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COMPARATIVE ANALYSIS OF ACADEMIC ACHIEVEMENT SCORES OF SECONDARY SCHOOL STUDENTS EXPOSED TO COMPUTER-BASED TEST (CBT) AND PAPER AND PEN TEST (PPT) IN ECONOMICS IN NIGERIA

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AUTHOR'S CONTRIBUTION

The sole author designed, analyzed, interpreted and prepared the manuscript.

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ABSTRACT

Assessment in education such as computerized test has taken a new direction as another form of students' assessment at different levels of education in Nigeria. This introduction of computerized tests for educational assessments geared this study on comparative analysis of academic achievement scores of students exposed to CBT and PPT in Economics. Three research questions were raised and answered. Three null hypotheses were tested at 0.05 level of significance guided the study. The study utilized pretest-posttest non-randomized control group design involving experimental and control groups. The study was carried out in Asaba, capital of Delta State, Nigeria. 973 SS II students who offered Economics in ten co-educational secondary schools in the study area comprised the population of the study. The sample was 107 students who offered Economics in the schools selected. Economics Achievement Test (EAT) was the instrument for data collection. The instrument was validated by experts in Educational Measurement and Evaluation. The reliability coefficient of EAT was 0.9. Mean statistics was used to analyze the research questions while the null hypotheses were tested using ANCOVA. The findings revealed the that students' mean achievement scores in PPT was slightly higher than students' mean achievement scores in CBT and the students' mean achievement scores were significantly different. The study recommended based on the findings that examination bodies, school authorities and other stake holders in education should use only PPT for all students' assessments in various internal examinations conducted in the country.

Keywords: Assessment; test; paper and pen test; computer based test; academic achievement; economics.

1. INTRODUCTION

Assessment has become a fundamental activity in the teaching/learning process because not only that it is used in getting facts on students' understanding but can be used to find out learning outcome through appropriate feedback mechanisms. In educational practice, assessment is central because, for students, excellent grades/achievements provide opportunities for further studies and employment. For tutors and educational institutions, it shows evidence of better improvement as individuals and institutions. Jim and Sean [1] stated that assessment provides means to assess learners and educational institutions' success, and this builds a great influence on what assessments were designed to serve. Nkwocha [2] explained assessment as using various tools, instruments, and devices to obtain information about how students develop in cognitive domain, affective domain and psychomotor domain at different intervals while in

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school. Assessment is also explained as an important stock-taking part of learning process to determine learners' learning outcome. Huba and Freed cited by Office of Assessment Services [3] explained that assessment is a way of obtaining fact from various sources to determine learners' knowledge because of the educational experiences they received. The above explanations reveal that for feedback to be effective in the process of teaching-learning, students must be assessed. Learners' performance can be assessed through various ways such as paper-and-pen test or computerized test delivery. Paper-and-Pen Test (PPT) is a common means used for assessment of students in Nigeria. PPT presents questions on paper and testees are expected to respond to such question using paper and pen or pencil. Testees read the questions on paper and provide responses using the same paper and pen (CTB/McGraw-Hill, 2011).

There are numerous advantages of PPT which include its portability, this implies that paper and pen test may be used in any setting whether rural, semi-urban or urban with or without existence of electricity, this is not the same as in the case of computerized tests. Database crashes do not happen in PPT because, responses to the questions are written down and recorded, so, cannot get lost as in computerized test. Paper and pen test removes equity issues among testees because it can be administered to learners even when they lack computer knowledge. Testees are given a sense of purpose and opportunity to think in paper and pen test (Best Answer, [4]). However, paper and pen test has bottlenecks as discussed in Sanni and Mohammad [5], paper and pen test is bedevil with numerous misconducts in examinations such as, testees use unauthorized materials, write on their bodies and copy from fellow testees' work. Similarly, limitations of paper and pen test also include tedious processes as the examination is conducted simultaneously at various examination centres, scored manually; high rate of accidents because of travelling by both the supervisors and the candidates for such examination. Another problem of paper and pen test is high cost of conducting examination by various bodies in charge of the examination for payment of invigilators, coordinators, markers, collators and other staff. Another problem of paper and pen test is manipulation of results because subjective scoring, delay in the release of results, missing scripts among others.

The threat of examination malpractices on the validity of examination has made some examination bodies to give excessive attention to checking examination malpractices even at the test development stage. For instance, JAMB administers different question formats in which questions do not follow the same order. The alternatives under each question in a format do not also follow the same order. However, it seems that candidates too are not relenting in frustrating and voiding all efforts by these bodies (Olatoye cited by Sanni & Mohammad, [5]).

Learners can be assessed through the use of computers as Computer-Based Test (CBT) which is one of the new approaches in the educational field and assessment under great influence of modern technology (Sorana-Daniela & Lorentz, [6]). Computerized test has been explained as a test in which questions are presented on a computer and testees are required to respond to the question through the same computer (Florida Department of Education [7]). This indicates that learners can be assessed using various computer gadgets, and, computerized test is recently used increasingly for assessment of learners' understanding in various examinations in Nigeria [8].

Advantages of CBT are recorded in numerous ways such as: computerized test gives stakeholders opportunity to obtain information on testees' testing strategies, progress, time spent on each question, as well as thinking processes [9-15] (Kozma, 2009). Additionally, computerized test offers several security advantages such as storing questions in the internet till last minute before testing to reduce any chance of exposing the questions before the examination. Furthermore, questions are scrambled randomly for various testees and as such, testees cannot copy or distribute any specific question [16,9,10,17,14,18,19]. (Mulvany (2011) stated that advantages of computerized test has made it to become an "innovative" approaches to various assessments. This has made different examination bodies to be moving from using paper and pen testing to computer mode to completely remove paper materials and supply adequate feedback, less and faster delivery of test. Computerized tests expands testing over the challenges of paper and pen test. Computerized test according to Scalise and Gifford [20] gives room to innovations in assessments in education through rich new tasks, powerful scoring, speedy reporting and timely feedback mechanisms. Computerized test measures complex form of knowledge and logical reasoning that is determine and assess through paper and pen test (Bodmann & Robinson, 2004). However, John, Cynthia, Judith and Tim [21] stated that the merits of computerized test do not in any way mean that computerized tests are better than paper and pen test.

There are numerous limitations of computerized test, for instance, testees need to be computer literate to remove test mode effect in computerized testing (Alderson [22]). Computerized tests cannot be administered safely and successfully without

electricity more especially in remote and primitive areas. Some testees may also become test anxious when they are presented with computerized tests. There is nothing like subjective questions computerized testing because such questions cannot be scored by the computer but by human alone, so, there is completely lack of human interaction in computerized test [23]. Despite the limitations of computerized test, it is recently accepted globally as a result of numerous advantages it offers. Some developed nations as a result have moved from traditional testing to computerized testing. Higher institutions in Nigeria have started using computerized testing in PUTME, while JAMB, one of the Nigeria examination bodies has started using computerized testing in UTME for candidates seeking admission in higher institutions. On the same note, other Nigeria examination bodies such as WAEC and NECO are preparing to use computerized testing for assessment of testees [24]. Similarly, some Nigeria higher institutions use computerized tests in their assessment, for instance UNIZIK has used computerized testing for more than several sessions in GS examinations. This is because computerized test offers various techniques of meeting limitations to design and implement different assessments methods that is more than paper and pen test as wel l as speedy records of broad deposition of cognition [25].

Research findings from observations are inconclusive to support the fact that no differences exist between the scores collected through computerized tests or paper and pen tests [26]. Numerous studies have been conducted to examine comparisons between computerized testing and paper and pen testing. Some of the studies [27,28] indicate that significant differences exist between computerized testing and paper and pen testing, while opposite is the case of other studies like Al-Amri [16]. Also, research findings on the preference of CBT or PPT by various stakeholders in the field of education and other fields of study have been quite varied in the literature. This is revealed in a study conducted by Lim, Ong, Wilder-Smith, and Seet [29] on attitude of medical students towards computerized testing and paper and pen testing. The findings showed that higher percentage of the students used in the study preferred CBT to PPT. In this same vein, Clariana and Wallace [30] found that computerized test positively impacted students' scores as opposed paper and pen test. The study revealed also students assessed using computerized test performed better than those assessed with paper and pen test. In contrast, some other studies such as Dermo and Eyre [31]; George [32]; Choi & Tinkler Choi & Tinkler [33]; Lee [34] found that paper and pen test improved students' academic performance while computerized test indicated a negative effect on the students. All these above studies were done in oversea countries.

Much has also not been said in research reports about effects of gender on students' academic achievement in CBT and PPT in Nigeria. Research reports of the impact of gender on students' performance in computerized testing and paper and pen testing are not consistent. Some studies found that students' performance is not gender related on differences between computerized testing and paper and pen testing [35] (Clariana & Wallance [30]), while some other studies found gender relatedness to test mode effect [36,37,38,39,40], with male testees performing better in computerized test than their female counterparts. Other studies have opposite submissions, Ayo, et al. [41]; Bebetos and Antonio [42] as well as Kadel [43] found that female testees performed better in computerized test than their male counterparts. Contradicting the above submissions, the findings of other studies revealed that the performance of testees in computerized test and paper and pen test are the same irrespective of their gender.

Observations have shown that students' performance in Economics is poor. This is evident in a report of Osadebe [44] that it is not uncommon that senior secondary school students perform poorly in SSCE Economics. Also, other studies by Smitter (2008); Ndupuechi [45]; Augustine [46,47]; Atanda and Jaiyeoba [48]; and Tahir [49] had similar submissions that academic achievement of students in secondary school is low in Economics. Corroborating this view, Premium Times [50] reported that only few candidates came out with five credits and above in English language, Mathematics and Economics in WASSCE May/June, 2015. From 2013 till date, total candidates who obtained five credits in English language, Mathematics and Economics have not been more than 50% of candidates.

The above situation is worrisome because, it has shown that the students' performance in Economics fluctuates every now and then. One may possibly feel that this continuous fluctuation of students' academic achievement is occasioned by the use of traditional test mode. An attempt to determine which of the test modes (PPT or CBT) can enhance academic achievement in Economics is of concern to the researcher.

1.1 Statement of the Problem

Every educational setting has an objective to monitor students' academic achievement by using the best test mode for excellent achievement in schools. However, observations have shown that students' academic achievement in Economics is dwindling even with the

use of paper and pen testing. Presently, various developed countries across the globe have migrated from the traditional test mode to the use of CBT for assessment of students' academic achievement. Computerized test is not only an alternative mode of assessment but it is a qualitative shift from paper and pen test as a result of numerous advantages it offers. Nigeria as a country is not left out in this as various educational institutions and examination bodies have migrated from the use of paper and pen testing to computerized testing for determining performance of students' in various school subjects.

Students' poor performance in the subject Economics, over the years has attracted a lot of concern amongst educators. Many researchers observed that students' performance in Economics is poor as a result of poor teaching/testing methods (WAEC, 2017). If this trend is allowed to continue, academic achievement in various subjects especially in Economics will continue to dwindle in our present society. The results of various studies have not provided an answer to whether CBT or PPT reduces or increases students' students' academic achievement. This may raise a question- which of these test modes (CBT or PPT) can effectively impact students' academic achievement in a positive or desired direction? Based on the above scenario and numerous questions surrounding the computerized testing and paper and pencil testing, this study therefore examined effects of computerized test and paper and pen test on students' performance in Economics in Nigeria.

1.2 Research Questions

The following research questions were raised and answered in this study;

1. What are students' mean achievement scores in CBT and PPT in Economics?
2. What are the male and female students' mean achievement in CBT in Economics?
3. What are the male and female students' mean achievement in PPT in Economics?

1.3 Hypotheses

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

1. There is no significant difference between students' mean achievement scores in CBT and PPT in Economics?
2. There is no significant difference between male and female students' mean achievement in CBT in Economics?
3. There is no significant difference between male and female students' mean achievement in PPT test in Economics?

2. METHODS

Research design of this study was quasi-experimental design. It utilized the pretest-posttest non-randomized control group design involving two groups – the experimental and control groups. It is a quasi-experimental study because participants were not assigned randomly in the groups. Intact students' classes were employed to avoid labeling and for the fact that the school authorities would not permit disruption of classes for the sake of the research.

Chart 1. shows the design used for study

Group	Pre-test	Treatment	Post-test
Experimental	O_1	X_1	O_2
Control	O_1	-	O_2

Symbols

X_1 – Treatment (CBT)

O_1 – Pre-test

O_2 – Post-test

Chart 1: Design of the Study

The study was conducted in Asaba, Delta North Education Zone of Delta State. The capital of Delta State is Asaba. The population of this study comprised 973 SS II students in ten schools in Asaba, Delta State (Ministry of Education, Asaba). Selection of this school type was to ensure gender was adequately considered in the study. 107 SSII students made up of 49 males and 58 females were drawn from two schools in Asaba, Delta North Education Zone of Delta State. The study used purposive sampling technique select two schools from the ten schools in Asaba, Delta State. The two schools selected had well equipped computer facilities which helped to facilitate and complete this study successfully.

Table 1. Sample descriptions

Group	No Subjects	Assignments	Males	Females
Treatment	56	Non-random	26	30
Control	51	Non-random	23	28
Total	**107**		**49**	**58**

Using simple random sampling technique, the researcher assigned one of the selected co-educational secondary schools to treatment group while the other was the control group. Two intact SSII classes were selected through balloting, one from each of the two co-educational secondary schools. The treatment group comprised 26 male and 30 female SSII students while the Control group comprised 23 male and 28 female SSII students. (See Table 2 for sample description).

The data collection instrument was EAT constructed by the researcher who is a subject specialist in Economics. EAT consisted of 40 questions of four-option multiple-choice questions based on the SSII curriculum. The EAT covered all levels of objectives in the cognitive domain. The EAT alongside with the table of specifications were sent to experts for face and content validations. The experts vetted the EAT and their suggestions were reflected in the final version of EAT for trial testing.

The 60-items on the table of specification were trial tested using 150 SSII students in schools different from the ones selected for this study. Feedback from this exercise was used for item analysis of the EAT. The duly completed EAT were collected and scored by the researcher. After the scoring, the researcher arranged the students' scores in descending order and selected $^1/_3$ of the upper scorers and $^1/_3$ lower scorers. Nworgu in Abanobi [51], Nkwocha [2] and Otubelu [52,53] recommend the selection of $^1/_3$ of the upper scorers and $^1/_3$ lower scorers for item analysis. Nworgu as cited by Abanobi [51] states that after item analysis, items with difficulty indices (p) between .30 and .70 as well as discrimination indices (d) between +.03 and +1.0 should be considered as valid items. Items which met the above criteria were included in the final version of the EAT. After the item analysis, 40-items out of 60-items were found adequate and selected in the final production of EAT. The Economics Achievement Test (EAT) contained 40 questions. Questions carried equal marks and any correct answer was scored one while incorrect answer was scored zero.

Kuder Richardson formular 20 was used to obtain the reliability coefficient of EAT. The 40-items of EAT selected after item analysis were again administered on 30 SSII students offering Economics selected from a secondary school not the same with the sampled secondary schools for the study. EAT yielded a reliability coefficient of 0.95 indicating that the EAT was reliable and fit for the study.

2.1 Procedure of the Experiment

There are experimental and control groups in the study. Computerized test was used to assess the experimental group whereas paper and pen test was used to assess the control group. EAT inform of paper and pen test was used as pretest to assess students in both experimental and control groups on the first day. The research assistants gave the pretest to the students and were carefully monitored by the researcher. Data obtained from this exercise served were used as pre-test scores. Lesson delivery exercise commenced immediately after the pretest.

Economics teachers taught the two groups in their respective schools using the format plans prepared by the researcher. To ensure uniformity of the instruction, the Economics teachers were trained as research assistants on how to effectively apply the format plans the researcher prepared for both. The researcher trained students in experimental and control groups on how to use monitor, mouse, and keyboard for CBT before the post-test. Because the students in experimental group and control group had well equipped computer laboratories in their schools, the CBT training session took place in the students' school premises using the school's computer facilities.

2.2 Training Session for Experimental Group and Control Group on CBT

The researcher first built rapport and familiarized himself with the students in experimental group and control group. He taught them extensively what Computer-Based Test (CBT) entails. In doing so, the researcher built confidence in the students to take CBT irrespective of their previous background knowledge on the use of computer. The students were trained by the researcher on simple use of keyboard and mouse to answer questions on a computer monitor. The reason for training the experimental group and control group on how to use computer for CBT was because, the students had never been involved in CBT exam.

The training focused on three key features of a computer for the CBT i.e the monitor, keyboard, and mouse. The students were taught what monitor, keyboard, and mouse entail, as well as how to use them for CBT. The researcher used CBT designed on SSI Economics as an example for students' deeper understanding of how to take CBT. At the end of the training, the researcher gave each student maximum of fifteen minutes to practice what has been taught on the computer. Also, the researcher ensured that the students were trained to mastery of using CBT for exam. The practice built confidence in the students for CBT. The training lasted for four days, two days for each school. The EAT in CBT mode was designed by the researcher in Microsoft word processor. The CBT

designed by the researcher did not require internet connection for its use. To ensure that there was no bias in the test modes, CBT was designed to be the same with PPT. The CBT had the same 40 items on the computer screen the way it is on the PPT format page by page. CBT participants were required type the correct response option to the questions at the end of each question. Just like examinees in PPT, examinees in CBT can review their answers using upward and downward arrow keys on the keyboard or scrolling up or down using mouse. The CBT participants could skip any item or answer questions in any order. Also, they could review and change their responses any number of times they needed.

30 sets of same quality and size of computer were used. All the computers were running Windows 8 as the operating system. The researcher copied the CBT program into the 30 sets of computer which were used for examination. The 30 sets of computer were attached to Uninterrupted Power Supply (UPS), and also, the researcher ensured that there was a stand-by generator to forestall power outage during CBT session. The time limit for both CBT and PPT was 40 minutes. The students in experimental group were asked to report at the school computer laboratory where they sat for the CBT examination. The experimental group used two sessions because of limited number computers for CBT; 30 students entered and completed the CBT examination in the first session and the remaining 26 students completed the CBT examination in the second session immediately after the first session finished.

The researcher invigilated the CBT examination where he guided students through all the instructions. The control group reported at one of the school's examination halls for the PPT examination. The PPT examination was invigilated by the students' regular Economics teacher. EAT in CBT mode served as a post-test for the treatment group; while EAT in PPT mode served as post-test for the control group. Feedback from this exercise served as post-test scores.

Mean was used to answer the research questions whereas ANCOVA was used test the null hypotheses at .05 level of significance. The data were analyzed using SPSS.

2.3 Analysis

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

Results of Table 2 indicates that students' mean achievement scores in PPT is higher than the students' mean achievement scores in CBT.

Research Question 2: What are the male and female students' mean achievement in CBT in Economics?

Data analyzed in Table 3 reveals that male students' mean achievement score is higher than the female students' mean achievement scores in Economics.

Research Question 3: What are the male and female students' mean achievement in paper and pen test in Economics?

Table 2. Students' mean achievement scores in CBT and PPT in economics

Subject	N	Pretest $\bar{x}$	Posttest $\bar{X}$	Difference in Mean
Experimental	56	21.71	20.68	-1.03
Control	51	21.33	22.06	0.73

Table 3. Male and female students' mean achievement scores in CBT in economics

CBT	N	Pretest $\bar{x}$	Posttest $\bar{X}$	Difference in Mean
Male	26	22.23	20.85	-1.38
Female	30	21.27	20.53	-0.74

Table 4. Male and female students' mean achievement scores in PPT in economics

PPT	N	Pretest $\bar{x}$	Posttest $\bar{x}$	Difference in Mean
Male	23	24.17	23.39	-0.78
Female	28	19.00	20.96	1.96

Table 4 indicates that male students' mean achievement score is higher than the female students' mean achievement scores in Economics.

Hypothesis 1: There is no significant difference between students' mean achievement scores in computerized testing and that of paper and pen testing in Economics?

Information Table 5 indicates that there is a significant difference in students' mean achievement scores in CBT and PPT.

Hypothesis 2: There is no significant difference between male and female students' mean achievement in computerized test in Economics?

Data analyzed on Table 6 revealed that the null hypothesis is accepted that there is no significant difference in the male and female students' mean achievement scores in CBT.

Hypothesis 3: There is no significant difference between male and female students' mean achievement in paper and pen test in Economics?

Result of analysis on Table 7 shows that there is a significant difference between male and female students' mean achievement scores in PPT in Economics.

3. DISCUSSION

The findings revealed that students' mean achievement scores in PPT was higher than the students' mean achievement scores in CBT. Therefore, there was significant difference between the students' mean achievement scores in CBT and PPT. Students' mean achievement scores in PPT being slightly higher than that of those in CBT was because students have been using PPT as 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 was slightly higher than their post-test scores. This may be as a result of several reasons; the students might have been taught and tested on what they already knew thus, a slight difference exists. Also, during the treatment 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 on the test mode which was the treatment and not on the lesson delivery exercise (teaching). Furthermore, the students' achievement score in CBT was slightly lower than that of their counterparts in PPT may be as a result of the fact that CBT was a new assessment approach. The students even after being trained in CBT might have found test on computer strange owing to the fact that CBT was still new to them.

Table 5. Difference in the students' mean achievement scores in CBT and PPT in economics

Source	Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	759.512[a]	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
Pretest	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			

Table 6. Difference in male and female students' mean achievement scores in CBT in economics

Source	Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	355.915[a]	2	177.957	15.156	.000
Intercept	150.720	1	150.720	12.837	.001
Pretest	354.552	1	354.552	30.196	.000
Gender	.779	1	.779	.066	.798
Error	622.299	53	11.741		
Total	24924.000	56			
Corrected Total	978.214	55			

Table 7. Difference in male and female students' mean achievement scores in PPT in economics

Source	Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	354.642[a]	2	177.321	14.277	.000
Intercept	271.720	1	271.720	21.877	.000
Pretest	.472	1	.472	.038	.846
Gender	280.262	1	280.262	22.565	.000
Error	596.181	48	12.420		
Total	25767.000	51			
Corrected Total	950.824	50			

The above finding of this study corroborates the work of Higgins, Russell, and Hoffmann (2005) that students assessed with PPT received a higher mean score, followed by their counterparts assessed with CBT. Added to that, Pommerich and Burden cited in Johnson and Green [54] reported that PPT make students to possess some degree of independence and control on paper that allowed them access to strategies that could facilitate their performance." Similarly, Dermo and Eyre [31] as well as George [32] found PPT improved students' performance than CBT. Furthermore, many studies such as Chuah, Drasgow and Roberts (2006) as well as Gosling, Vazire, Srivastava and John (2004) found that significant differences exists in CBT and PPT.

The study indicates that male students' mean achievement scores in CBT was higher than the female students in the same CBT. Nevertheless, the difference in the male and female students' mean achievement scores in CBT was not significant. Again, the male students' mean achievement scores in PPT was higher than female students in PPT. Thus, there is a signifcant difference in the mean achievement scores of male and female students in PPT. In addition, there is no significant difference in the male and female students' mean achievement scores in CBT as well as male and female mean achievement scores in PPT. The male students might be very good and at home with recent technologies such as smart phones and computers. Probably, because male students were not afraid of these technologies, they had an edge in CBT exam than that of their female counterparts who may not be at home with these technologies.

This is in consonance with the findings of Gallagher, Bridgeman and Calahan [36] as well as Leeson [37] that male testees did better in CBT than the female testees. Furthermore, a triangulation of studies [12,13] (Csapó et al., 2009; Halldórsson et al., 2009; Higgins et al., 2005; Lee, 2009; Sórenson & Andersen, 2009) found that male testees performed better than the female testees in CBT whereas the female testees performed better than the male testees in PPT. Numerous reasons for this finding have been explained by some researchers. Male testees have been said to be very good at playing video games and online games, and as a result, perform better in CBT when compared to female testees [12,13] (Crusoe, 2005; Halldórsson et al., 2009; Sórenson & Andersen, 2009). In the same fashion, Horkay et al (2005) used the National Assessment of Educational Progress' (NAEP) Writing Online (WOL) and found that there is no significant differences in either male testees' or female testees' performance in CBT and PPT. Again, Gavin and Matthew (2005) found that there is no significant difference between male testees and females testees in PPT.

4. CONCLUSION

Students' performance in Economics are not the same using CBT and PPT. Also, Students' performance when assessed with CBT and PPT in Economics is not dependent on gender or testing type.

5. RECOMMENDATIONS

The following recommendations were made;

1. Examination bodies, school authorities and other stake holders in education should use only PPT for assessment of students' performance in various internal and external examinations conducted in the country.
2. Curriculum planners should make and implement policies that will ensure that secondary schools use only PPT for internal assessment of students' performance in various subjects in the country.
3. The curriculum planners should make and implement policies that will mandate various examination bodies in the country to use only PPT for all external assessment of students' performance in various subjects.
4. Government and various secondary school authorities should ensure there is enabling environment for assessment of students' performance using PPT as this will reduce limitations posed by PPT.

IMPLICATION OF THE STUDY

The study provided empirical evidence of students' performance in CBT and PPT in Economics. A significant difference was found in students' performance in CBT and PPT. This implies that performance of students assessed with PPT is higher than their counterparts assessed with CBT. The implication of this is that PPT is better for all internal and external assessments of students' in Economics which may also apply in other subjects.

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COMPETING INTERESTS

Author has declared that no competing interests exist.

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