COMPARABILITY OF COMPUTER BASED AND PAPER & PENCIL TEST ON STUDENTS' PERFORMANCE IN EDUCATIONAL ASSESSMENT COURSE AT THE FEDERAL UNIVERSITY GUSAU, NIGERIA

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ABSTRACT

Introduction: Computer-Based Test (CBT) is being adopted for assessment by many institutions in Nigeria due to increase in students' population, expansion of work demands from academic staff, and advances in Information and Communication Technology (ICT).
Purpose: This study investigated the comparability of Computer Based Test (CBT) and Paper-Pencil Test (PPT) on students' scores in Educational assessment course at Federal University Gusau, Zamfara State.
Methodology: The study adopted the repeated measures design. The population for this study comprised of all undergraduate students of Federal University Gusau. The target population comprised of all the 450 registered 300 level undergraduate students from Faculty of Education, Federal University Gusau during 2021/2022 academic session. All the students were purposively selected for the study. Two instruments were used for data collection: The Multiple Choice Test in Test and Measurement (MCTTM) used for PPT and CBT had acceptable content validity coefficient of correlation of 0.69 percent and split-half reliability coefficient of 0.81, while the ICT Competence Questionnaire developed for obtaining information on students' competence in and attitude to ICT had test re-test reliability coefficient of 0.78 and 0.81 respectively. Data collected were analyzed using descriptive and inferential statistics. The hypotheses formulated for the study were tested at 0.05 alpha level of significance.
Results: The findings of the study revealed that Federal University Gusau undergraduate students have little competence in ICT. It also revealed significant difference in students' scores in CBT and PPT in an educational assessment course. The difference is in favour of PPT with mean score of 48.72. The study also revealed no significant effect of gender on students' scores on the two modes of testing. In addition, significant relationships also exist among students' competence in, attitude to ICT and their performance in CBT.
Recommendation: The study therefore recommended that educators should encourage the use of the adequate ICT facilities for teaching and learning. This will not only motivated the learners in learning but also prepare them for CBT.

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PUBLIC INTEREST STATEMENT

The findings of this study will provide useful information to the examiners and students, University administration, test developers and researchers in educational testing. Such information would help examiners and students to be aware of the learner characteristics that are directly associated with CBT and PPT comparability such as familiarity with computers and attitude to ICT.

INTRODUCTION

In recent times, advances in Information and Communication Technology (ICT) have led to widespread availability of computers in most parts of the world. The impact of this on curriculum, instruction and student learning at every level of education is spreading to the grassroots especially in developing countries like Nigeria. According to Okoli, Ubangha and Egberongbe (2018) ICT has shown immense potentials for enhancing effectiveness and efficiency in various fields of education. Advancement in technology has thus provided the measurement community with considerable potentials in testing. That is, a fixed form of the Paper and Pencil Test (PPT) administered on the computer. Though, Paper-and-pencil tests still account for a major portion of some universities student's final result. Now with the advances in personal computer technology and huge investments in evaluation and testing software (Varughese, 2005 & Sheu, 2019), computer-based testing is becoming commonplace. Without question, computer has increasing the efficiency of testing especially in courses with large population of students. The use of computer-based technology has greatly facilitated test administration, scoring, data analysis, data management and score reporting.

CBTs, according to Sorana-Daniela and Loventz (2007), and Sheu (2019), are tests or assessments administered by computers in either stand-alone or dedicated network, or by other technological devices linked to the internet or World Wide Web most of them using Multiple Choice Questions (MCQs). The student or examinee is expected to access questions which have already been saved in a computer, answer the questions using the system and feedback answers into the system within a specified time for scoring and grading through the system (Clariana & Wallance, 2002).

Computer based assessment has enabled educators and trainers to author, schedule, deliver, and report on surveys, quizzes, tests and examinations. Education stakeholders are exploring more efficient measurement tools in place of traditional Paper and Pencil Test (PPT). Paper-and-pencil test according to Sheu (2019) is a fixed items test in which all students answer the same questions on hardcopy test booklets, using pencil/biro and an answer format as instructed. Paper and pencil test is the type of test wherein questions of different types are penned or printed and given to the respondents to answer using paper and pencil (Okoli, Ubangha & Egberongbe, 2018). One of the disadvantages of the paper and pencil test is that it takes several weeks for the respondents to get the feedback. Many of the advantages of Computer Based Tests over traditional Paper Pencil Tests include immediate scoring and reporting of students' test results, greater test security, test administration efficiency, flexible test administration schedules, comparative cost advantage, the use of multimedia innovative item types, use of audio and large-print, accommodations for vision-impaired students, and the ability to measure response time (Bennett, 2001; & Parshall, Spray, Lalohn, Davey, 2002 & Sheu, 2019).

The CBT according to Adekunle (2015) composed of an assessment engine and items bank. Assessment engine comprises the hardware and software required to create and deliver a test. Most e-test engine like the CBT runs on standard hardware. There is a wide range of software packages. The software does not include the questions themselves, these are created by an items bank. Once created, it uses the items bank to generate a test.

Fig.1 Network Switch

Fig. 2 Thin Client Server

Item bank on the hand is a term for a repository of test items that belong to a testing program as well as all information pertaining to those items. Over here, items are of multiple choice formats, but any format can be used. Items are pulled from the bank and assigned to test forms for publication. Item banking saves time and energy. This is an added advantage over the conventional test development (Flaugher 1990).

The application of CBT in schools assessment is justified by the widespread availability of computers in schools. In addition, computer based tests have become part of an integrated plan to apply technology throughout the educational process at the school district, state and national levels (Bennett, 2001). Also, CBT has become an effective method of assessment due to increase in student population, escalating work commitments for teachers/academic staff, and the advancement in internet technology. Khoshsima, Hosseini and Hashemi, (2017) explained that CBT has recently appeared as one of the most demanded viable form of alternative assessment throughout the world. The use of computer-based test has been an attractive proposition for many higher institutions (Jimoh, AbdulJaleel & Kawu, 2012).

Researches in assessment have approached the issue by examining the extent to which scores provided by CBT are comparable to scores provided by the PPTs. Since paper-and-pencil tests have precedence of use; they represent the gold standard to which CBT is compared. As PPTs are replaced by CBTs, the CBT scores need to be tied back in some way to the original PPT in order to maintain continuity. Watson (2001), and Wang and David (2010) reported that PPT and CBT should produce exactly equivalent results if the content and cognitive activities of the two are identical. Empirical evidences from Russell (2003) showed that identical PPTs and CBTs will not obtain the same results, as a result of test mode effect.

The effectiveness of achievement tests as tools that yield scores that can be validly interpreted regardless of the mode of delivery of tests are often questioned (American Educational Research Association, 1999). For example, scores derived from CBT as compared to PPT might reflect not only the examinee's proficiency in the construct being measured but also the level of computer proficiency (Puhan, Boughton & Kim, 2007). This will likely affect the constructed measures and disrupts the comparison and interpretation of test scores across the two modes of administration.

Both published and unpublished research studies have been conducted in recent years to explore the comparability of test scores between administration modes of a test in various content areas, such as, reading or language, mathematics, and writing. Results from reported studies, however, vary from study to study depending on the research design and methodology, content area, grade level, sampling procedures, item format, scoring, and technology device and computer system involved. Mazzeo and Harvey (1988) for example, reviewed studies comparing PPTs and CBTs which include some 30 comparability studies about a range of tests such as ones focusing on intelligence, aptitude, personality, and achievement and indicated that CBTs tend to be more difficult than PPT versions of the same tests. Similarly a meta-analysis of studies

comparing PPTs and CBTs mode of testing in power and speed tests by Mead and Drasgow (1993) suggested that the constructs being measured across the two modes were similar for power tests but not for speed test. Also, Gallagher, Bridgeman and Cahalan (2000) found that performance across PPT and CBT versions of tests differed for subgroups based on gender and ethnicity. Similarly, Sheu (2019) studied test mode effect on students' score among university of Ilorin undergraduate students found no equivalence in the CBT and PPT scores in an educational assessment course among University of Ilorin students. However, Taylor, Jamieson, Eignor and Kirsch (1998) studied the comparability of PPTs and CBTs for the 1996 administration of the TOEFL and found no meaningful difference in performance for examinees taking the two different versions. Similarly, Wise and Plake (1990) contended that PPTs and CBTs versions of achievement test yield very similar scores.

STATEMENT OF THE PROBLEM

Currently at the Federal University Gusau, paper-and-pencil tests still account for a major portion of their students' final results. In the past few years, the number of students increased drastically and the conventional paper-and-pencil test method became time consuming in term of examination time for administration and preparation of results. CBT is a step towards reducing the testing life cycle of examination and allowing the school management to guarantee transparency and consistency. While opting for CBT, examinees should possess computer skills to such a proficiency level that the use of it in examination will minimally or insignificantly affect their performance. Any attempt to subject examinees that have not been adequately prepared tantamount to basing their performance on two parameters namely, computer skills and also knowledge and skills in the segment area of the subject being tested. In fact, the computer knowledge and skills become the most important parameter of decision-making in this circumstance. Where then lie the validity and reliability of the examination process. The issue of fairness has been

compromised in this matter especially when the education system has not yet provided adequate opportunity for learning all relevant computer skills. Any examination procedure which does not meet the criteria of validity and reliability is not truthful and basing judgment and decision on results from such process is certainly not the best (Onuekwusi & Onuekwusi, 2010).

On the other hand, there are issues that users have to be aware of while opting for CBT. Major among them is the need to establish the equivalence of paper-based tests and computer-based tests. Parshall, Spray, Kalohn, and Davey (2002) suggested that there is a need for systematic studies to establish their equivalence. Johnson and Green (2004) asserted that "if computer technology is to be able to fulfill the potential claimed by its supporters, it needs to be seen to, at least match the levels of validity and reliability of the paper and pencil assessments that it hopes to replace". However, in order to gain more precise understanding about the equivalence of paper-based tests and computer-based tests, this study aimed at investigating comparability of computer based and paper & pencil test on students' scores in an educational assessment course at the federal university gusau, Nigeria. It is also necessary to examine learner characteristics that are directly associated with their comparability such as familiarity with computers and attitude to ICT would also be assessed.

PURPOSE OF THE STUDY

Specifically, the study determined:
1. the comparability of computer based and paper & pencil test on students' score in an educational assessment course among Federal University Gusau students.
2. gender effect on students' scores on the two modes of testing.
3. the level of competence of Federal University Gusau undergraduate students in the use of ICT.
4. the attitude of Federal University Gusau undergraduate students to ICT.

5.   the relationship among student's competence in, attitude to ICT and their performance on CBT.

RESEARCH QUESTIONS

The following research questions guided the study.
1.   What is the level of competence of Federal University Gusau undergraduate students in the use of ICT?
2.   What is the attitude of Federal University Gusau undergraduate students to ICT?

HYPOTHESES

1.   There is no significant difference in students' scores in CBT and PPT in an educational assessment course.
2.   There is no significant effect of gender effect on students' scores on the two modes of testing.
3.   There is no significant relationship among student's competence in, attitude to ICT and their performance on CBT.

METHODOLOGY
Research Design

The repeated measures design was adopted in this study. According to Baumgartner, Strong and Hensley (2002), repeated measures design uses the same subjects with every condition of the research. This research design is considered appropriate for this study because the researcher intend to compare the performance of undergraduate 300 level students in Faculty of Education, Federal University Gusau in PPT and CBT in the course ` EDU 301: Test and Measurement'.

Population and Sample

The population for this study comprised all undergraduate students of Federal University Gusau. Federal University Gusau, also known by the acronym FUGUS, located in Gusau Zamfara State, Nigeria. It was established in 2013. Federal University Gusau offers courses and programs leading to officially recognized higher education degrees such as Bachelor degrees in several areas of study. The choice of Federal University Gusau was based on the fact that Federal University Gusau is one of the Universities in Nigeria that have not started using computer to assess their undergraduate students. The target population comprised all the 450 registered 300 level undergraduate students from Faculty of Education, Federal University Gusau during 2021/2022 academic session. The choice of 300 level students of the Faculty of Education was based on the fact that they have undergone CBT for their UTME. They also registered for EDU 301 (Test and Measurement).

Instrument for Data Collection

The instruments for this study are: Multiple Choice Test in Test and Measurement (MCTTM) and an ICT Competence Questionnaire (ICTCQ). The MCTTM was a multiple choice objective test of 100 items with four options A-D. This was developed by the researcher following the course outline of EDU 301 (Test and Measurement). In determine the content validity of MCTTM a table was developed showing the proportional representation of the topics and objectives of EDU 301 side by side with the proportional coverage of topics and objectives in the test. The reliability of the achievement test was determined through the split-half method for a measure of internal consistency of the instrument. The scores in the two halves of the test were correlated using Pearson Product Moment Correlation Co-efficient. The correlation coefficient obtained between the two halves was adjusted using the Spearman-Brown Prophecy formula. The reliability coefficient of 0.81 was obtained. A questionnaire measuring students' ICT competence and attitude to ICT was designed by the researcher. The instrument is a non-cognitive scale because there is no right or wrong answer as far as responding to the items is concerned. More so, it is a multi-variate instrument since it is developed on two variables that are students' ICT competence and students' attitude to ICT. The instrument consists of three sections; A, B and C. Section A is designed to elicit personal information from the respondents such as Matriculation

Number, Department, Sex and Age. Section B which contains 20 items is designed to provide adequate information on the students' competence level in the use of ICT. The items were structured on a 4-point Likert Scale such that a tick (√) of No Competence (a skill that the student do not have) scored "1 point", Little Competence (a skill that the student engage in with some difficulty) scored "2 points", Moderate Competence (a skill that the student demonstrate with relative ease) scored "3 points", and Much Competence (a skill that the students demonstrate easily or engage very well) scored "4 points". Section C which also contains fourteen (14) items is designed to provide information on students' attitude toward ICT. The items of the instrument were structured on a 4-point likert scale of Strongly Agree (SA) "4 points", Agree (A) "3 points", Disagree (D) "2 points" and Strongly Disagree (SD) "1 point". Content validity of ICTCQ was determined by three experts in the Department of Educational Foundation. The instrument was presented to the experts to indicate the degree of suitability or relevance of the items of the instrument. Included for the experts' attention were the topic of the study, purpose of the study, research questions and hypotheses. This practice constitutes a guide to the experts for checking the degree of relevance or appropriateness of the items in measuring what the instrument purports to measure. The experts were requested to rate the items on a 4-point scale weighted as: Not Relevant "1 point", Some-what Relevant "2 points", Relevant "3 points" and Very Relevant "4 points". The experts' ratings for each item were analyzed with mean. Any items with mean rating of 3 and above, representing "Relevant" and "Very Relevant" respectively were included in the final draft of the instrument while those items with mean rating below 3, were dropped. All these operations were carried out by the researcher in order to achieve high content validity for the instrument. The reliability of the instrument was established through a test re-test method for a measure of its stability. This is in support of Nwankwo (2010) who described test re-test method

as one of the most convenient reliability estimates for cognitive and non-cognitive instruments. The instrument was initially given to thirty (30) 200 level undergraduate students, randomly selected from Faculty of Science, Federal University Gusau, Zamfara State, Nigeria who did not participate in the final study. After an interval of three weeks, the instrument was re-administered on the same students. The score obtained from the two administrations were correlated using Pearson Product Moment Correlation Co-efficient (PPMC). For the fact that the instrument is a multi-variate instrument with two variables organized section by section, there was need the need to determine the reliability for each variable (section). The coefficient of stability was found to be 0.78 for students' competence in ICT and 0.81 for students' attitude to ICT scale.

Procedure for Data Collection
The instruments used by the researcher for data collection include Multiple Choice Test in Test and Measurement (MCTTM) and an ICT Competence Questionnaire (ICTCQ). In administration of the instruments, permission was sought from authority of Federal university Gusau for the study. The achievement test was administered to the students in a repeated measure in order to minimize the practice and order effect with a two weeks gap. CBT was taken two weeks after the students have completed taken PPT. CBT was administered with the help of staff of CBT center of Federal College of Education (Technical) Gusau and researchers' assistants. PPT was administered in two sessions; the first session contained 60 items that covers the first six (6) topics of the course, while the second session of PPT achievement test contained 40 items that covers the last five (5) topics. Upon completion of the CBT, examinees' were asked to complete a questionnaire. This questionnaire was used to collect information on students' competence in ICT and attitude toward ICT. This was done immediately after the CBT session of testing.

Method of Data Analysis

Data collected for this study were analyzed using descriptive and inferential statistics. Research Questions 1 and 2 were analyzed using mean and standard deviation. Hypothesis one was analyzed using t-test, Two-way ANOVA was used to test Hypotheses 2. While Hypotheses 3 was tested using regression analysis. All the analyses would be carry out at 0.05 alpha levels

RESULTS

Research Question 1: What is the level of competence of Federal University Gusau undergraduate students in the use of ICT?

Table 1: Result of Descriptive Statistics of Students' Competence in ICT

Variable	N	Mean	Std Deviation	Minimum Value	Maximum Value	Range
Students' Competence in ICT	432	38.9	7.25	20	80	60

Table 1 shows results of descriptive statistics of sampled Federal University Gusau undergraduate students' competence in ICT. Minimum, maximum and range values were used to categorize students' response as; 20-35 (low competence), 36-50 (little competence), 51-65 (moderate competence) and 66-80 (much competence). It revealed from the table a mean score of 38.9 which fall within the range of little competence (36-50). This shows that Federal University Gusau undergraduate students have little competence in ICT.

Research Question 2: What is the attitude of Federal University Gusau undergraduate students to ICT?

Table 2: Result of Descriptive Statistics of Students' Attitudes to ICT

Variable	N	Mean	Std. D	Minimum Value	Maximum Value	Range
Students' Attitude to ICT	432	37.92	6.122	14	56	42

Table 2 shows results of descriptive statistics of sampled Federal University Gusau undergraduate students' attitude to ICT. Minimum, maximum and range values were used to categorize students' response as; 14-35 (negative attitude) and 35-56 (positive attitude). It revealed from Table a mean score of 37.92 which fall within the range of positive attitude (35-56).

Hypothesis One: There is no significant difference in students' scores in CBT and PPT in an educational assessment course.

Table 3: t-test analysis of difference in students' scores in CBT and PPT in an educational assessment course

Test mode	N	$\bar{x}$	SD	Mean diff	Df	t-value	P-value	Decision
CBT	432	44.24	6.97					Significant at 0.05
PPT	432	48.72	5.59	4.48	431	12.940	.000	

Table 3 showed t-test analysis of difference in students' scores in CBT and PPT in an educational assessment course. A calculated t-value of 12.940 with p-value of 0.000 was obtained, which is significant at 0.05 alpha level. This shows that there is significant difference in students' scores in CBT and PPT in an educational assessment course. The difference is in favour of PPT with mean score of 48.72.

Hypothesis Two: There is no significant effect of gender on students' scores on the two mode of testing.

Table 4: Results of Two-way ANOVA on effect of gender on students' scores

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Decision
Corrected Model	6500.146[a]	3	2166.715	57.762	.000	
Intercept	1866018.311	1	1866018.311	49745.746	.000	
Testmode	4244.923	1	4244.923	113.164	.000	
Gender	70.182	1	70.182	1.871	.172	Significant
Testmode * Gender	2100.849	1	2100.849	56.006	.000	
Error	32259.557	860	37.511			
Total	1905456.000	864				
Corrected Total	38759.704	863				

Table 4 shows that the calculated F-ratio is 56.006 with significant p-value of 0.000 computed at level of significance 0.05. Since the calculated p-value of 0.000 is less than 0.05 alpha levels, therefore, the null hypothesis is rejected. This implies that there is significant effect of gender on students' scores on the two modes of testing.

Hypothesis Three: There is no significant relationship among students' competence in, attitude to ICT and their performance on CBT

Table 5: Model Summary of Regression Analysis

Model	R	R Square	Adjusted R	Std Error of the Estimate
1	.294	.086	.082	6.68187

Table 5 shows that the calculated R-value was .294 and R^2 was .086 which indicates that the independent variables (students' competence in, and attitude to ICT) contributed $R^2 =0.086$ (8.6%) of the

variance to students' performance on CBT, which was significant as indicated by the calculated F-value of 20.222.

Table 6:   Result of Regression Analysis

Model	Sum of squares	Df	Mean square	F	Sig	Decision
Regression	1805.754	2	902.877			
Residual	19153.725	429	44.647	20.222	0.000	Rejected
Total	20959.479	431				

Table 6 shows that the calculated F-value was 20.222 with p-value of 0.000 computed at level of significance 0.05. Since the calculated p-value of 0.000 is less than 0.05 alpha levels, therefore the null hypothesis is rejected. This implies that there was a significant relationship among students' competence in, attitude to ICT and their performance on CBT. To further examine the contributions of students' competence in, and attitude to ICT to their performance on CBT, t-value and Beta weight were computed as shown in Table 7 below.

Table 7:   Contributions of Students' Competence in, and Attitude to ICT to their Performance on CBT

Model		Unstandardised coefficient B	Std error	Standardized Coefficient Beta	t	Sig.
1	Constant	6.532	7.164		.912	.362
	Students' competence in ICT	.188	.165	.188	3.915	**.000**
	Students' attitude to ICT	.178	.050	.178	3.690	.000

Table 7 shows that, the calculated t- value on students' competence in, and attitude to ICT is 3.915 and 3.690 respectively, with significant probability value (p-value) of 0.000 and 0.000 respectively at 0.05 level of significance. This implies that students' competence in, and attitude to ICT significantly contributed to their performance on CBT. Furthermore, through the Beta weight, the table shows that students' competence in ICT contributed 0.188 greater than 0.178 of students' attitude to ICT.

DISCUSSION
One of the major findings from the study was the finding of Research Question 1 that Federal University Gusau undergraduate students have little competence in ICT. The finding is in line with that of Onuekwusi and Onuekwusi (2010) and National Assessment of Educational Progress. (2017), asserted that competence in ICT is the ability of the examinees to have the required basic computer skills or competence like; mastering of use of computer input devices like keyboard and mouse or touch pad. The above competences according to them constitute the basic pre-requisite

required in Computer based testing. Any attempt to subject examinees that have no computer skills to CBT is tantamount to poor performance.

The findings of this study also revealed that Federal University Gusau undergraduate students have positive attitude towards ICT. Students' attitudes are a major enabling/disabling factor in the adoption of technology. Kersaint, Horton, Stoul and Garofalo (2003), and Sheu (2019) found that students who have positive attitudes towards technology feel more comfortable with using it and usually incorporate it into their learning. In fact, Woodrow (1992) asserts that any successful transformation in educational practices requires the development of positive user attitude towards new technology. The development of students' positive attitude towards ICT is a key factor not only for enhancing computer integration but also avoiding Federal University Gusau students' resistance to computer based test.

The result obtained from the study also revealed no equivalence in the CBT and PPT scores in an educational assessment course among Federal University Gusau students. This is in consonance with the findings of Gallagher, Bridgeman and Cahalan (2000) and Khoshsima, Hosseini, & Hashemi, (2017) who found performance differences between PPT and CBT versions of achievement test, though the difference is small. A plausible reason for this could be in line with Russel and O'Conner (2003) assertion that prior computer experience was a major factors in explaining difference between students' performance on CBT and PPT. Due to a little competence of Federal University Gusau students in ICT, the difference in the performance of the examinees taking the two different versions was in favour of PPT.

The results in this study also reported no significant gender effect on students' scores on the two modes of testing. This implies that no significant effect existed between male and female Federal University Gusau students in the test administration mode of CBT and PPT. Conversely, studies of Bennett, Braswel,

Oranje, Sandene, Kaplan and Yan (2008) and Clariana and Wallance, (2002) all agreed with the present study that a no significant difference in the test administration mode for gender. This finding, in consonance with the findings of Lambert (1991) who found that gender effect was not an issue in both test performance and preference of delivery mode.

The result of the regression analysis indicates significant contributions of the two independent variables to the variance of students' performance on CBT. This reveals that, the independent variables (students' competence in, and attitude to ICT) are predictors of their performance on computer-based test. This shows that the variables were interconnected and they significantly determined students' performance on CBT. This result was in line with the findings of Pelgrum (2001), Pomplun and Custer (2005), Bennett, Braswell, Oranje, Sandene, Kaplane and Yan (2008) and Sheu (2019) who asserted that, students' competence in and attitude toward ICT are good predictors of their performance on computer-based test. This finding was also in consonance with that of Jimoh, Abduljaleel and Kawu (2012) who posited that poor performance of some students on CBT was connected to their poor ICT skills. It is also in line with the findings of Tella and Bashorun (2012) who maintained that students' attitude towards ICT is a determinant of their performance on CBT. The plausible reason for these findings could be as a result of the apparent importance of competence in and attitude to ICT on Students' performance on CBT. That is, students have positive attitude toward technology feel more comfortable with CBT, which will no doubt improve their performance.

CONCLUSION

Based on the findings of the study, it was concluded that Federal University Gusau undergraduate students have little competence in ICT. It was further concluded that due to a little competence of Federal University Gusau students in ICT, the difference in the performance of the examinees taking the two different versions was in favour of PPT. That is, poor

performance of some students on CBT was connected to their poor ICT skills.

RECOMMENDATIONS
The study therefore recommended that:

1. Educators should encourage the use of the real ICT for teaching and learning. This will not only motivated the learners in learning but also prepare them for CBT.
2. Federal University Gusau should also provide adequate opportunity for all students in learning relevant computer skills by the introduction of courses at all levels of undergraduate programme on basic computer skills such as computer appreciation certificate course.
3. Federal University Gusau should also introduce mini-computer or an equivalent electronic device such as cell phone or Personal Digital Assistant (PDA), which gives examinees more frequent opportunities to learn ICT.

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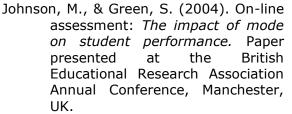
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