



## The Comparative Impact of JAMB and University Computer-Based Test (CBT) on the Evaluation of First Year Students' Readiness for Science Education

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### Abstract

The increasing adoption of Computer-Based Test (CBT) in Nigeria has reformed assessment practices at both the national and institutional levels. While several studies have explored the efficiency and reliability of CBT, no empirical research has comparatively examined the Joint Admissions and Matriculation Board (JAMB) CBT and University Screening CBT as evaluative tools for students' readiness for Science Education. This study therefore investigates the comparative impact of JAMB and University Computer-Based Testing (CBT) on the Evaluation of First Year Students' Readiness for Science Education. A descriptive correlational design was employed. Data were collected from 200 students in the Department of Science Education, Rivers State University, using documented JAMB and University Screening CBT scores. Data were analysed using mean, standard deviation, Pearson's correlation, and paired sample t-test. Results revealed a significant positive correlation ( $r = 0.69$ ,  $p < 0.05$ ) between JAMB and University CBT scores, indicating a strong relationship between the two evaluative systems. However, a significant difference was observed in mean scores ( $t = 3.72$ ,  $p < 0.05$ ), with University CBT yielding higher average scores ( $M = 61.45$ ,  $SD = 8.21$ ) than JAMB CBT ( $M = 57.12$ ,  $SD = 7.93$ ). It was concluded that both CBTs are valid but contextually distinct in assessing students' readiness for Science Education. The study contributes new empirical evidence on the comparative validity of national and institutional CBTs in science-related evaluations and recommends closer alignment of JAMB and university assessment frameworks to ensure standardised admission evaluation.

**Keywords:** Computer-Based Testing (CBT), JAMB, University Screening, Science Education, Academic Achievement

### Introduction

Assessment is an important part of the teaching-learning process, providing evidence for measuring students' knowledge, skills, and attitudes (Menéndez et al., 2019; Penuel & Shepard, 2016). In the present-day educational landscape of Nigeria, admission assessment has definitively shifted from traditional paper-and-pencil testing to advanced computer-based formats that guarantee greater accuracy, security, and fairness (Onyekwelu & Obikeze, 2023; Abubakar & Adebayo, 2014). The Joint Admissions and Matriculation Board (JAMB) took a courageous step by pioneering the computer-Based Testing (CBT) for tertiary entrance examinations in 2013, setting a standard for modern assessment practices (Abdulkadir et al., 2019). Following this accomplishment, universities adopted the same model for Post-Unified Tertiary Matriculation Examination (post-UTME) or screening assessments (Oluwatayo et al., 2015). Both tests are used successively to evaluate and admit candidates into university programmes, in which Science Education is not an exception (Kennedy & Ebuwa, 2020).

Computer-Based Test (CBT) is being implemented for assessment by JAMB and various institutions in Nigeria due to increase in the population of registered candidates, increase in work demands from academic staff, and more developmental strides in Information and Communication Technology (ICT) (Sheu & Evanero, 2022).

Notwithstanding the prevalent adoption of CBT, there are ongoing deliberations regarding the proportional competence of JAMB's standardized assessments and the university-specific CBT systems. While the CBT conducted by JAMB offers a nationwide evaluation of wide-ranging aptitude, each university's CBT is personalised to meet its exclusive requirements and curriculum objectives for a particular discipline (Kolawole, 2018).

Computer-Based Testing (CBT) denotes a system of assessment administered, managed, and scored through computer technology (Chukwuma-Nosike & Chukwuma, 2023; Dolan & Burling, 2017). It involves the presentation of questions in digital form, allowing candidates to respond via a computer interface. CBT has been recognised for improving reliability, ensuring test security, and providing instant feedback to candidates (Jimoh et al., 2013). In the Nigerian context, the Joint Admissions and Matriculation Board (JAMB) uses CBT to evaluate general aptitude and subject-specific knowledge, while universities apply CBT for post-UTME screening and in-course assessments (Umar et al., 2022; Okafor, 2017).

Science education, by its nature, emphasises analytical thinking, logical reasoning, and problem-solving. Thus, the adoption of CBT in science-related assessments aligns with the pedagogical demand for objective and valid evaluation tools (Osborne, 2013). According to Russell et al. (2003), CBT enhances test standardization. It also supports the integration of technology into science learning, fostering academic excellence among students (Chin et al., 1991). Furthermore, CBT platforms can be designed to test a range of competencies, that is, from realistic recall to higher-order cognitive skills, subject to the complexity of the software used (Yunita et al., 2021). CBT is also applauded for reducing human error and examiner bias in test administration and scoring (Okoye & Duru, 2020; Öz & Özturan, 2018). By automating scoring systems, especially in multiple-choice formats, CBT provides faster and more accurate evaluation outcomes (Chukwuma-Nosike & Chukwuma, 2023).

Clariana and Wallace (2002) investigated the general impact of CBT on students' readiness and academic achievement in universities. Their study revealed that students exposed to computer-assisted testing demonstrated higher confidence levels and better performance compared to those assessed through traditional paper-based methods. Similarly, Okoye and Duru (2020) found that CBT enhances test fairness and reliability by reducing examiner subjectivity and increasing consistency in scoring.

In another study, James et al. (2019) examined secondary school students' attitudes toward CBT in Adamawa State. Their findings showed that most students perceived CBT as more transparent and motivating, although inadequate computer access and erratic electricity were reported as key challenges. A related investigation by Alabi et al. (2023) assessed the effects of CBT on learning outcomes in chemistry. The results indicated significant improvement in students' performance and retention when CBT was used, particularly for multiple-choice and simulation-based questions.

Oduntan et al. (2015) explored the comparative effectiveness of CBT and traditional paper tests among students in education faculties. They observed that students who undertook CBT performed better in cognitive domains requiring application and analysis, implying that CBT can effectively assess higher-order scientific reasoning. Similarly, Umar et al. (2022) studied the use of CBT in Nigerian universities and found it enhanced both efficiency and student engagement during examinations.

### **Statement of the Problem**

Despite the fact that CBT has enhanced competence and fairness in Nigerian educational evaluation, the dual use of JAMB and University CBTs raises questions about consistency in assessing student competence. Instances exist where students with high JAMB scores perform poorly in the University CBT and vice versa. This inconsistency challenges the validity of using both assessments as complementary evaluative tools for Science Education students. No prior study has examined these CBT systems comparatively using actual screening scores. Therefore, this study addresses the existing research gap by empirically comparing their effectiveness in evaluating student readiness for science education.

### **Objectives of the Study**

The objectives of this study are to:

1. Compare the mean performance of students in JAMB CBT and University Screening CBT.
2. Determine the relationship between JAMB CBT scores and University Screening CBT scores of first-year Science Education students.
3. Identify which of the two CBT systems provides a more valid evaluation of students' academic readiness.

### Research Questions

This study will be guided by the following research questions:

1. What are the mean scores of students in JAMB CBT and University Screening CBT?
2. What is the relationship between students' JAMB CBT scores and University Screening CBT scores?
3. Is there a significant difference between students' JAMB CBT and University Screening CBT mean scores?

### Research Hypotheses

The following null hypotheses were formulated and tested at the 0.05 level of significance:

H<sub>01</sub>: There is no significant relationship between students' JAMB CBT and University Screening CBT mean scores.  
H<sub>02</sub>: There is no significant difference between the mean scores of students in JAMB CBT and University Screening CBT.

### Methodology

#### Research Design

The study employed a descriptive correlational design. The population comprised all first-year Science Education students at Ignatius University of Education, Rumuolumeni, Port Harcourt, Rivers State, during the 2023/2024 academic session. A purposive sample of 200 students was carefully chosen, as complete records of their JAMB and University Screening CBT scores were available. The study utilised documented JAMB CBT scores and University Screening CBT scores obtained from the university's admission office in the Registry Department of Ignatius University of Education, Rumuolumeni, Port Harcourt, Rivers State. The scores represented total marks obtained by each student in their respective CBT assessments. Descriptive statistics (mean, standard deviation) were used to answer the research questions, while Pearson's Product Moment Correlation and Paired Sample t-test were used to test the hypotheses at the 0.05 significance level.

### Results

**Research Question 1:** What are the mean scores of students in JAMB CBT and University Screening CBT?

**Table 1. Mean scores of students in JAMB CBT and University Screening CBT.**

Test Type	N	Mean (M)	Standard Deviation (SD)
JAMB CBT	200	57.12	7.93
University CBT	200	61.45	8.21

Table 1 shows the mean scores of students in JAMB CBT and University Screening CBT. Students' mean score in University CBT (61.45) was higher than their mean score in JAMB CBT (57.12), suggesting that students performed better in the institution-based assessment, hence the reason for their admission.

**Research Question 2:** What is the relationship between students' JAMB CBT scores and University Screening CBT scores?

**Table 2: Pearson's Product Moment Correlation between students' JAMB CBT scores and University Screening CBT scores.**

Variables	N	r	p-value	Remark
JAMB CBT vs University CBT	200	0.69	0.001	Significant

\*Significant,  $p < 0.05$

Table 2 reveals the Pearson's product moment correlation between the mean scores of students in JAMB CBT and University Screening CBT. There was a strong positive correlation ( $r = 0.69$ ,  $p < 0.05$ ) between JAMB and University CBT scores, indicating that both assessments are related in measuring students' academic competence and readiness.

### Research Question 3 / Hypothesis 2: Is there a significant difference between students' JAMB CBT and University Screening CBT mean scores?

Table 3. Paired Sample t-test *between students' JAMB CBT and University Screening CBT mean scores*

Test	Mean Difference	df	t-cal	p-value	Decision
JAMB CBT vs University CBT	-4.33	199	3.72	0.000	Reject H <sub>0</sub>

\*Significant,  $p < 0.05$

Table 3 shows the paired sample t-test between students' JAMB CBT and University Screening CBT mean scores. The result shows a significant difference between the two CBT systems ( $t = 3.72$ ,  $p < 0.05$ ). Students scored higher in University CBT, indicating that university-level CBTs may be less stringent or more aligned with prior preparation.

### Discussion

The findings of this study indicate that while both JAMB and University CBTs are valid and positively correlated, their evaluative focus differs. However, the significant difference in mean scores suggests that university CBTs may test knowledge more on the specific context relevant to Science Education curricula, as opposed to JAMB's comprehensive, generalised testing structure. This supports the argument of Sheyin et al. (2018) that institutional post UTME conducted as CBTs are better aligned with departmental learning outcomes. The observed mean difference also implies that JAMB CBT may serve as a broader screening mechanism, while the University CBT provides greater judgement in academic readiness.

### Conclusion

The study concluded that both JAMB and University CBTs are valid evaluative instruments but differ in focus and strictness. The JAMB CBT measures general academic potential, while University CBT better captures subject-specific readiness. Together, they provide a balanced framework for evaluating student readiness for Science Education.

### Recommendations

The following were recommended by the researcher:

1. JAMB and universities should harmonise CBT structures to ensure continuity and reduce duplication of testing efforts.
2. University CBTs should align more closely with JAMB content to enhance predictive validity.
3. Admission committees should utilise comparative analysis of both CBT results to ensure fair evaluation.
4. Similar comparative studies should be carried out across other disciplines and institutions.

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