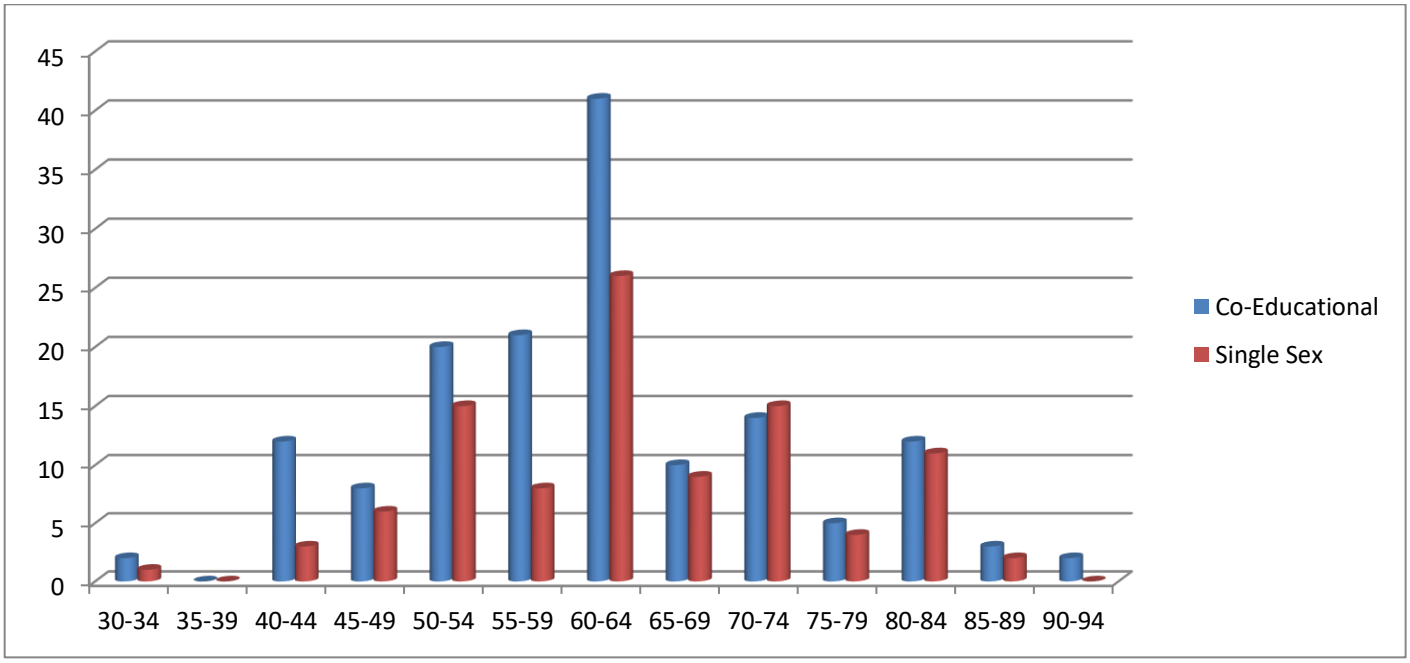
Table 3.2.2.4 School Type Wise Frequency Distribution of the Test Scores

Class Interval (Scores)	Co-Educational	Single Sex	Total
30-34	2	1	3
35-39	0	0	0
40-44	12	3	15
45-49	8	6	14
50-54	20	15	35
55-59	21	8	29
60-64	41	26	67
65-69	10	9	19
70-74	14	15	29
75-79	5	4	9
80-84	12	11	23
85-89	3	2	5
90-94	2	0	2
Total	**150**	**100**	**250**
Mean	**61.11**	**62.98**	

The mean score for single sex schools is 62.98 as against that of co-educational schools score which is 61.11. This shows that single sex schools performed slightly better than the co-educational schools.

The bar chart of co-educational and single sex school is shown in figure 3.2.2.4 below.

Figure 3.2.2.4 Bar Chart of School Ownership Score



Independent Sample t-test

The necessary data to test the significance of difference between mean scores of the test for different groups were calculated based on the formulated hypotheses and tested at 0.05 level of significance as shown below.

There is no significant difference between the scores of boys and girls.

Table 3.2.2.5 Independent Samples Test for difference between Boys and Girls Scores

Gender	N	Mean	Std. Deviation	df	t-value	Sig(2-tailed)
Boys	86	63.58	12.746			
				248	1.591	.113
Girls	210	60.95	11.753			

$\alpha = 0.05$

In Table 3.2.2.5, it was observed that the *p*-value of .113 is greater than the significance level of 0.05 ($p > 0.05$). This means that, the scores of students from the gender group is not significant. That is, there is no significant difference between the scores of boys and girls.

There is no significant difference between the scores of students in urban and rural schools.

Table 3.2.2.6 Independent Samples Test for difference between Urban and Rural Scores

Location	N	Mean	Std. Deviation	df	t-value	Sig(2-tailed)
Urban	150	63.11	12.262			
				248	2.023	.04
Rural	100	59.98	11.774			

$\alpha = 0.05$

In Table 3.2.2.6, it was observed that the *p*-value of .04 is lesser than the significance level of 0.05 ($p < 0.05$). This means that, the scores of student from the location group is significant. That is, there is a significant difference between the scores of students in urban and rural schools.

There is no significant difference between the scores of students in co-educational and single sex schools.

Table 3.2.2.7 Independent Samples Test for difference between Public and Private School Scores

School Ownership	N	Mean	Std. Deviation	df	t-value	Sig(2-tailed)
Public	150	61.79	11.951			
				248	-.109	.913
Private	100	61.96	12.485			

$\alpha = 0.05$

In Table 3.2.2.7, it was observed that the *p*-value of .913 is greater than the significance level of 0.05 ($p > 0.05$). This means that, the scores of student from the school ownership group is not significant. That is, there is no significant difference between the scores of students in public and private schools.

There is no significant difference between the scores of students in public and private schools.

Table 3.2.2.8 Independent Samples Test for difference between Co-Educational and Single Sex School Scores

School Ownership	**N**	**Mean**	**Std. Deviation**	**df**	**t-value**	**Sig(2-tailed)**
Co-Educational	150	61.11	12.380			
				248	-1.209	.228
Single Sex	100	62.98	11.750			

$\alpha = 0.05$

In the Table 3.2.2.8, it was observed that the *p*-value of .228 is greater than the significance level of 0.05. This means that, the scores of student from the school type group is not significant. That is, there is no significant difference between the scores of students in co-educational and single sex schools.

DISCUSSION OF FINDINGS

The results from the findings revealed that, there is no significant difference between the scores of boys and girls. This finding in this study is in agreement with the findings of Adebule and James (2014) which their study revealed that the attitude of students towards mathematics did not depend upon gender. But contrary with that of Wangu (2014) whose findings revealed a significant gender differences by overall performance with more boys passing in form 1 and 2 as compared to the girls in the same divisions. The lack of disparity between boys and girls could be as a result of the awareness to both sexes about how effective learning can improve one performance irrespective of one sex. In the case of location, there is a significant difference between the scores of students in urban and rural schools. This study is in accordance with that of Ellah and Ita (2017) who in their study revealed that; there is a significant difference in students' academic performance in English language on the basis of school location. The study is also in line with Umar and Samuel (2018), their result showed significant difference in Basic Science achievements between urban and rural students. That student in urban schools had better achievement than those at rural settings.

For school ownership, there is no significant difference between the scores of students in public and private schools. This finding is in agreement with the findings of Olasehinde and Olatoye (2014), their findings revealed that, there is a significant difference between public and private secondary school students' science achievement; but no significant difference between public and private senior secondary school students' achievement in biology and chemistry and there is a significant difference in physics achievement between public and private school students respectively. The lack of difference could be as a result of the level of monitoring or supervision in the public school. This must have increase the level of seriousness from the teachers. While the school type, there is no significant difference between the scores of students in co-educational and single sex schools. This findings is similar to that of Musibau and Johnson (2010), their study revealed that school type, sex and location had no significant influence on students' academic performance.

CONCLUSION

In the construction and standardization of the achievement test, pilot testing and final run out were described and the norms were established. The test have been subjected to content validity and a reliability coefficients index of 0.93, this shows that the test is highly reliable. Therefore, based on the item analysis, content validity and the reliability coefficients index and the standardization of the test, the test is found satisfactory.

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