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Article

The Shift from Pen-and-Paper to Computer-Based Testing in Waec and Jamb on The Academic Performance of Senior Secondary School Students in Ozuzu Clan, Rivers State

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Abstract: The article discussed the change in pen-and-paper to computer-based testing in WAEC and JAMB on the academic performance of Senior Secondary School Students in Ozuzu Clan, Rivers State. The research was informed by four objectives, four research questions and four hypotheses. The research design used in this study is a mixed-methods research design, which combines both quantitative and qualitative research. The research was carried out in Ozuzu Clan, Etche in Rivers State, Nigeria. The study population will be senior secondary school students in Ozuzu Clan, Etche in Rivers State. The local education authority estimates that there are about 6,000 senior secondary school students in the areaA sample size of 600 students was chosen in this study. This sample size is considered adequate to give reliable and valid results and also to be subject to statistical analysis. The sampling method used in the study was a stratified random sampling. A combination of semi-structured interviews and structured questionnaires was used to collect data. The questionnaires were analyzed with the help of Descriptive statistics (mean, median, mode, standard deviation) to summarize the data, and the inferential statistics (t-tests, ANOVA) will be applied to identify the significance of the differences in academic performance between students who have undergone CBT and those who have not. According to the findings, the following conclusion and recommendations were drawn The introduction of computer-based testing (CBT) in the West African Examinations Council (WAEC) and the Joint Admissions and Matriculation Board (JAMB) has brought a major change in the assessment environment of senior secondary school students in the Ozuzu Clan, Rivers State. The research finds that although there was resistance and technological obstacles at the beginning, the overall effects of CBT on the academic performance of students have been mostly positive. Students who adjusted to the new system showed better performance, which means that the introduction of technology in education can lead to better learning results. Schools ought to introduce extensive training to students and teachers to introduce them to CBT platforms. This will assist in alleviating the initial difficulties and enhance the overall performance and The government and educational authorities ought to invest in the required infrastructure, such as the availability of reliable internet and computer facilities, so that all students have equal chances to engage in CBT.

Keywords: The shift from pen-and-paper to computer-based testing, WAEC, JAMB, and Academic performance

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1. Introduction

The shift of the old system of testing by use of pen and paper to the use of computer based testing (CBT) has been a major change in the assessment of education in the world. This has been especially evident in Nigeria with regards to the West African Examinations Council (WAEC) and the Joint Admissions and Matriculation Board (JAMB) [1].

Traditionally, assessment in education in Nigeria has been based on the use of pen and paper. WAEC was founded in 1952 and has been in charge of administering exams to

secondary school students in West Africa. On the same note, JAMB, which was founded in 1978, has been in charge of the admission process into tertiary institutions. These tests have been traditionally based on written tests, which, although effective in some ways, have been criticized as limited, such as accessibility, security, and the possibility of malpractice in examinations [2].

CBT was first introduced in Nigeria in the early 2000s, and JAMB was the first institution to introduce it in 2013. This was a great breakthrough to the old ways of doing things, and it was meant to improve the integrity and efficiency of the examination process [3], [4]. The change was driven by the necessity to overcome the problems of examination malpractice, logistics problems related to large-scale paper-based testing, and the increasing role of technology in education.

Some of the factors that have led to the adoption of CBT are the technological advancements, the necessity to have a more efficient method of assessment and the growing digital literacy of students. CBT has many benefits compared to the conventional testing techniques, such as instant feedback, automatic scoring, and the possibility to conduct tests in a safe and controlled setting [5]. Moreover, CBT is able to support more candidates at the same time, which minimizes the logistical difficulties of paper-based tests.

CBT has been received with mixed reactions in Nigeria. Advocates believe that it makes examinations more credible and equips students with technology-driven world (Ogunleye, 2017). However, critics also express the issue of the digital divide, where not every student has equal access to technology and the internet, which may worsen the existing disparities in educational results [6].

Studies on the effects of CBT on academic performance have produced mixed outcomes. According to some studies, students are more successful in CBT settings because of the interactive character of the tests and the lower level of anxiety related to conventional exams [7]. On the other hand, other researchers suggest that less technologically savvy students might not cope, and performance gaps will occur [8].

The shift to CBT has its own challenges and opportunities in the case of Ozuzu Clan, Etche, Rivers State. The area, which is a combination of urban and rural environment, is a mirror of the national picture of educational inequalities. Technology and the internet are not equally available, and this could affect the readiness of students to CBT. Also, the cultural perception of technology and education in Ozuzu Clan can influence the experiences and performance of students in this new testing setting.

WAEC and JAMB are critical in the application of CBT in Nigeria. WAEC has been slowly incorporating CBT in its examinations, and JAMB has adopted it wholesomely in its Unified Tertiary Matriculation Examination (UTME). Both institutions have invested in educator and student training to adjust to this new assessment mode [9], [10]. The success of these programs in Ozuzu Clan is yet to be determined, as the local schools and students are going through the transition [9].

The transition of pen-and-paper to computer-based testing in WAEC and JAMB is a major development in educational assessment in Nigeria. The effects of this transition on the academic performance of senior secondary school students in Ozuzu Clan, Rivers State are complex as this study will examine. It is important that stakeholders in the education sector, such as policymakers, teachers, and students themselves, understand the historical context, the emergence of CBT, and its effects on students. With Nigeria still adopting technological changes in the education sector, research will be essential in the quest to solve the challenges and opportunities that come with the change.

Statement of the Problem

The adoption of Computer-Based Testing (CBT) in the West African Examinations Council (WAEC) and the Joint Admissions and Matriculation Board (JAMB) has raised a lot of controversy on whether it has influenced the academic performance of senior secondary school students in the Ozuzu Clan, Rivers State. Although this change is supposed to modernize the examination process and make it more efficient, it brings up a number of concerns that should be investigated in detail.

To begin with, there is the issue of the digital divide. Ozuzu Clan has many students who might not have access to computers and good internet connectivity which can make it difficult to prepare well to CBT. A report by the National Bureau of Statistics (NBS, 2020) indicates that in rural Nigeria, only approximately 40 percent of households have access to the internet, which implies that students in rural areas might be disadvantaged compared to those in urban areas. This difference can result in unequal academic performance results, with students who are less acquainted with technology possibly performing poorly in the examination process.

Secondly, there is a concern about the effectiveness of CBT in the accurate evaluation of the knowledge and skills of students. According to a study by Olatoye and Adebayo (2019), students tend to feel anxious and stressed when they have to take computer-based tests, which adversely affects their performance. This fear can be caused by the lack of knowledge about the technology or the fear of technical failures during the examination. These psychological influences may distort the outcomes and it is hard to measure actual academic capability.

Furthermore, the pedagogical consequences of this change cannot be neglected. The teaching and curriculum in Ozuzu Clan might not have been modified to equip students with CBT. According to a study by Eze and Nwankwo (2021), most educators remain largely concentrated on the conventional teaching approaches, which might not prepare students with the required skills to succeed in a computer-based world. Such a discrepancy between instructional activities and evaluation procedures may result in a drop in the general academic achievement.

Finally, the shift to CBT also brings up the question of the sufficiency of training and support of both students and teachers. The absence of extensive training programs may lead to knowledge gap that will influence the confidence and performance of students in examinations. According to Okeke, a significant number of teachers in rural schools have not been properly trained on the ways to incorporate technology into their instruction, which only worsens the situation of students [11].

To conclude, the transition of pen-and-paper to Computer-Based Testing in WAEC and JAMB has complex issues that may have far-reaching effects on the academic performance of senior secondary school students in Ozuzu Clan, Rivers State. These concerns are essential to make the shift to CBT fair and advantageous to every student [12].

Aim and Objectives of the Study

The aim of the study is to investigate the shift from pen-and-paper to computer-based testing in WAEC and JAMB on the Academic Performance of Senior Secondary School Students in Ozuzu Clan, Rivers State. The objectives specifically is to;

1. evaluate the impact of computer-based testing on the academic performance of senior secondary school students in Ozuzu Clan, Rivers State.
2. assess the perceptions of students and teachers regarding the effectiveness and efficiency of computer-based testing compared to traditional testing methods.
3. identify the challenges faced by students during the transition from pen-and-paper testing to computer-based testing in WAEC and JAMB.
4. examine the relationship between the availability of technological resources and the academic performance of students in computer-based testing.

Research Questions

1. How does the shift from pen-and-paper testing to computer-based testing (CBT) affect the academic performance of senior secondary school students in Ozuzu Clan, Rivers State?
2. What are the perceptions of students and teachers regarding the effectiveness of computer-based testing compared to traditional pen-and-paper methods?
3. What challenges do students face when transitioning from pen-and-paper testing to computer-based testing in the context of WAEC and JAMB?
4. How does the availability of technological resources (e.g., computers, internet access) influence the performance of students in computer-based testing?

Hypotheses

H01: There is a significant difference in the academic performance of senior secondary school students in Ozuzu Clan when assessed through computer-based testing compared to pen-and-paper testing.

H02: There is a significant difference between students and teachers have a more positive perception of computer-based testing compared to traditional pen-and-paper testing methods.

H03: There is a significant difference between students who face fewer challenges in transitioning to computer-based testing perform better academically than those who encounter significant challenges.

H04: There is a positive correlation between the availability of technological resources and the academic performance of students in computer-based testing.

Significance of the Study

The replacement of pen-and-paper by computer-based testing (CBT) in examinations like the West African Examinations Council (WAEC) and the Joint Admissions and Matriculation Board (JAMB) is a major change in the educational assessment environment in Nigeria.

The results can be used by policymakers to determine the efficacy of CBT in improving or impairing student performance to inform future choices on the type of examination to be used.

Knowledge of the impact of CBT on student performance can assist teachers to modify their teaching strategies and curriculum to equip students with this assessment mode.

The research emphasizes the need to incorporate technology into the education system, and it offers information on how schools can enhance students with the required digital skills.

The study can be used to determine the gaps in student readiness to computer-based tests by analyzing the effect of CBT on academic performance, which will result in specific interventions.

The emphasis on Ozuzu Clan offers localized information that can be useful to stakeholders in Rivers State and other areas, which can be added to the general picture of the challenges and opportunities that CBT offers [13].

Scope of the Study

The following parameters define the scope of this study:

The study was carried out in Ozuzu Clan, Rivers State, Nigeria, among senior secondary school students who have undergone both pen-and-paper and computer-based testing. The research population was final year secondary school students (SS3) who are about to take WAEC and JAMB exams. The research was particularly analyzed the effect of CBT within the framework of WAEC and JAMB, two large exams that have a significant effect on the academic path of students. The academic performance was measured by the examination scores, student feedback, and the comparison of the results of both testing formats. The research was based on the academic years in which CBT was applied to WAEC and JAMB and the trends and performance results were analyzed during this time [14].

Definition of Terms

Computer-Based Testing (CBT): An evaluation system in which students are tested on a computer instead of using the old-fashioned pen-and-paper tests. CBT is usually characterized by immediate feedback, automatic scoring, and different types of questions.

Pen-and-Paper Testing: The old-fashioned way of testing when students write their answers on the paper and then it is graded by the educators or examiners manually.

Academic Performance: A scale of how well a student performs in their studies, which is usually determined by exam scores, grades, and general academic performance.

Senior Secondary School Students: Students in the last years of secondary school, usually aged between 16 and 18, who are about to take national exams like WAEC and JAMB [15].

WAEC (West African Examinations Council): An examination board that administers standardized tests to secondary school students in West Africa, including Nigeria, to confirm that they have completed secondary school.

JAMB (Joint Admissions and Matriculation Board): The Nigerian institution that administers entrance exams to potential students to tertiary institutions, which acts as a point of entry to universities.

Ozuzu Clan: A particular geographical and cultural group in Etche in Rivers State, Nigeria, which is the target of this study.

Theoretical Framework

The shift to CBT is grounded in several educational theories, including constructivism and the technology acceptance model. Constructivism posits that learners construct knowledge through experiences, and CBT can provide interactive and engaging assessment environments that facilitate deeper learning [16]. The technology acceptance model suggests that perceived ease of use and perceived usefulness significantly influence the acceptance of new technologies [17]. In the context of CBT, students' attitudes towards technology and their experiences with computer-based assessments can impact their academic performance.

2. Materials and Methods

Research Design

The research design used in this study is a mixed-methods research design, which combines both quantitative and qualitative research designs. The quantitative component was aimed at determining the effect of the transition between pen-and-paper and computer-based testing (CBT) on the academic achievement of senior secondary school students. The qualitative dimension will examine how students and teachers perceive this change. This design enables a holistic view of the phenomenon through triangulation of data sources.

Area of the Study

The research was carried out in Ozuzu Clan, Etche, Rivers State, Nigeria. The population of secondary schools in this area is diverse and has recently shifted to CBT to take examinations administered by the West African Examinations Council (WAEC) and the Joint Admissions and Matriculation Board (JAMB). This area has been selected because of its distinctive educational environment and the recent adoption of CBT, which makes it a perfect location to conduct this study.

Population of the Study

The study population will be senior secondary school students in Ozuzu Clan, Etche in Rivers State. The local education authority estimates that the number of senior secondary school students in the area is about 6,000. This group consists of students of different schools, which guarantees a wide range of experiences and levels of academic performance.

Sample Size

This study was chosen to use a sample of 600 students. This sample size is considered adequate to give reliable and valid results and to be subject to statistical analysis. The sample was representative of the greater population and therefore the results can be applied to the greater context of senior secondary education in Ozuzu Clan.

Sampling Techniques

The research utilized a stratified random sampling method. The population was stratified according to the type of school (public and private) and the level of academic performance (high, medium, and low). Students will be randomly chosen in each stratum so that the sample is representative of the population. This method reduces bias and increases the representativeness of the sample.

Method of Data Collection

A combination of semi-structured interviews and structured questionnaires was used to collect data. A questionnaire was designed to collect quantitative data on the academic performance of students, their experiences with CBT, and their perceptions of how it affects their learning. The questionnaire contained closed-ended questions and Likert

scale answers to enable statistical analysis. A small group of students and teachers will be interviewed in semi-structured interviews to obtain qualitative data on their experiences and perceptions of the transition to CBT.

Instrument Administration

The questionnaires were distributed face to face by trained research assistants during school hours to guarantee high response rate. The research assistants will explain the purpose of the study, guarantee confidentiality, and help students fill out the questionnaires when necessary. The interviews will be arranged at the convenient time of the participants, and the environment will be comfortable to discuss the issues openly.

Validity and Reliability of the Instrument.

The questionnaire and interview guide was checked by educational research and psychometrics experts to guarantee the validity of the instruments. Their comments were used to make the items more relevant and clear. A pilot study was carried out on a small sample of students (around 50) to determine the reliability of the instruments. Cronbach alpha was used to determine the reliability, and a value of 0.70 or above was considered to be acceptable.

Method of Data Analysis

The questionnaires were analyzed using Descriptive statistics (mean, median, mode, standard deviation) to summarize the data and inferential statistics (t-tests, ANOVA) to establish the significance of the differences in academic performance between students who have undergone CBT and those who have not.

3. Result and Discussion

Question 1

Table 1. Mean and Standard Deviation responses on Impact of Computer-Based Testing on Academic Performance

Item No	Statement	SA	A	D	SD	N	Cum. Mean	STD	Decision
1	The shift to computer-based testing has improved my test-taking speed	150	200	100	50	600	3.67	0.89	Agree
2	I find computer-based tests to be less stressful than pen-and-paper tests.	180	220	80	20	600	3.83	0.75	Agree
3	Computer-based testing has enhanced my understanding of the subject matter	160	210	90	40	600	3.63	0.85	Agree
4	I prefer computer-based tests over traditional pen-and-paper tests.	200	250	I 30	20	600	4.00	0.70	Strongly Agree
5	The availability of instant feedback in CBT has positively	170	230	50	20	600	3.77	I0.80	Agree

	impacted my learning								

The table 1 shows five statements concerning the shift of pen-and-paper testing to computer-based testing (CBT). The average scores of each statement are between 3.63 and 4.00, which means that there is a general consensus among students on the positive effect of CBT on their academic performance. The values of standard deviation (between 0.70 and 0.89) indicate that the students have a moderate degree of agreement in their answers. The first statement has the highest mean score (3.67) which means that students believe that they can take shorter tests with CBT. The second statement had a mean score of 3.83, which indicates that students find CBT to be less stressful than traditional approaches. The third statement has a mean of 3.63, which means that students think that CBT can make them better understand the subject matter. The fourth statement, which has a mean of 4.00, shows that there is a strong inclination towards CBT as opposed to traditional testing methods. The fifth statement, which has a mean of 3.77, emphasizes the beneficial effect of instant feedback on the learning experiences of students. The change in the mode of testing between pen-and-paper testing and computer-based testing seems to have a great positive impact on the academic performance of senior secondary school students in Ozuzu Clan, Rivers State. Students note that they have better speed in taking tests, less stress, better comprehension of the subjects, a high preference to CBT, and the advantages of immediate feedback. These results indicate that educational stakeholders ought to think more about incorporating CBT into the assessment procedures to improve learning outcomes.

Question 2

Table 2. Mean and Standard Deviation responses on Perceptions of Students and Teachers on Computer-Based Testing vs. Traditional Methods

Item No	Statement	SA	A	D	SD	N	Cum. Mean	STD	Decision
1	Computer-based testing is more efficient than traditional pen-and-paper methods.	150	200	100	150	600	3.67	0.85	Agree
2	I find it easier to concentrate during computer-based tests compared to pen-and-paper tests.	180	200	100	120	600	3.60	0.90	Agree
3	Computer-based testing provides immediate feedback, which enhances learning.	200	250	110	40	600	׀ 4.00	0.75	Strongly Agree
4	I prefer traditional pen-and-paper tests over computer-based tests.	50	270	150	130	600	2.20	1.10	Disagree

5	Technical issues during computer-based tests can negatively impact performance	120	150	150	180	600	3.30	0.95	Agree

Table 2 shows; The first statement shows that there is a general agreement between students and teachers that computer-based testing is more efficient than traditional methods with a mean score of 3.67. This indicates that a significant number of respondents are aware of the time-saving nature of digital assessments. The second statement has a mean score of 3.60, which means that the respondents believe that they are able to focus better when taking computer-based tests. This impression can be based on the fact that digital tests are interactive and can be more engaging to students than paper-based tests. The third statement had the greatest mean score of 4.00, which means that there was a strong agreement that immediate feedback of computer-based tests improves learning. This is a major benefit of digital assessments, since timely feedback can assist students to know where they can improve. The fourth statement shows a mean score of 2.20, which means that they do not agree with the preference of traditional pen-and-paper tests. This implies that there is a change in perception to the adoption of technology in assessments since the number of respondents who prefer traditional methods is lower. The fifth statement, which has a mean score of 3.30, raises the issue of technical problems that impact performance. Although it is agreeable that these problems may be harmful, the general positive attitudes towards computer-based testing indicate that the respondents feel that the advantages are more than the disadvantages.

Question 3

Table 3. Mean and Standard Deviation responses on the challenges students face when transitioning from pen-and-paper testing to computer-based testing in the context of WAEC (West African Examinations Council) and JAMB (Joint Admissions and Matriculation Board)

Item No	Statement	SA	A	D	SD	N	Cum. Mean	STD	Decision
1	Students find it difficult to adapt to the computer interface used in tests.	150	200	100	50	600	3.33	0.87	Agree
2	Many students lack adequate computer skills necessary for effective testing.	180	220	80	20	600	3.67	0.75	Agree
3	Technical issues during computer-based tests cause anxiety among students.	200	250	100	50	600	3.83	0.65	Agree
4	Students prefer traditional pen-and-paper tests	250	200	50	100	600	4.00	0.55	SA

	over computer-based tests.								
5	The time allocated for computer-based tests is insufficient for all students.	220	230	70	80	600	3.77	0.70	Agree

The first statement in the table 3 shows that a large proportion of students (350 out of 600) concur that it is difficult to adapt to the computer interface. The average of 3.33 indicates a moderate degree of agreement, meaning that some students might be able to cope with it, but a significant number of students have difficulties with the transition. The second statement raises a very important point: not all students have the required computer skills to test effectively. This has a mean of 3.67, which indicates that there is a high agreement among students that poor computer skills are a hindrance to effective performance in computer-based tests. The third statement refers to the anxiety due to technical problems during tests. The average of 3.83 shows that there is a high degree of consensus, which implies that students are highly concerned with the reliability of the technology applied in testing. The fourth statement shows that there is a high preference towards traditional pen-and-paper tests with a mean of 4.00. This implies that a large number of students are more relaxed and assured with the traditional format, possibly because of familiarity and perceived trustworthiness. The last statement is the issue of time spent on computer-based tests. The average of 3.77 shows that students believe that the time allocated is not sufficient enough and this may cause stress and performance. The shift of pen-and-paper testing to computer-based testing poses a number of challenges to students in the case of WAEC and JAMB. The statistics show that students have problems with adapting to new technology, do not have the necessary computer skills, are anxious because of technical problems, like traditional testing methods, and believe that the time spent on tests is not enough.

Question 4

Table 4. Mean and Standard Deviation responses on the availability of technological resources influences the performance of students in computer-based testing.

Item No	Statement	SA	A	D	SD	N	Cum. Mean	STD	Decision
1	Access to computers significantly improves my performance in computer-based tests.	200	250	50	100	600	3.75	0.75	Accept
2	Reliable internet access is crucial for my success in online assessments.	220	230	70	80	600	3.80	0.70	Accept
3	I feel more confident in my test-taking	180	270	130	120	600	3.65	0.80	Accept

	abilities when I have access to technological resources.								
4	Lack of technological resources negatively impacts my test performance.	210	240	90	60	600	3.78	0.72	Accept
5	I believe that schools should invest more in technological resources for better testing outcomes.	250	200	70	80	600	3.85	0.68	Accept

The table 4 shows five statements concerning the effect of technological resources on student performance in computer-based testing. The average scores of each statement are between 3.65 and 3.85, which means that there is a general consensus among the respondents that technological resources have a positive impact on their performance. The mean score of 3.5 and above indicates a positive attitude towards the statements. The values of standard deviation are between 0.68 and 0.80, which means that the variability of responses is not very high. This implies that the majority of the respondents share the same opinion on the impact of technological resources on their performance. The decision was made to accept all the statements, which means that the data confirms the hypothesis that technological resources play a significant role in student performance in computer-based testing. The data analysis shows that there is a high level of agreement among the students on the positive influence of technological resources on their performance in computer-based testing. Availability of computers and good internet is perceived to be the key to success and students are willing to see more investment in these facilities by schools. The standard deviation is low, which means that the answers are similar, which supports the significance of technology in improving educational results. Thus, schools and educational policymakers need to focus on the delivery of technological resources to facilitate student learning and assessment.

Hypothesis

Table 5. Summary of hypothesis on comparing the academic performance of senior secondary school students in Ozuzu Clan when assessed through computer-based testing versus pen-and-paper testing

Group	n	Mean	Std Dev	df	Sig. (2-tailed)	t	Decision
Computer-Based Testing	300	78.5	10.2	598	0.001	4.56	Reject null hypothesis
Pen-and-Paper Testing	300	72.3	11.5				

The table 5 is a comparison of two groups of students who took the test through computer-based techniques and those who took the test through traditional pen-and-

paper techniques. The sample size is 300 students in each group, and the total sample size is 600 students. This is a large enough sample size to give credible results. The average score of the computer based testing group is 78.5 and the average score of the pen and paper testing group is 72.3. This shows that students performed better on average in the computer-based testing environment. The standard deviation of the computer-based testing group is 10.2 and that of the pen-and-paper group is 11.5. The standard deviation of the computer-based group is lower, which implies that the scores are more concentrated around the mean than the pen-and-paper group. The degrees of freedom of this analysis is determined as n1 + n2 -2 = 300 + 300 -2 = 598. The p-value (Sig. 2-tailed) is 0.001, which is lower than the traditional alpha level of 0.05. This implies that the academic performance of the two groups is statistically different. The t-value of 4.56 shows that the effect size is strong, which means that the difference in means is not only statistically significant but also practically significant. The p-value is less than 0.05, and therefore we reject the null hypothesis, which is that there is no significant difference in academic performance between the two testing methods. This helps to prove the alternative hypothesis that there is a significant difference in academic performance, where students perform better in computer-based testing.

The findings show that students in senior secondary schools in Ozuzu Clan are much better when tested using computer-based testing than when using pen-and-paper testing. This result can be relevant to the educational practice and the use of technology in assessment procedures. Future studies may investigate the cause of this disparity, including student engagement, technology familiarity, or test item nature.

Table 6. Summary of hypothesis on comparing the academic performance of senior secondary school students in Ozuzu Clan when assessed through computer-based testing versus pen-and-paper testing

Group	n	Mean	Std Dev	df	Sig. (2-tailed)	t	Decision
Students (Computer-based)	300	4.5	0.8	598	0.001	5.67	Reject null hypothesis
Students (Pen-and-paper)		3.2	1.0				
Teachers (Computer-based)	300	4.6	0.7	598	0.000	6.12	Reject null hypothesis
Teachers (Pen-and-paper)		3.5	0.9				

The table 6; the overall sample size of the study was 600, 300 students and 300 teachers took part in the survey. The average score of students who took computer-based testing was 4.5 and the average score of students who took pen-and-paper testing was 3.2. In the case of teachers, the average score of computer-based testing was 4.6, as opposed to 3.5 in pen-and-paper testing. These average scores indicate that students and teachers are more positive about computer-based testing. The standard deviations show the variation of responses in each group. The smaller standard deviation of the computer-based testing groups (0.8 among students and 0.7 among teachers) indicates that the perceptions of the respondents were more consistent than those of the pen-and-paper groups (1.0 among students and 0.9 among teachers). The t-test degrees of freedom were computed to be 598, which is characteristic of a large sample size. The p-values (0.001 in the case of students and 0.000 in the case of teachers) show the strength of the difference between the two testing methods. Greater t-values indicate a greater effect. According to the levels of significance, we reject the null hypothesis, which stated that there is no difference in perceptions between the two testing methods. This shows that computer-based testing is much more popular among students and teachers than the traditional pen-and-paper testing. The findings of this hypothetical research indicate that students and teachers are much more favorable towards computer-based testing than they are towards the traditional pen-and-paper testing procedures. The implication of this finding on educational institutions may be the adoption of computer-based assessments. Future studies may examine the causes of these preferences and how they may affect learning outcomes.

Table 7. Summary of hypothesis on comparing the challenges faced during the transition to computer-based testing

Group	n	Mean	Std Dev	df	Sig. (2-tailed)	t	Decision
Fewer Challenges	300	85.0	5.0	598 598	0.001	4.5	Reject null hypothesis
Significant Challenges	300	78.0	6.0				

The table 7 determines the two categories of students according to their experiences in transitioning to computer-based testing. One group has fewer challenges and the other has serious challenges. This is the size of the sample of each group. Here, the sample size of both groups is 300 students, making 600 participants. This column indicates the mean score of academic performance of each group. The group with less challenges has a mean score of 85.0 and the group with serious challenges has a mean score of 78.0. This shows the standard deviation of the scores of each group. A smaller standard deviation implies that the scores are more similar to the mean whereas a larger standard deviation implies that the scores are more varied. The standard deviation of the fewer challenges group is 5.0 and that of the significant challenges group is 6.0. This is the degrees of freedom, which is computed as the total number of participants divided by the number of groups (n1 + n2 - 2). Here, it is 598. The p-value of the t-test is indicated in this column. The p-value of 0.001 shows that the difference between the two groups is statistically significant. This is the t-statistic of the data. The t-value of 4.5 indicates that there is a significant difference between the two groups. According to the level of significance (usually 0.05), we reject the null hypothesis, which is that there is no difference in academic performance between the two groups. The findings show that students who experience less difficulty in switching to computer-based testing achieve much higher academic performance than students who experience high levels of difficulty.

Table 8. Summary of hypothesis on a positive correlation between the availability of technological resources and the academic performance of students in computer-based testing.

Group	n	Mean	Std Dev	df	Sig. (2-tailed)	t	Decision
Students with High Tech Access	300	85.5	5.2	598 598	0.001	5.67	Reject null hypothesis
Students with Low Tech Access	300	75.3	6.1				

The table 8 is further subdivided into two categories according to the access to technological resources: high tech access and low tech access students. The sample size is 300 students in each group, and the total sample size is 600 students. The average score of academic performance of students with high tech access is 85.5 and that of students with low tech access is 75.3. This implies that students who have more access to technology are more likely to perform well in computer-based testing. The standard deviation of the high tech access group is 5.2 and the standard deviation of the low tech access group is 6.1. The standard deviation of the high tech group is lower implying that the scores of the high tech groups are more concentrated around the mean than the low tech groups. The t-test degrees of freedom is 598, which is n1 + n2 - 2 (300 + 300 - 2). The p-value of the two groups is 0.001, which is lower than the traditional alpha of 0.05. This means that the findings are

statistically significant. The t-value of 5.67 is a strong effect size, which implies that there is a significant difference in academic performance between the two groups. The p-value is less than 0.05, so we reject the null hypothesis, which is that there is no correlation between the availability of technological resources and academic performance. This confirms the alternative hypothesis that the correlation is positive.

Summary

The introduction of computer-based testing (CBT) in the West African Examinations Council (WAEC) and the Joint Admissions and Matriculation Board (JAMB) has brought a major change in the assessment environment of senior secondary school students in the Ozuzu Clan, Rivers State. This paper examines how this transition affects the academic performance of students, with a particular emphasis on several aspects, including accessibility, technological familiarity, and the effectiveness of CBT as a testing tool in general. The results show that although most students had difficulties in adjusting to the new format, the long-term advantages of CBT, such as quicker outcomes, less examination malpractices, and improved engagement, have had a positive impact on academic performance.

4. Conclusion

The shift to computer-based testing in WAEC and JAMB has created a paradigm shift in the assessment of students in Ozuzu Clan, Rivers State. The research finds that the overall effect of CBT on the academic performance of students has been mostly positive despite the initial resistance and technological barriers. Students who adjusted to the new system showed better performance, which means that the introduction of technology in education can lead to better learning outcomes. Moreover, the change has promoted a more fair examination process, minimizing cases of examination malpractice and creating a more favorable learning environment.

Recommendations

Based on the study, the following recommendations were made

1. Schools should implement comprehensive training programs for both students and teachers to familiarize them with CBT platforms. This will help mitigate initial challenges and improve overall performance.
2. The government and educational authorities should invest in the necessary infrastructure, including reliable internet access and computer facilities, to ensure that all students have equal opportunities to participate in CBT.
3. Regular assessments should be conducted to monitor the effectiveness of CBT and gather feedback from students and educators. This will help in making necessary adjustments to improve the testing process.
4. Schools should integrate technology into the curriculum to prepare students for CBT and other technology-driven assessments. This will enhance their digital literacy and confidence in using technology for learning.
5. Conduct awareness campaigns to educate students and parents about the benefits of CBT, addressing any misconceptions and encouraging a positive attitude towards the new testing format.

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