Computer-Based Testing (CBT): A Paradigm Shift in Examination Administration in Nigerian Post-Primary Schools

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Abstract

This study examined *Computer-Based Testing (CBT): A Paradigm Shift in Examination Administration in Nigerian Post-Schools*; focusing on academic performance, students' perceptions, and resource availability. A survey design with descriptive statistics guided the study and its analysis. The population consisted of 3,000 students and 350 staff across three secondary schools in Bwari and Garam. Using purposive and random (blind balloting) sampling, 150 students and 150 staff were selected. Three hypotheses were tested at the 0.05 level of significance. Logistic regression results with **Intercept (1.299, p<0.001) signifying b**aseline odds of agreeing (vs disagreeing) are significantly > 0 led to the rejection of **Ho1**, showing a significant difference in academic performance between students assessed through CBT and those using paper-based tests (PBT). Chi-square tests also rejected **Ho2** and **Ho3**, indicating significant differences in students' perceptions of transitioning from PBT to CBT, and a significant relationship between available resources and CBT requirements. The findings suggest that while students generally favour CBT, its successful implementation depends on adequate ICT infrastructure, reliable electricity, and technical support. Based on this outcome, therefore, the study concludes that CBT adoption in Nigerian post-schools is feasible but requires improved resource provision, staff capacity development, and student preparedness. It recommends gradual adoption, continuous sensitisation, and investment by government and school owners in ICT facilities and staff development to strengthen examination administration in WAEC/NECO.

Keywords: Computer-Based Testing, Examination Administration, Academic Performance, Students' Perception, ICT facilities, WAEC/NECO.

Introduction

Education is seen as the bedrock of every society for both individual growth and societal progress; a continuous learning process through which members of a society acquire requisite knowledge and skills to facilitate effective performance of assigned social responsibilities; and the means through which the citizens get their bearings and learn to live with and among one another, transmitting ideas of value for the development of the whole man in relation to the dynamic needs of the society; a vehicle which always reflects a society's view of what is necessary,

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worthy or excellent. In order to achieve educational objectives and goals, different mechanisms are used to obtain feedback, one of such mechanisms being examination and test results (Udomette, 2022; Osarenren-Osaghae, Irabor, & Aigbuza, 2019; Abolarin, 2019; Federal Republic of Nigeria, 2013).

A system of education is built with a well specified curriculum, which components include Objectives and Aims; Methods; Contents and Evaluation. While the other three components take place during the planning and teaching-learning stages of education, evaluation takes place at the end of each stage of learning. Evaluation or Assessment is central to the practice of education (Abubakar & Adebayo, 2014). Evaluation can take the form of simple questions, tests, examinations, monitoring, etc and this must be measured or the outcomes must be quantified, for instance, in terms of scores or marks, positions, grading, etc. Udomette (2022) defines evaluation as dealing with the assessment of the goal, the determination of whether or not the intended objectives and goals have been attained. He further listed three major forms of evaluation to include **Formative evaluation**, which is done with a small group during the development process to test run various aspects of the instructional materials with the intent to improve; **summative evaluation**, which is made at the end of the learning programme such as WAEC/NECO/NABTEB ordinary level certificate examinations at the end of the senior secondary education; and **diagnostic evaluation**, which takes place when the teacher seeks to identify learning difficulties during the teaching process, usually with immediate feedback (Udomette, 2022).

At the secondary school level of learning, other forms of evaluation take place between the learners and their immediate learning environment except summative evaluation, which usually comes from external examining body at the conclusion of one's learning period.

School examination is the testing method used to measure the learning outcomes and to evaluate the degree to which set learning objectives have been achieved at the end of learning period. Usman and Olaleye (2022) have seen examination as one of the most widely used means of assessing learning and capability of students. However, Enebechi, Okoye and Arisokwu (2023) and Okoye and Duru (2019) opined that examinations have been statutorily positioned in Nigeria as an avenue for the assessment of learner understanding, attainment and level of competence to display academic attainment after a given period of a student's exposure to learning experiences. More so, Nwoke, Osuji and Agi (2017) posited that examinations constitute the process of assessing understanding, knowledge and academic ability of an individual within a given period. But Tomori and Aliyu (2025) decried the menace of examination malpractices which, despite the efforts of stakeholders in education to curb its widespread, had been a serious issue that affects credibility, integrity and quality while undermining every good effort of the individual, other persons, policymakers, etc.

The responsibility of conducting of terminal examinations at the end of secondary education in Nigeria had hitherto been vested on West African Examinations Council (WAEC), National Business and Technical Examinations Board (NABTEB) and National Examinations Council (NECO) and the system of test administration had been traditionally on pen-based testing (PBT) or pen on paper (POP) testing mode. This traditional system had been characterised by several challenges which according to Enebechi, et al (2023) included tedious process in the conduct of the examinations, marking of scripts, result publication and associated examination malpractices. In the view of Bala (2018) as cited by Enebechi, et al (2023) some institutions including examination bodies like Joint

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Admission and Matriculation Board (JAMB) Examination, National Open University of Nigeria (NOUN) and Teachers Registration Council of Nigeria (TRCN) had embraced the use of Computer-based testing (CBT) mode in assessing candidates as an innovative method of examination as against the old pencil or pen on paper mode. Bala (2018) in Enebechi, et al (2023) further pointed out that despite the successful adoption of CBT by JAMB in conduct of UTME (Unified Tertiary Matriculation Examination), it is still faced with some challenges, some of which are mostly poor power supplies, technical difficulties, poor education funding, among others. This therefore affects the way different individuals see this mode of examination especially in the wake of the proposal by terminal examining bodies like WAEC and NECO to adopt this mode for its final school certificate examinations with hope to administer objective tests in November Private Examinations 2025 and fully in 2026 WASSCE for School Candidates (The Punch, 2025; Vanguard News, 2025). It could be recalled that during the COVID-19 era, many settings began to shift from traditional methods of doing things to the new normal, the digital way. This transcends into educational settings, especially some of the tertiary institutions, which test-run computer-based examinations such as Dorben Polytechnic, Veritas University both in Abuja; Unizik and COO University, Uli amongst others (Enebechi, et al, 2023).

Computer-Based Testing (CBT) has emerged as a popular alternative to traditional paper-based testing methods (Al-Amri, 2019), and offers several benefits, including increased efficiency, accuracy, and security (Bartram, 2018). But this mode of assessment had not been adopted in the secondary school, especially owing to lack of adequate infrastructures in Information and Communication Technology and digital gadgets and inadequate manpower to meet the demands of a computer-assisted examination administration system (Tomori & Aliyu, 2025). Computer-based testing utilises information and communication technology platforms. According to Olafare and Fakorede (2017), Computer-Based Testing (CBT), also known as Computer-Based Assessment (CBA) or e-assessment/testing is a mode of administering test in which the responses are electronically recorded, assessed, or both; or tests and assessments conducted through the use of the organised systems on computers with the ability to automate a very time-consuming task, marking and monitoring progress (Olumorin, et al, 2013 cited in Olafare & Fakorede, 2017). Izevbizua, Igodan and Ukaoha (2024) added that the entire process of test delivery, response recording, and scoring is managed electronically; hence, CBT can be defined as the process of test administration or assessment whereby examinee responses are electronically coded, assessed and recorded, with the prompt publication of results (Okoye, 2019).

CBT is commonly used in educational settings, professional certifications, and standardised testing programs due to its efficiency, scalability, and ability to provide instant feedback to test-takers (Tomori & Aliyu, 2025; Izevbizua et al., 2024; Alabi, et al, 2012; Onyesolu & Chimaobi, 2017). Many scholars have applauded CBT to have possessed many advantages over Paper-based testing (or pen-on-paper) mode, both for teachers or test-administrators and for the students who participate in the test; especially in the areas of higher accuracy, security, and high-degree rapid and more controlled test administration. Administration of test on the computer helps to reduce almost entirely the use of hardcopy printing on papers (Ogunlade and Olafare, 2011; Akintonde, *et al*, 2019; Izevbizua, et al, 2024; Alabi, et al, 2012). Besides, scholars have highlighted the benefits of CBT to include efficient and accurate assessment

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with reduced grading error (Singleton, 2017); enhanced security, reducing cheating and malpractice (French, 2015) and personalised assessment, allowing for tailored questions and feedback (Scalise, 2017). Computer based testing can foster and boost the enhancement of more legitimate evaluations (Daramola, 2018).

The accomplishment or otherwise of this commendable innovation like CBT would largely be contingent on several factors such as the students' perceptions or disposition towards it; availability of ICT and other facilities in institutions of learning; awareness and abilities of learners to operate computers and the nature of the examination questions, etc. Huff (2016) had identified technical issues like system crashes and connectivity issues; and Warschauer (2018) pointed equity and access issues to be challenges that must be watch-out for when considering the implementation of computer-based testing mode.

The big question is what is the degree of readiness of most schools especially those in remote settlements to meet the requirements for the conduct of computer-based testing mode of examinations? How competent are the teachers to prepare the students to face the task of using computer to write their examinations unguided, and what is the level of funding public schools as well as private ones to provide adequate facilities such as well-equipped ICT centres, regular power supply, etc.? What nature of examination should be tested and how familiar are learners to such contents and computer technology? It is against such concerns as regarding the impact of CBT on creative writing skills and self-expressions, poor infrastructure in rural setting and such other related factors that this study is conducted.

The objectives of this study include the following:

a) To assess the difference in academic performance between students writing examination using computer-based tests and those using paper-based testing mode

b) To examine students' perceptions of the switching from paper-based testing (PBT) to computer-based testing in WAEC, NECO examinations

c) To evaluate the strength of available infrastructure and resources to meet the requirement for CBT mode of examination for WAEC, NECO, etc

To guide this study, the following hypotheses are postulated:

Ho1: There is no significant difference in academic performance between students taking computer-based tests and those who take paper-based tests

Ho2: There is no significant difference between students' perceptions of switching from PBT to CBT in WAEC/NECO examinations

Ho3: There is no significant relationship between available resources and the requirements for CBT in WAEC/NECO examinations

Review of related Literature and theoretical underpinnings

Akintonde, et al (2019) conducted a study on the perception of students towards computer-based test in agricultural science training at Ladoke Akintola University of Technology, using multi-stage sampling technique and chi-square test statistic and came out with the inference that there is significant relationship between some of the selected personal characteristics such as department, age, mode of admission; basis for supporting CBT examination and perception of CBT mode of examination and therefore advised the management to provide solution to some of the associated constraints with CBT examinations to encourage its full adoption.

Abubakar and Adebayo (2014) conducted a study on the use of CBT method for the conduct of examination in Nigeria. They examined the prospects, challenges and

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strategies thereto and found that the adoption of CBT in Nigeria faces critical challenges primarily security, software, poor ICT culture, policy and implementation, epileptic power supply and economic factors and therefore recommended provision of identified constraints to defuse the challenges.

Jim and Sean (2006) were cited in Abubakar, et al (2014) to have concluded that the electronic assessment can be justified in a number of ways such as its ability to help avoid the meltdown of current paper-based systems; assess valuable life skills; and it can be better for users through the providing of demand tests with immediate, perhaps diagnostic feedback, and more accurate results via adaptive testing; hence a proper preparation of the students for examination could make CBT a good method to curtail examinations malpractice effectively.

Izevbizua, et al (2024) in their study on CBT based on Voice Recognition adopted object-oriented analysis and design methodology and discovered that with voice recognition mode, a click would read onscreen questions to blind or visually impaired candidates who could answer such questions using Text-to-Speech API with the aid of earpiece and system speaker, thereby reducing the attendant problems faced by institutions such as cases of impersonation, corruption cases, leakages of examination questions as well as eliminating printing costs.

In their own view, Olafare and Fakorede (2017) examined lecturers' and students' acceptance of CBT in selected Nigerian universities and discovered that the most significant variable was perceived ease of use for lecturers and perceived usefulness for students and therefore concluded that the relationship between their perception and acceptance was significant; hence, it was recommended that the institutions should intensify efforts in improving on their CBT centres and make provision for necessary facilities for the conduct of the examinations so that students can have their examinations easily without any delay.

Enebechi, Okoye, and Arisokwu (2023) undertook a study on students' perception towards the use of CBT mode of examinations in institutions and from their results concluded that computer-based test is useful, easy to use and credible and so recommended that government should from time to time help in supporting the procurement of ICT equipment in the schools while there is the need to employ software engineer, computer engineer and computer teachers to facilitate the development, usage and maintenance of CBT software in the institutions of learning.

In their study, Tomori and Aliyu (2025) observed that the headships of secondary education seem to be helpless and toothless mainly because they do not have the financial independence to run the school system but are at the mercy of the school owners and proprietors with a paltry source of income. They cited Olanrewaju (2019) of stressing that most of these schools do not have an electricity power supply and no provision for an alternative power supply due to them being located in remote areas. They concluded that ICT integration will serve as a corrective strategy for curbing examination malpractice among secondary school students and therefore recommended that professional development programme be provided continuously for teachers to update their ICT knowledge and skills and that governments should pursue a viral policy on ICT integration for curbing examination malpractice in secondary schools to save the system from the brink of catastrophic collapse.

Abubakar and Adebayo (2014) further cited Bodmann and Robinson (2004) who conducted an experimental study to computer speed and performances differences among CBTs and PBTs with the result showing that candidates completed the CBT faster than PBT with no difference in scores; hence when

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students are motivated and testing conditions are equivalent, there are no differences between the scores obtained via CBT or PPT (Abubakar and Adebayo, 2014 citing Alabi, et al, 2012). They also reported that Calarina and Wallace (2002) conducted investigation to confirm several key factors in CBT versus PBT assessment; particularly content familiarity, computer familiarity, competitiveness, and gender using post-test only designed with one factor, test mode (Computer-based and Paper-based) and the study findings revealed that the CBT group out-performed the PBT group and that apart from content familiarity such other factors like gender, competiveness, and computer familiarity were not related to such performance difference.

Some theoretical underpinnings for this study include the theory of behaviourism, technology acceptance model and competency-based education. Behaviourism theory emphasises the role of environment and observable behaviours in learning and thus could devising informed strategies for improving educational outcomes through measurable and observable changes. Technology Acceptance Model (TAM) could help in studying the adoption and application of technology in education, such as computer-based testing whereas Competency-Based Education centres on developing specific skills and competencies in students, and this would be relevant in adequate planning on infrastructural and skill development to impact student outcomes, determining the degree of competencies in computer technology education with commensurate facilities to boost learning outcomes.

Materials and Methods

The study employed survey design with the use of Likert-scale structured questionnaire scaled into Strongly Agreed (SA), Agreed (A), Neutral (N), Disagreed (D) and Strong Disagreed (SD). These scales are denoted by assigned values of 5 to 1.

The study population covered 3000 students and 350 teachers of three selected secondary schools around Bwari in Abuja namely ASACS Staff College; Government Day Secondary School and Government Secondary School Garam. A sample size of 150 students was adopted. A blind ballot system was adopted to select the sample size. This method was used by Enebechi, et al (2023) and was noticed to be void of personal bias as each participant has equal chance to be randomly picked. 100 pieces of paper were folded into a box with only sixty labelled between 1 and 50 and the rest were empty. Each student was given opportunity to pick only one piece and on opening, they are either selected (if picked a paper with value) or rejected (if paper is empty); hence, fifty students were selected from each school. The questionnaire instrument was distributed to the selected students who were guided on how but not influenced to fill the paper by research assistants. Retrieval was immediate as soon as completed to avoid undue influences. Also, 150 teachers and administrators of the three schools were also selected using purposive sampling, with all (10) administrators included while ballot selection was used to select the remaining 140 teachers from the three schools. The responses of teachers were used to test hypotheses I and II, while those of students were used for testing hypothesis II.

Data collected were analysed by means of descriptive statistics using logistic regression analysis and chi-square test statistics.

Results and Discussion of Findings

The data collected were presented, summarised, analysed and interpreted as follows:

Ho1: There is no significant difference in academic performance between students

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taking computer-based tests and those who take paper-based tests

Table 1: Ho1 testing (performance comparison)

Item	Strongly Agree (SA)	Agree (A)	Neutral (N)	Disagree (D)	Strongly Disagree (SD)	TOTAL
Taking CBT examinations is more preferred over PBT	78	38	12	12	10	150
Students will feel more comfortable with PBT than CBT	12	10	15	46	67	150
CBT will help students perform better academically than PBT	76	34	10	13	17	150
PBT is considered more effective for assessing students' knowledge and cognitive skills	13	11	14	54	58	150
TOTAL	179	93	51	125	152	

Source: Field Survey, 2025

Table 2: Descriptive Statistics (Mean & Standard Deviation per Item)

Item	Mean	(SD)
Taking CBT examinations is more preferred over PBT	4.08	1.23
Students will feel more comfortable with PBT than CBT	2.03	1.24
CBT will help students perform better academically than PBT	3.93	1.39
PBT is considered more effective for assessing students' knowledge and cognitive skills	2.11	1.24

Table 3: Logistic Regression (Agree vs. Disagree)

(Neutral excluded, Agree = 1, Disagree = 0)

Coefficients & Significance (α = 5%)

Variable	Coefficient	Std. Error	z	p-value	Significance
Intercept	1.299	0.206	6.31	<0.001	✔ Significant
PBT is considered more effective	-2.840	0.305	-9.31	<0.001	✔ Significant
Students will feel more comfortable with PBT	-2.936	0.311	-9.44	<0.001	✔ Significant
Taking CBT examinations is more preferred	0.363	0.311	1.17	0.242	✘ Not Significant

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Table 4 Odds Ratios (Interpretation)

Variable	Coefficient	Odds Ratio	Interpretation
Intercept	1.299	**3.67**	Baseline odds of agreeing are 3.7 times higher than disagreeing.
PBT is more effective	-2.840	**0.058**	Students are **94% less likely** to agree that PBT is more effective.
Comfortable with PBT	-2.936	**0.053**	Students are **95% less likely** to agree they feel more comfortable with PBT.
CBT preferred	0.363	**1.44**	Students are **1.4 times more likely** to agree that CBT is preferred, but not statistically significant (p=0.24).

Interpretation of Findings

Ho1: No significant difference in academic performance between CBT and PBT.

Therefore, Hypothesis Testing at 5% significance level signifies the following**:** The Intercept **(1.299, p<0.001)** signifying baseline odds of agreeing vs. disagreeing are significantly > 0. Both **Item 4 (PBT more effective) and Item 2 (Comfortable with PBT)** have large **negative coefficients**, meaning respondents are **significantly less likely to agree** with these statements (strong support against PBT preference). More so, **Item 1 (CBT preferred)** has Positive coefficient but **not significant** (p=0.242) reflecting no strong evidence that preference for CBT over PBT is statistically different from neutral baseline; whereas **Item 3 (CBT improves performance)** is the baseline category (reference), so its effect is absorbed in the intercept. This item (Item 3) therefore shows strong support for CBT (Mean = 3.93, significant positive baseline); hence the Logistic regression confirms that **respondents reject PBT as being more effective**. By this finding, it implied that students strongly **reject the idea that PBT is more effective** or that they feel more comfortable with it; but are **more supportive of CBT's academic benefits**, though preference for CBT over PBT (Item 1) is not statistically strong.

Decision: Based on the result, the null hypothesis *that there is no significant difference in academic performance between students taking computer-based tests and those who take paper-based tests* is hereby rejected while the alternate hypothesis is hereby accepted, implying that the respondents significantly favour CBT over PBT in terms of performance in examinations. This outcome corresponded with earlier results of Akintonde, et al (2019) of which students really supported CBT based on its advantages when compared with the paper and pen examinations; and of Enebechi, et al (2023) that learners preferred CBT because it improves their academic performance, gives them more confidence during examination with no distractions that constitute a nuisance but satisfactory speed and greater control over their academics, they find CBT useful for their examinations and CBT makes examination easier for them.

Table 5: Perception of Switching to CBT (Ho2)

Hypothesis (Ho2): There is no significant difference between students' perceptions of switching from PBT to CBT in WAEC/NECO examinations

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Responses

Item	Description	(SA)	(A)	(N)	(D)	(SD)	Total
1	We have been exposed to CBT training and so we have understanding of its usage and can use it for exams	69	20	21	19	21	150
2	There is the belief that CBT is more effective than PBT in reducing examination malpractices.	78	20	19	15	18	150
3	CBT will make examination results more transparent, real-time in speed and on- demand.	75	37	11	10	17	150
4	Candidates will feel more comfortable writing examinations through CBT than PBT.	76	35	12	13	14	150
5	Switching from PBT to CBT in WAEC/ NECO would improve examinations' credibility.	48	53	18	9	22	150
6	CBT would give students an equal opportunity to perform well as PBT	73	45	12	12	8	150
7	Overall, I support WAEC/NECO's full adoption of CBT over PBT.	80	32	15	12	11	150

Source: Field Survey, 2025

Table 6: Descriptive Statistics - Summary of Means and SDs

Item	Mean	SD
1. Exposure to CBT	**3.65**	**1.47**
2. Credibility	**3.64**	**1.23**
3. Malpractice	**3.83**	**1.36**
4. Transparency	**3.95**	**1.32**
5. Comfort	**3.97**	**1.29**
6. Equal Opportunity	**4.09**	**1.20**
7. Support Adoption	**4.05**	**1.25**

Table **7: Chi-square Test of the Association between Students' Perceptions and Support for CBT Adoption**

Dependent Variable (Y): Support for adoption (Item 7, dichotomized: SA/A = 1, else = 0).
Predictors (X): Items 1–6.

Predictor Variable	χ^2	df	p-value	Interpretation
Exposure to CBT (Item 1)	**368.28**	**16**	**< .001**	**Significant association**
Credibility of exams (Item 2)	**290.21**	**16**	**< .001**	**Significant association**
CBT reduces malpractice (Item 3)	**347.27**	**16**	**< .001**	**Significant association**
Transparency & speed (Item 4)	**416.15**	**16**	**< .001**	**Significant association**
Comfort with CBT (Item 5)	**439.37**	**16**	**< .001**	**Strongest association**
Equal opportunity (Item 6)	**384.15**	**16**	**< .001**	**Significant association**

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Findings and Interpretation

The Table 7 above reflects the Chi-square test of association conducted to determine whether students' perceptions of CBT were significantly related to their overall support for the adoption of CBT in WAEC/NECO examinations. The results showed that all six perception items were significantly associated with support for CBT adoption ($p < .001$ in all cases). Specifically, exposure to CBT training ($\chi^2 = 368.28$, df = 16, $p < .001$), credibility of examinations ($\chi^2 = 290.21$, df = 16, $p < .001$), belief that CBT reduces malpractice ($\chi^2 = 347.27$, df = 16, $p < .001$), transparency and faster results ($\chi^2 = 416.15$, df = 16, $p < .001$), comfort with CBT ($\chi^2 = 439.37$, df = 16, $p < .001$), and equal opportunity to perform well ($\chi^2 = 384.15$, df = 16, $p < .001$) all showed strong positive associations with students' support for CBT. Among these, **comfort with CBT (Item 5)** showed the strongest association with support for adoption, followed closely by **perceptions of transparency and faster result release (Item 4)**. These findings indicate that students' support for CBT adoption is strongly influenced by their perceptions of its fairness, effectiveness, and usability. Therefore, the null hypothesis (Ho_2), which states that there is no significant difference between students' perceptions of switching from PBT to CBT, **is hereby rejected** and the alternate hypothesis (there is significance difference between students perceptions) **hereby accepted**.

In summary, the findings revealed that:

- All χ^2 values are significant at **$p < .001$**, indicating strong associations.
- The strongest predictor of support for CBT adoption was **comfort with CBT (Item 5)**, followed by **transparency & speed (Item 4)**.
- All Chi-square tests are **highly significant** ($p < 0.001$).
- This means there is a **strong association** between each perception variable (Items 1–6) and students' support for full CBT adoption (Item 7).
- The strongest associations are with:
  - **Comfort with CBT (Item 5)** ($\chi^2 = 439.37$)
  - **Transparency & speed (Item 4)** ($\chi^2 = 416.15$)
  - **Equal opportunity (Item 6)** ($\chi^2 = 384.15$)
- Null hypothesis (Ho_2: *no significant difference in perceptions*) is hereby **rejected**.

Testing Hypothesis III

Ho3: There is no significant relationship between available resources and the requirements for CBT in WAEC/NECO examinations

Table 6: Responses from Questionnaire

Item	Description	SA	A	N	D	SD	Total
1	Your school has functioning CBT centre or ICT hub to support CBT exams	59	45	18	8	20	150
2	There are adequate CBT resources like computer sets, software, etc to support CBT exams	65	34	22	11	18	150
3	Electricity and alternative power supply system is available in our school to support CBT exams	58	56	11	8	17	150
4	There are adequate technical staff to handle CBT exams	46	45	12	33	14	150
5	Inadequate resources and technical knowledge are major barrier to CBT adoption in WAEC/NECO	48	56	12	23	11	150

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Source: Field Survey, 2025

Table 7: Re-Organising the data from instrument

Item	SA	A	N	D	SD	Total
CBT centre/ICT hub	59	45	18	8	20	150
Adequate CBT resources	65	34	22	11	18	150
Electricity/power supply	58	56	11	8	17	150
Adequate technical staff	46	45	12	33	14	150
Inadequate resources barrier	48	56	12	23	11	150

Table 8: Chi-square test of Available Resources vs. CBT Requirements (Ho3)

Response Category	Observed (O)	Expected (E)	$(O - E)^2 / E$
Strongly Agree (SA)	276	150	105.84
Agree (A)	236	150	49.31
Neutral (N)	75	150	37.5
Disagree (D)	83	150	29.93
Strongly Disagree (SD)	80	150	32.67
Total	**750**	**750**	**255.25**

Chi-square (χ^2) = 255.25, df = 4, p < 0.001

Findings and Interpretation

A Chi-square test of independence was performed to determine whether there is a significant relationship between available resources and the requirements for CBT in WAEC/NECO examinations. The null hypothesis stated that *there is no significant relationship between available resources and the requirements for CBT in WAEC/NECO examinations*. The analysis revealed a Chi-square value of **$\chi^2(4)$ = 255.25, p < 0.001 at a 4df**.

Decision: Since $\chi^2 = 255.25 > 9.49$ (critical value at 0.05, df=4), then null hypothesis (Ho3: There is no significant relationship between available resources and the requirements for CBT in WAEC/NECO examinations) is hereby rejected. This result is far greater than the critical value of 9.49 at the 0.05 level of significance, leading to the rejection of the null hypothesis. The distribution of responses was not uniform across categories, with a clear concentration of respondents selecting *Agreed* and *Strongly Agreed*. This suggests that the availability of resources such as ICT hubs, adequate computer systems, reliable electricity, and technical staff has a statistically significant association with meeting the requirements for CBT examinations.

This finding therefore highlighted that availability of facilities significantly influenced the adoption of CBT mode in WAEC/NECO examinations. This finding aligns with earlier studies on CBT adoption in developing contexts, which emphasised that successful implementation depends not only on infrastructure but also on technical expertise and continuous maintenance support (Alabi, Issa & Oyekunle, 2012). The significant Chi-square result underscores that schools with stronger resource bases are more likely to meet CBT requirements effectively. Conversely, deficiencies in staffing and technical knowledge may hinder the smooth conduct of examinations, reinforcing the need for targeted investment in training and capacity building. Overall, the results provide strong evidence that available resources and infrastructural support are significantly related to the effective deployment of CBT in WAEC/NECO examinations, and strengthening these resources is critical for sustainable implementation.

Summarily, the findings revealed that **Null hypothesis (H_0):** Responses are equally distributed across categories (no

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significant difference); whereas **Alternative hypothesis (H_1):** Responses are not equally distributed.

Discussion

From the analysis of data in respect to hypotheses one to three above, the findings in hypothesis I highlighted that students tend to prefer CBT (all mean scores > 3.5 → students lean **positively** toward CBT adoption 5) and believe it helps them perform better academically.In relation to Hypothesis II, it was revealed by the findings that all six perception items were significantly associated with support for CBT adoption ($p < .001$ in all cases) and following the chi-square test that was highly significant, the null hypothesis **Ho_2 ("no significant difference in perception") was rejected. This highlighted that s**tudents' perceptions about training, credibility, malpractice reduction, transparency, comfort, and fairness all **significantly predict** their support for adopting CBT in WAEC/NECO. This finding is in line with Oyelakan (2018) and Akpotu (2018), whose work found that students perceived CBT would curb examination malpractice and add fairness, credibility and integrity to examinations. Finally, the findings in relation to Hypothesis III highlight that resource availability plays a pivotal role in the readiness of schools to adopt and sustain CBT for WAEC/NECO examinations. Students' strong inclination toward positive responses reflects recognition of the importance of ICT infrastructure, computer facilities, and reliable power supply in supporting CBT. However, responses regarding the adequacy of technical staff were comparatively weaker, suggesting that while physical infrastructure may be somewhat in place, human resource capacity remains a challenge.

Conclusion and Recommendations

Based on the findings of this study, it could be concluded that students strongly reject the idea that PBT is more effective or that they feel more comfortable with it but are more supportive of CBT's academic benefits, though preference for CBT over PBT (Item 1) is not statistically strong. More so, it could be seen that the students' perceptions of CBT were significantly related to their overall support for the adoption of CBT in WAEC/NECO examinations.

Conclusively, the study revealed that the successful implementation of CBT in WAEC/NECO examinations requires a holistic strategy that integrates student preparedness, perception management, infrastructural development, and policy support.

Consequently, the following recommendations are made:

a) **Progressive Adoption of CBT:** Adoption of CBT for WAEC/NECO should be encouraged as CBT appears to influence performance differently than PBT but a progressive and **gradual transition approach** is advisable;
b) **Practice-Based Integration:** Schools should integrate **practice CBT sessions** into classroom assessments so that students become familiar with the format before high-stakes examinations.
c) **Awareness and sensitisation campaigns**, training and orientations should be conducted to address misconceptions and fears about CBT and improve computer literacy and reduce test anxiety..
d) Policy makers and examination bodies (WAEC/NECO) should **collect continuous feedback** from students to improve the CBT experience.
e) **Investment in infrastructure**: Schools should be equipped with modern ICT facilities, reliable power supply, and internet connectivity.
f) **Technical Staff Development or Capacity building**: Adequate technical staff should be employed, trained and deployed to support CBT

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administration in or troubleshooting during CBT examinations in schools.

g) There is necessity for Budgets for education to be increased by government while proprietors and private outlets may engage in partnerships to fund educational infrastructures and maintenance of CBT resources in schools.

h) **Establishment of Minimum Standards:** WAEC and NECO should develop, define and enforce minimum resource **standard** or benchmarks that schools must meet before being approved as CBT examination centres to ensure fairness and efficiency.

It is believed that by addressing these factors, examination bodies and educational stakeholders can ensure that the transition to CBT enhances fairness, accessibility, and academic performance in Nigeria's secondary school examinations.

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