

Effects of Computer-Based Test (CBT) and Paper and Pencil Test (PPT) on Academic Achievement and Test Anxiety of Secondary School Students' in Economics

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Abstract

Investigated in this study were the effects of Computer Based Test (CBT) and Paper and Pencil Tests (PPT) on Secondary School (SS) students' academic achievement and test anxiety in Economics. The pretest-posttest non-randomized control group design was used as the research design. The study was done in Asaba, Delta State, Nigeria. All Senior Secondary II (SSII) students who offered Economics comprised the study's population. 107 SS II students were selected as the sample. Two instruments - Economics Achievement Test (EAT) and Test Anxiety Inventory (TAI) were used for data collection. Both EAT and TAI were validated by the experts. The reliability coefficients of the instruments were .95 and .68, respectively. The data collected were analyzed using mean statistics to answer two research questions, whereas two formulated null hypotheses were tested at a .05 level of significance using ANCOVA. The findings of the study indicated that students' mean achievement scores in PPT were slightly higher than students' mean achievement scores in CBT and the students' mean achievement scores were significantly different. Students in PPT exhibited greater test anxiety than their counterparts in CBT, even though the difference in the mean test anxiety scores of students in CBT and PPT was not significant. Based on the findings, the researchers recommended, among others, that the Federal Government should make and implement policies to mandate senior secondary students to use PPT for all internal assessments in various subjects in the country.

Keywords: computer-based test, paper and pencil test, academic achievement, test anxiety, economics

Introduction

One of the most threatening situations that cause anxiety in students is testing. Test anxiety is an intense fear of performing poorly on assessments. It is characterized by feelings of nervousness and discomfort paired with cognitive difficulties (Columbus, 2008; Ofqual, 2020). Akman-Yesilel (2012) submitted that anxiety is a term used for several disorders that cause nervousness, fear, apprehension, and worry. Test anxiety is also explained to be a feeling of unease, apprehension, or nervousness as a result of fear of failing an examination. It results in high levels of stress and apprehension during testing/evaluative situations that significantly interfere with performance, emotional and behavioral well-being, and attitudes toward school (Cizek & Burg, 2006; Huberty, 2009). Similarly, Segool (2009) observed that test anxiety affects students' test performance, be it in Paper and Pencil Tests (PPT) or Computer-Based Tests (CBT). Corroborating the above, Cassidy, cited in Akinleke and Adeaga (2014), reported that between 25% and 40% of students experience test anxiety.

This also significantly interferes with their academic achievement, emotional and behavioral well-being, and attitudes toward school (Huberty, 2009).

Academic achievement is the presentation results that show the extent to which a student has acquired the specific stated goals of activities in an educational setting (Eleje et al., 2020). As regards Economics, the academic achievement of secondary school students in Economics has been fluctuating over the years. It is no longer news that students' academic performance in SSCE Economics is poor and nothing to write home about (Esomonu & Eleje, 2017; Osadebe, 2014). A triangulation of studies on the academic performance of students in Economics (Jaiyeoba & Atanda, 2011; Augustine, 2010, 2013; Mahmood et al., 2012; Ndupuechi, 2009) had similar submissions that secondary school student's academic achievement in Economics is low. This was also reported by The Premium Times cited in Abanobi (2022) that out of 1,593,442 candidates who sat for (WASSCE) in May/June 2015, only 616,370 candidates passed with five credits and above, including English language, Mathematics and Economics. Again,

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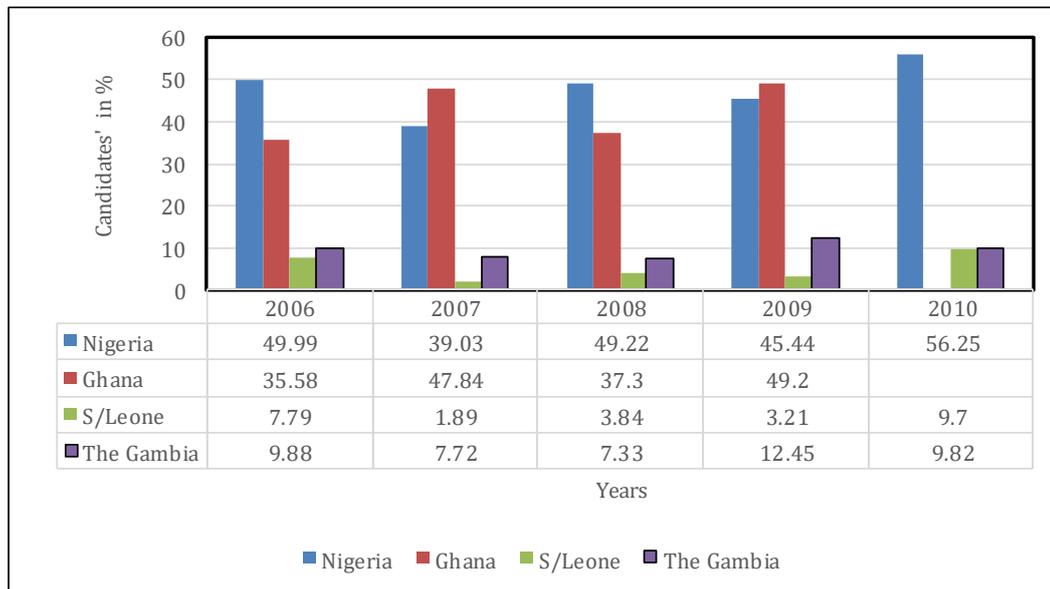
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students' performance in Economics in Nigeria is not encouraging. There is a noticeable fluctuation in students'

performance in economics in the Senior Secondary Certificate Examination (SSCE). This is shown in the statistics below;

Figure 1

Appraisal of Candidates' Achievement in the West African Senior School Certificate Examination (WASSCE) among WAEC member countries



Note. The date of appraisal of candidates' from M. A. Bello & M.G. Oke, n.d., an appraisal of candidates' achievement in the West African Senior School Certificate Examination (Wassce) Among Waec Member Countries. https://www.natinpasadvantage.com/essays/comparative_examination_performance_among_WAEC_member_countries.htm

The statistics show that less than 57% of the candidates had credit and above (A1 – C6) in Economics in all the countries during the period under consideration. The trend of performance fluctuated in all the countries throughout the period. The above situation is worrisome because it has indicated that students' academic achievement in Economics is fluctuating. One may possibly ask whether this continuous fluctuation in the academic achievement of students is a result of the use of the Paper and Pencil Test (PPT) or CBT for assessment.

PPT is the most commonly used assessment technique/method in Nigeria. It is a method in which students are assessed using paper and pencil. PPT is a written form of the exam (with pen or pencil and paper) as opposed to an exam taken electronically via computer. Therefore, PPT generally refers to tests in which questions are presented on a paper, and test takers respond by writing. Some benefits of PPT include portability and can be used in any setting. This means that PPT can be used in a rural, semi-urban, or urban area where there is electricity or no electricity as opposed to a test administered electronically. Additionally, there is nothing such as database crashes in PPT because the student's responses to the questions are made in writing and documented and, therefore, could not be lost as compared to electronic tests. However, there are limitations of PPT, which include various forms of examination malpractices such as bringing in unauthorized materials, writing on currency notes and identity cards, spying on other candidates in the examination hall, substitution of answer sheets and change of examination scores or grades (Sanni & Mohammad, 2015). Other limitations, as noted by Alabi et al. (2012), include tedious processes as the examination is conducted at various and distant centers simultaneously and marked manually; high risks of accidents during travels by both the staff involved and the prospective students for the paper examination; cost of conduct of the examination on the part of the examination bodies including honoraria for invigilators, coordinators, markers, collators and other allied staff; subjective scoring and plausible manipulation of results; late release of results, missing scripts and examination malpractices.

Alternatively, students' academic performance can be assessed through the use of a Computer-Based Test (CBT). CBT is a method/technique used to administer the test on computers and testees are expected to respond or answer the questions on the computer (Eleje et al., 2019; Sorana-Daniela & Lorentz, 2007). Some of the advantages of CBT include that it allows educators to collect data on students' testing strategies, intermediate progress, amount of time spent on each question, and thought processes, in addition to their final answers. CBT also provides several security advantages; for example, instead of storing testing materials at school sites for days before a test administration, tests can be sent over the internet at the last minute, reducing the possibility of questions being exposed prior to the test. Nevertheless, CBT has limitations which include that examinees need computer literacy in order to eliminate the mode effect on computer-based testing (Alderson, 2000). CBT may not be successfully administered without electricity, especially in rural areas. Additionally, some of the students may get anxious when tests are presented on a computer.

Observations from findings of various studies are inconclusive to support the fact that there are no differences between the scores obtained via CBT or PPT (Alabi et al. cited in Abanobi, 2022). Many studies have been conducted on the comparability of CBT and PPT. Some of the studies (Choi et al., 2003; Scheuermann & Björnsson, 2009) revealed that there is a significant difference between the two testing modes on test scores, while other studies (Al-Amri, 2009; Alakyleh, 2018) reported opposite or inconsistent results. Alakyleh's (2018) study aims to determine whether the university students' scores in the compulsory Islamic culture course test on a selected sample differ across the paper and pencil test (PPT) & computer-based test (CBT) versions and to reveal the relationship between gender and the student's level of performance in the test. The results showed that there was no significant difference between the two versions provided to students, CBT and PPT, with .36 moderate correlation indicators in the pre-CBT test and no significant differences between the males and females in the CBT test results.

Also, research findings on the preference for CBT or PPT by various stakeholders in the field of education and other fields of study have been quite varied in the literature. This has been shown in a study by Lim et al. (2006) on medical students' attitudes toward CBT Vs. PPT testing in Singapore through an online survey. The findings showed that a higher percentage of the students used in the study preferred CBT to PPT. In this same vein, Clariana and Wallace (2002) found out that CBT delivery positively impacted students' scores as compared to PPT. The study also found that the CBT group outperformed the PPT group. On the contrary, other studies (Dermo & Eyre, 2008; George, 2011) carried out on CBT and PPT have opposite submissions. The results showed that students believed the PPT enhanced their performance while CBT had a negative effect and other varied results. All these studies above were conducted overseas. A Nigerian study by Sheu and Evanero (2022) investigated the comparability of Computer Based Test (CBT) and Paper-Pencil Test (PPT) on students' scores in educational assessment courses at the federal university Gusau, Zamfara State. The findings of their study revealed that Federal University Gusau undergraduate students have little competence in ICT. It also revealed a significant difference in students' scores in CBT and PPT in an educational assessment course. The difference is in favor of PPT, with a mean score of 48.72. The study also revealed no significant effect of gender on students' scores on the two modes of testing. Sheu and Evanero's study population were not secondary school students.

Much has also not been said in research reports about the effects of CBT and PPT on test anxiety and academic achievement in Nigeria. This implies that there is a lack of reports about the effects of CBT and PPT on test anxiety. A few studies have examined the effects of CBT or PPT on students' test anxiety, results of these studies seem inconsistent, providing no support that CBTs or PPTs will induce more anxiety or impact performance levels positively (Cassady & Cridley, 2005; Stowell & Bennett, 2010). Some studies reported increased test anxiety among students unfamiliar with the use of the computer (Lim et al., 2006). Revuelta et al. (2003); Schult and McIntosh (2004) reported no correlation between the anxiety levels of students who take a PPT and those who take CBT. However, a study by Stowell and Bennett (2010) found some correlation between the two test types and anxiety. They found that students with high anxiety in the classroom had less anxiety when taking their exams online. Students with low classroom anxiety had more anxiety about taking an online exam. They also found the relationship between test performance and test anxiety was stronger in the classroom setting.

The results of various studies have not provided an answer to whether CBT or PPT reduces or increases students' test anxiety as well as students' academic achievement. This may raise a question- which of these test modes (CBT or PPT) can effectively impact students' test anxiety and academic achievement in a positive or desired direction? Based on the above scenario and the many still unanswered questions surrounding the comparability of CBT and PPT, this study attempt to determine which of the test modes (PPT or CBT) can reduce secondary school students' test anxiety and enhance academic achievement in Economics.

Studies on Comparability of Computer-Based Test (CBT) and Paper-Pencil Test (PPT) on Students' Scores in Educational Assessment

Alisa (2014) conducted a study to determine to what extent there was a difference in student achievement, as measured by the Acuity Language Arts Diagnostic assessment, between students using a paper/pencil or a computer-based delivery method. A quantitative research design was used in this study. The population of interest was upper elementary students in the state of Missouri. The sample for the study included approximately 650 fifth and sixth-grade students from Mill Creek Upper Elementary during the 2011-2012 school years. Findings

revealed a statistically significant difference did exist between the sixth-grade males and sixth-grade females when taking the computer-based assessment. The mean achievement score for the sixth-grade males on the computer-based assessment was more than 10% lower than the mean achievement score for the sixth-grade females.

In another study by Sanni and Mohammad (2015) perception of students on the use of computer-based testing in examinations was investigated. The study adopted a survey research method. Problems encountered by the student and prospective methods of enhancing CBT acceptance in Nigeria were also documented. A total of 300 questionnaires were administered to students who participated in the 2014 UTME at Ahmadu Bello University (ABU), Zaria center and 237 were adequately completed and found usable, representing (79%). The finding revealed, among others, that majority of the respondents confirmed that CBT could curb examination malpractice. The majority of candidates were also found to prefer CBT over the conventional way of writing examinations. The Chi-square and Pearson's correlation analysis showed that the respondent's preferences for CBT were sensitive across gender, age distribution and student-faculty. While improving the electricity supply was identified as critical in enhancing CBT Exams, poor ICT skills on the part of the student and the invigilators were identified as the major problem facing the implementation of the JAMB CBT Exam.

Oduntan et al. (2015) conducted a study on comparative analysis of student performance in CBT and PPT. A correlational analysis of CBT and PPT assessment methods was used. This involves the use of a questionnaire to collect data on the scores of students who wrote both CBT and PPT UTME exams in 2013 and 2014. Pearson Correlation was used for the analysis. The result showed a positive correlation in the scores of the student. It is therefore concluded that if students are well prepared for the CBT exams, their performance will be enhanced.

On the other hand, Alakyleh's (2018) study aims to determine whether the university students' scores in the compulsory Islamic culture course test on a selected sample differ across the paper and pencil test (PPT) & computer-based test (CBT) versions and to reveal the relationship between gender and the student's level of performance in the test. The results showed that there was no significant difference between the two versions provided to students, CBT and PPT, with .36 moderate correlation indicators in the pre-CBT test and no significant differences between the males and females in the CBT test results.

While Sheu and Evanero (2022) study investigated the comparability of Computer Based Test (CBT) and Paper-Pencil Test (PPT) on students' scores in an Educational assessment course at Federal University Gusau, Zamfara State. The study adopted the repeated measures design. The findings of their study revealed that Federal University Gusau undergraduate students have little competence in ICT. It also revealed significant differences in students' scores in CBT and PPT in an educational assessment course. The difference is in favor of PPT, with a mean score of 48.72. The study also revealed no significant effect of gender on students' scores on the two modes of testing.

Owolabi and Dahunsi (2014) investigated related factors and anxiety in a computerized testing situation - a case study of the National Open University, Nigeria). The study adopted a correlation design with test anxiety in a computerized testing situation as a dependent variable, while the student-related factors constituted independent variables. Three scales, namely: The test Anxiety Scale ($r = .84$), Computer Anxiety Scale ($r = .84$), and Computer Experience Scale ($r = .81$), were used as instruments for data collection. Data collected were analyzed using Frequency, Percentages, Pearson Product Moment Correlation (PPMC) coefficient and Multiple Regression analysis. The results of the analysis showed that those with higher computer experience had significant contributions to the variation in test anxiety in a computerized testing situation.

A study on the assessment of computer literacy skills and computer-based testing anxiety of secondary school students in Adamawa and Taraba states, Nigeria, was conducted by Dangut and Sakiyo (2014). The study adopted a correlation design to

assess Senior Secondary School (SSS) students' Computer Literacy Skills (CLS) and their perceived level of anxiety when confronted with CBT. Two validated questionnaires, the "Computer Basic Literacy Competence Questionnaire" (CBLCQ) and the "Computer Based Assessment Anxiety Questionnaire" (CBAAQ), were administered to 1595 final year senior secondary school students in 106 randomly selected senior secondary schools in Adamawa and Taraba states. The questionnaires yielded Cronbach Alpha reliability coefficients of .72 and .81, respectively. Four research questions and four hypotheses guided the study. Mean and standard deviation used to answer the research questions. The t-test and Pearson Product Moment Correlation Coefficient were used to test the hypotheses. Results revealed that students have low competence in basic computer literacy skills and a high level of anxiety toward CBT. There was also a weak positive relationship between computer competence and computer anxiety.

Research Questions

The following research questions guided this study:

1. What are the mean achievement scores of students in CBT and PPT in Economics?
2. What are students' mean test anxiety scores in CBT and PPT in Economics?

Hypotheses

The following null hypotheses were tested at .05 alpha levels in the present study:

1. The difference in the mean achievement scores of students exposed to CBT and those exposed to PPT in Economics is not significant.
2. The difference in the mean test anxiety scores of students exposed to CBT and those exposed to PPT in Economics is not significant.

Methodology

The design of this study was a quasi-experimental design. It utilized the pretest-posttest non-randomized control group design involving two groups – the experimental group and the control group. It is a quasi-experimental study because participants were not randomly assigned to groups. Intact classes were used to avoid labeling and for the fact that the school authorities would not permit the disruption of classes for the sake of the research. The population of this study comprised all students in senior secondary II who offered Economics in ten co-educational secondary schools in Oshimili South Local Government Area of Delta State (Ministry of Education, Exams and Standard, Asaba). The reason behind the selection of this school type was to ensure that male and female students were adequately included in the present study. The sample of this study comprised 107 senior secondary school II students who offered Economics drawn from two co-educational secondary schools in Oshimili South Local Government Area, Delta North Education Zone of Delta State. A purposive sampling technique was used to sample two co-educational secondary schools from the ten secondary schools in the Local Government Area. The two co-educational secondary schools selected had well-equipped computer facilities, which helped to facilitate the successful completion of the study. Using a simple random sampling technique, the researcher assigned one of the selected co-educational secondary schools to the treatment group while the other was to the control group. Two intact SSII classes were selected through balloting, one from each of the two co-educational secondary schools. The treatment and control groups comprised 56 and 51 SSII students, respectively.

Two instruments were used for data collection in this study. They are Economics Achievement Test (EAT) and Test Anxiety Inventory (TAI). The EAT is a 40-item, 4-option multiple choice objective test on the theories of demand, supply and cost units of study in the SSII Economics curriculum. TAI was developed by

Spielberger in 1980 and re-validated in Nigeria by Oladimeji (2005). It measures anxiety proneness to examinations and evaluative situations. The inventory was designed for secondary school students and undergraduates and consists of 20 items. Three scores are generated with the inventory, namely: Worry (W), Emotionality (E) and Total anxiety scores (T). Worry (W) refers to excessive preoccupation and concern about the outcome of a test, especially the consequences of failure. Emotionality (E) refers to an individual's behavioral reactions and feelings aroused by the test situation. The total anxiety score (T) is the sum of W and E. It refers to total cognitive, affective and behavioral reactions to test/examination situations. Responses to the items vary from "almost never" to "almost always," with a minimum score of 20 and a maximum of 80. TAI was used to collect data on the student's test anxiety.

Face and content validation were carried out for the EAT. The researcher sent two copies of EAT with the table of specifications to two experts, one in Educational Measurement and Evaluation and the other, a secondary school Economics teacher. These experts were requested to vet the items in terms of clarity of words, appropriateness to the class levels and plausibility of distracters in order to ascertain the face and content validity of the EAT. The corrections and suggestions made were used in producing the final version of EAT. The TAI used had been validated. Oladimeji (2005) said that different forms of validation, such as concurrent, discriminant, construct and convergent validity, were determined when it was used on Nigerian students. The reliability coefficient of EAT was determined using the Kuder-Richardson formula 20. The 40 items of EAT selected after item analysis were again administered to 30 students offering Economics selected from a secondary school different from the sampled secondary schools for the study. The Kuder Richardson formula 20 was used to compute the reliability coefficient of EAT, which yielded .95. With this, the instrument was deemed reliable for the study. The reliability coefficient of TAI was determined using the Cronbach Alpha formula. The TAI was administered to 30 SSII students offering Economics selected from a secondary school different from the sampled secondary schools for the study. The Cronbach Alpha formula was used to compute the reliability coefficient of TAI, which yielded .68. This means that the instrument (TAI) was deemed reliable for the study.

The scoring of the instruments was done as follows, for the Test Anxiety Inventory (TAI), the items were scored with the four-point rating scale ranging from 1 for "almost never" to 4 for "almost always," except item number one, which was scored in reverse order. These scores were summated to obtain test anxiety scores. The Economics Achievement Test (EAT) contained 40 questions. Questions carried equal marks and any correct answer was scored one while an incorrect answer was scored zero.

Experimental Procedure/Data Collection Technique

This study involved two groups of subjects, i.e. experimental group and the control group. The experimental group was assessed with CBT, while the control group was assessed with PPT. On the first day of the experiment, the EAT was administered in PPT mode as a pre-test to the students in the experimental group and control group. The TAI was equally administered as a pre-test to the two groups after the completion of EAT. The pre-tests were administered by research assistants and were carefully monitored by the researchers. Data obtained from this exercise served as pre-test scores in this study. Before the post-test, the researchers trained the experimental group on how to use a monitor, mouse, and keyboard for CBT. Because the students in the experimental group and control group had well-equipped computer laboratories in their schools, the CBT training session took place in the student's school premises using the school's computer facilities. All the groups were post-tested on achievement and test anxiety. EAT in CBT mode served as a post-test for the experimental group, while the control group was post-tested with EAT in PPT. After the achievement test, the TAI was also administered to all groups as a post-test to determine the students' test anxiety. Feedback from this exercise served as post-

test scores of the study. The data collected were analyzed using to answer the research questions. The Hypotheses were tested at a .05 level of significance using Analysis of Covariance (ANCOVA).

Table 1
Mean Achievement Scores of Students in CBT and PPT in Economics

Group	<i>n</i>	Pre-test <i>M</i>	Post-test <i>M</i>	<i>MD</i>
Experimental (CBT)	56	21.71	20.68	-1.03
Control (PPT)	51	21.33	22.06	.73

Note. *N* = 107; *MD* = mean difference.

Table 1 shows the pre-test and post-test mean achievement scores of students exposed to CBT and PPT in Economics. The analyses further revealed that the mean achievement score of students exposed to PPT is higher than that of the students exposed

Results

Research Question 1: What are the mean achievement scores of students in CBT and PPT in Economics?

to CBT. However, it is a surprise that the pre-test score is higher than the post-test score in CBT which has a mean difference of -1.03.

Research Question 2: What are the mean test anxiety scores of students in CBT and PPT in Economics?

Table 2
Mean Test Anxiety Scores of Students in CBT and PPT in Economics

Group	<i>n</i>	Pre-test <i>M</i>	Post-test <i>M</i>	<i>MD</i>
Experimental (CBT)	56	39.80	40.68	.88
Control (PPT)	51	42.86	41.75	-1.11

Note. *N* = 107; *MD* = mean difference.

Table 2 shows the pre-test and post-test mean test anxiety scores of students exposed to CBT and PPT in Economics. Also, the analyses revealed that the mean test anxiety scores of

students exposed to PPT are higher than that of their counterparts exposed to CBT.

Hypothesis 1: The difference in the mean achievement scores of students in CBT and PPT in Economics is not significant.

Table 3
Tests of Difference between Mean Achievement Scores of Students in CBT and PPT in Economics

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Corrected model	759.512	4	189.878	15.870	.000
Intercept	413.517	1	413.517	34.562	.000
Groups	65.755	1	65.755	5.496	.021
Gender	2.038	1	2.038	.170	.681
Pre-test	632.918	1	632.918	52.900	.000
Groups * Gender	.175	1	.175	.015	.904
Error	1220.375	102	11.964		
Total	50691.000	107			
Corrected total	1979.888	106			

Note. *p* < .05.

SS = sum of squares; *MS* = mean of square.

Table 3 reveals that the test mode effect on achievement is significant given that $F_{(1,102)} = 5.496$, and $p < .05$ (.021 < .05). Therefore, the null hypothesis is rejected. Thus, the difference in the mean achievement scores of students in CBT and PPT is

significant. The students' mean achievement score in PPT, as can be seen from Table 1, is higher than that of those in CBT.

Hypothesis 2: The difference in the mean test anxiety scores of students exposed to CBT and that of those exposed to PPT in Economics is not significant.

Table 4
Test of Difference between Mean Test Anxiety Scores of Students in CBT and PPT in Economics

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Corrected model	3011.906	4	752.977	10.959	.000
Intercept	4601.251	1	4601.251	66.967	.000
Groups	1.187	1	1.187	.017	.896
Gender	538.790	1	538.790	7.842	.006
Pre-test	2336.923	1	2336.923	34.012	.000
Groups * Gender	.838	1	.838	.012	.912
Error	7008.355	102	68.709		
Total	191531.000	107			
Corrected total	10020.262	106			

Note. *p* < .05.

SS = sum of squares; *MS* = mean of square.

Results in Table 4 show that $F_{(1,102)} = .017$, and $p > 0.05$ (.896 > .05); this implies that the test mode effect on mean test anxiety scores of students in Economics is not significant. So, the null hypothesis is not rejected, implying that the difference in the mean test anxiety scores of students in CBT and PPT is not significant.

Discussion

Achievement Scores of Students on CBT and PPT in Economics

The finding of this study showed that the mean achievement scores of students exposed to PPT were higher than that of the students exposed to CBT. Therefore, the difference in the mean achievement scores of students exposed to CBT and PPT was significant. The student's achievement scores in PPT were slightly higher than that of those in CBT because students had been using PPT as a form of assessment before then, so it was not strange to them. It was also a surprise that, in some cases, pre-test scores on students' achievement in CBT/PPT were slightly higher than their post-test scores. This may be a result of several reasons; the students might have been taught and tested on what they already knew; thus, there was a slight difference in their pre-test scores and post-test scores. Also, during the experimental period, the students were engaged in other school/classroom activities, which might have distracted them from having 100 percent participation in the study. In addition, the study was more interested in the test mode, which was the treatment and not the lesson delivery exercise (teaching). Furthermore, the student's achievement score in CBT was slightly lower than that of their counterparts in PPT may be a result of the fact that CBT was a new assessment approach. The students, being trained in CBT, might have found a test on a computer strange owing to the fact that CBT was still new to them. The finding of this study corroborates the findings of Dermo and Eyre (2008) as well as George (2011). They carried out a study on computer-mediated examinations, students' perceptions, students' attitudes and performance. They found out that students believed the PPT enhanced their performance while CBT had a negative effect.

Test Anxiety Scores of Students on CBT and PPT in Economics

The result showed that students in PPT exhibited greater test anxiety than their counterparts exposed to CBT, even though the difference in the mean test anxiety scores of students in CBT and PPT was not significant. This means that test mode has no effect on students' test anxiety. Surprisingly, it was unexpected that there was no significant difference in students' test anxiety in both CBT and PPT. One would have thought that CBT might induce additional anxiety in students, but it never did. Rather, students in CBT exhibited less test anxiety than their counterparts in PPT. This may be a result of the proliferation of recent technologies such as smartphones, i-pad, laptops, and computers, which students see around their environments.

The above result corresponds with the findings of Wang and Chuang (2002) in a study using junior high, high school, and college students. Measures of anxiety, test preference, adaptability of the test, and acceptance of test results all showed that students viewed the CBT with less anxiety and positive preference. Likewise, research conducted by Gwen (2013) comparing two groups of junior high students, one group taking a PPT test and one group taking a CBT version of the same test, found lower rates of self-reported state test anxiety in the group taking the CBT version than students taking the PPT version. It is the general consensus that there is no significant difference between the anxiety levels of students who take a PPT and those who take a CBT (Revuelta et al., 2003; Schult & McIntosh, 2004).

Conclusion

Based on the findings, the study concluded that the student's academic achievements and test anxiety scores are not the same when assessed with PPT and CBT in Economics.

Recommendations

Based on the findings, the following recommendations have been made;

1. Nigeria examination authorities should use PPT for secondary school students' academic achievement in all external examinations conducted in the country.
2. The federal government should make and implement policies to mandate secondary schools to use PPT for all internal assessments in various subjects in the country.

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