ASSESSMENT OF SCIENCE EDUCATION STUDENT'S PERCEPTION ON THE USE OF COMPUTER BASED-TEST EXAMINATION (CBT) IN PRINCE ABUBAKAR AUDU, UNIVERSITY (PAAU), ANYIGBA

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Abstract

The purpose of this study was to assess Science Education students' perception on the use of Computer-Based Test (CBT) mode of examinations in Prince Abubakar Audu, University, Anyigba, Nigeria. Two research questions and a null hypothesis guided the study. A case study research design was adopted in this study. The population of the study comprised of 3,000 students from 100 and 200 levels of Science Education Department. Proportionate stratified random sampling technique was used to select 1,500 students from the two levels in the institution. The instrument for data collection was a 20-item structured questionnaire titled Science Education student's perception on the use of CBT mode of examinations in Price Abubakar Audu University, Anyigba. The questionnaire was structured on a 4-point rating scale and was face validated by three experts. Cronbach's Alpha method was used to determine the reliability of the instrument at 0.80 which is high and reliable for the study. Research question one and two were analyzed using Mean and standard deviation. While the null hypothesis was tested using t–test statistics at 0.05 level of significance. The result of the study showed that, Science Education students' perception on the use of CBT mode of examination had higher mean ratings. Again, the result shows no significant gender difference on their perception on the CBT modes of examinations in the University. Based on the findings, it was recommended, among others, that Students should be trained on how to use computer based examinations during the process of studying general studies (GST) and entrepreneur development studies (EDS) courses in the university to boost their performance, since they will be assessed using CBT mode of examination.

Key Words: Assessment, Perceptions, Science Education, Students, CBT Examinations

Introduction

Assessment is an integral part of education that involves teaching and learning process because the teacher uses it when the course of lesson is on-going to test the level of students' understanding and to improve learning. This indicates that the teaching and learning process begin and end with assessment. According to sadler (2005), assessment refers to the process of forming a judgment about the quality and extent of student's achievement or performance, and therefore by inference a judgment about the learning that has taken place. Before embarking on such judgment, information

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will be made available to the learners either during or after the instruction before given a task to work on and the feedback obtained will tell the teacher if instructional objectives have been attained. Idialu (2013) observe that, assessment can be made valid, ethical, feasible and efficient tools for learning using multiple measures. Assessment can be successful depending on effective selection and use of appropriate methods as well as proper interpretation of students' performance. Assessment is the process of gathering and interpreting information/evidence to make value judgments about a place of learning (National Research Council NRC, 2001). It is crucial because there is link among learning outcome, content teaching and learning activities. Williams (2007), asserts that assessment can be used to direct instruction. The author further stated that the use of various assessment tools enables the teacher to differentiate the instructional strategies that are effective and those that need to be reviewed. In essence, assessment made classroom practices and curriculum better and effective. With the aid of assessment, school administrators, parents and also students gather reliable evidence which serve as a means by which students can observe and control their own progress and acquire ability to be goal oriented/self–directed.

According to Angell (2018), perception is 'the consciousness of particular material present to sense. Operationally, perception is the awareness of something using sense organs. That is, how we respond to the information around us. It refers to the process of getting, interpreting, selecting and organizing sensory information. In essence, the researchers want to find out the view of Prince Abubakar Audu University, Science Education students on the process of getting, interpreting, selecting and organizing the CBT mode of examination in the University.

Some years back, the only mode of assessing students in the Universities was by paper based test (PBT) and this mode of assessment had its own challenges such as scoring issues, administrative matters, protection of tests and exams, cost of tests and exams items, among others. Now the discovery of Information Communication Technology (ICT) which is widely used in various institutions like Prince Abubakar Audu University had reduced some of the challenges of using paper based test for assessing the students' in some courses such as general studies (GST) and entrepreneurial development studies (EDS). The mode of ICT which is widely used today for assessment is referred to Computer Based Test (CBT). According to Coniam (2009), it is a system with an installed learning management that can only be accessed through internet facilities. It is electronic method of administering, responding, documenting and processing test or examination. Ndume, Twaakyondo and Tilya (2008), state that adequate use of the technologies like computers enhances learning activities. This mode of assessment summarieses and improves learning because electronic device like computer are use to administer test and examination.

The benefit of CBT has brought positive changes to assessment processes such as, difficult forms of knowledge that could not be measured through the PBT can now be assessed, companies and organizations in Nigeria today make use of CBT to recruit job seekers, tertiary institutions also employ the use of computer and internet facilities for registration and examination of their students.

Saad (2007), observe that, the introduction of CBT helps evaluators to improve the quality of their tests and enables them set the same test condition for the testee irrespective of the population size. Other benefit includes low cost of administration, release of candidate results immediately, less time consumption on the part of students and teachers. Flexibility involved because it allows the candidate to select a date and location that is most convenient to them for their test. In light of the above mentioned Marzieh, Marzieh, and Afshin (2014) opined that this mode of assessment will soon become the basic mode that will be used to administer examination in future.

Furthermore, CBT also provides several advantages such as reducing paper consumption which indirectly reduces greenhouse gases and energy consumption (DeRosa, 2007); assisting students to evaluate their strengths and weaknesses and providing quantitative improvements in assessment for academics and tutors (Singleton, 1997).These improvements can be keeping record for item analysis and reliability of scoring (Gvozdenko & Chambers, 2007); increasing efficiency and providing instant feedback to students (Bull & McKenna, 2003).Moreover, the CBT offers enormous scope for innovations in testing and assessment (Chatzopoulou & Economides, 2010) and measures complex form of knowledge and reasoning which is not possible through PBT methods (Bodmann & Robinson, 2004).

However, CBT might has some disadvantages such as lacking underlining or making notations on computer screen, looking at the computer screen for a long time, and anxiety from changing the exam mode from PBT to CBT (Butler, 2003). Nonetheless, prior research argued that students still prefer CBT more than PBT as performance assessment because CBT is more promising, credible, objective, fair, interesting, fun, fast and less difficult or stressful (Croft, Danson., Dawson, & Ward, 2001).

Several studies have been carried out on the use of CBT examination on student academic achievement. Baghdarnia (2014) compared reading comprehension test with multiple-choice items administered on computer and on paper; at the end of the study, no significant difference was found. Retnawati (2015) compared the scores of the participants who took paper-based Test of English Proficiency with the ones who took computer-based version of the test and the results revealed that scores in both exam modes were quite similar. Logan (2015) aimed to search the students' performance differences on exam administration mode within the frame of mathematics course. In total, 807 6th grade Singaporean students took the mathematics test with 24 items and the paper folding test either on computer or on paper. The results displayed that there was no significant difference. Yağcı, Ekiz and Gelbal, (2011) at a state university carried out a similar study on this topic. This time participants were 75 vocational school students in the department of business administration. In order to reveal the probable academic success differences among participants, the exam was done in two ways (CBT versus PBT), and at the end, participants' scores were compared.

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It was found that students who had taken the computer- assisted exam outperformed those who did not. Hensley (2015) carried out a study with 142 students in the department of mathematics at the University of Iowa with an aim to compare the students' test scores taken from paper-based tests and computer-based tests. At the end, it was found that there was a significant difference between CBT and PBT in favor of CBT. A recent study done by Hakim (2017) with 200 female students whose English language command at B1 level in Saudi Arabia displayed that tests done in two different versions, CBT versus PBT, had statistically significant differences in favor of CBT. Barros (2018), carried out a study on students' perceptions of paper-based vs. computer-based testing in an introductory programming course. He found out that despite the preference students often demonstrate towards computer-based tests, anecdotal evidence and some published work indicates that paper-based tests are still widely used in introductory computer programming courses. Wang, Jiao, Young, Brooks, & Olson (2008), conducted a study on the effective use of CBT and PBT by gender and found no difference in the assessment scores of the two modes across a variety of education levels, disciplines, and geographies such as K–12 students. The acceptance and use of CBT are increasing each year. However, one unresolved problem associated with using CBT is performance bias due to examinees' differences (FairTest, 2007).

 Several studies presented mixed findings on the performance of examinees from both genders based on their previous usage of computers. Makrakis and Sawada (1996) argued that male students express more interest than female students in computing, have greater access to computers, enjoy working with computers, and have more confidence in their ability to work with computers. Koohang (2004), stated that males had more positive perceptions than females towards the use of a digital library. Chou (2003) stated that males were thought to be more positive towards computers than females concerning computer anxiety. Shashaani (1997), investigated the attitudes of 202 college students from both genders and concluded that students are aware of the importance of computer knowledge for obtaining jobs, saving time and work, processing data, and solving problems. Jalali, Zeinali, and Nobakht (2014) emphasized that female students outperformed male students in both modes. Furthermore, Wallace and Clariana (2005) found that male students outperformed their female peers on the initial assessment regardless of the test mode, whereas female students using CBT outperformed male students on the final assessment. On the contrary, Alexander, Bartlett, Truell, and Ouwenga (2001) noted no gender differences in performance on both test modes. The outcome of the above studies encourages the researchers to assess Science Education students' perception on the use of CBT examination in Prince Abubakar Audu University, Anyigba.

Assessment in education has been an issue from ages, recently, the innovation in education has brought about CBT modes of test, and this research has come to find out the perception of Science Education students on the use of CBT modes of examination. During the conventional mode of examination many institutions face so many challenges of how to conduct free, fair, valid and reliable examinations.

However, solutions on some of the environmental and internal problems that may cause a hitch to the effective conduct of CBT modes of examination must be found. Internal factors such as students' phobia for computer because of sight problems, levels of computer literacy because of technical issues such as malfunctioning of the mouse, problem of font size, screen clarity, display rate, hanging and scrolling of the document. Mentioned above are problems that may throw any student's that lack knowledge on the use of computer off balance during examinations as broken pencils are easier to fix than resolving computer problems during examination. Furthermore, the problem of power supply during the assessment is a threat to CBT examination, lack of enough computers to test all the students at once in the institution, inadequate ICT staffs, challenges of constructing valid and reliable questions that will cover all levels of instructional objectives on CBT as compared to conventional mode of exam is a problem confronting test developers since same feedback are required for both mode of examinations. Students should not be at a demerit based on the mode of examination given to them in the terms of their performance, so test developers must ensure that all avenues that could cause poor performance should be rectified.

The following research questions guided the study;

1. What is the perception of Science Education students on the use of CBT mode of examination in Prince Abubakar Audu University, Anyigba?
2. What is the perception of student's gender on the use of CBT mode of examination in Prince Abubakar Audu University, Anyigba?

Research Hypotheses

One hypothesis was formulated to guide the study and tested at 0.05 level of significance.

1. There is no significant difference in the mean ratings of male and female perception on the use of CBT mode of examinations Prince Abubakar Audu University, Anyigba

Methodology

The design used for the study is a case study design. The population for this study consists of 3,000 students of 100 and 200 levels (1,500 and 1,500) who are offering general studies (GST) in the university. Proportionate stratified random sampling technique was used to select 1,500 students from the two levels (750 and 750) in the institution. These two levels were selected because they are present sets of students using CBT mode of examination for general studies. A 20-item structured questionnaire was developed by the researchers for the study. The instrument was title 'Science Education students' perception on the use of CBT mode of examination in Prince Abubakar Audu University, Anyigba'.
. The instrument was rated in a four point linkert scale, such as Strongly Agree (SA), Agree (A),

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Disagree (D), and Strongly Disagree (SD). The instrument was face validated by three experts and the reliability was tested using Cronbach's Alpha with a result of 0.80 which is high and reliable for the study. The instrument was administered to the respondents by the researchers. Mean and standard deviation was used to answer research questions while t-test was used to test research hypothesis.

Results

Research Question 1

What is the perception of Science Education student's on the use of CBT mode of examination in Prince Abubakar Audu University, Anyigba?

Table 1: Mean responses of Science Education Students' on the use of CBT mode of examination in Prince Abubakar Audu University, Anyigba

Science Edu. Students	N	Mean	SD
100Level	750	3.00	0.25
200Level	750	3.44	0.28

The mean ratings set as a criterion for accepting are within the range of $2.50 - 3.49$

Result in Table 1 shows the mean and standard deviation of students' perception on the use of CBT mode of examination in Prince Abubakar Audu University, Anyigba. The Table shows that 100Level Science Education Students' had mean ratings of 3.00 and standard deviation of 0.25 while 200Level Science Education Students' had mean ratings of 3.44 with standard deviation of 0.28. The mean ratings are within the range of $2.50 - 3.49$ set as criterion for accepting an item. The result implies that, Science Edu. Students' perception on CBT mode of examination had higher mean ratings. This means that, students in the University prefer CBT mode of examination compare to any other mode of examinations.

Research Question 2

What is the perception of student's gender on the use of CBT mode of examination in Prince Abubakar Audu University, Anyigba?

Table 2: Mean responses of male and female Science Edu. Students' on CBT mode of examinations in Prince Abubakar Audu University, Anyigba

Gender	N	Mean	SD
Male	650	3.20	0.28
Female	850	3.01	0.26

The mean ratings set as a criterion for accepting are within the range of $2.50 - 3.49$

Result in Table 2 shows the mean and standard deviation of male and female perception on the use of CBT mode of examination in Prince Abubakar Audu University, Anyigba. The Table shows that male had mean ratings of 3.04 and standard deviation of 0.28 while female had mean ratings of 3.01 with standard deviation of 0.26. The mean ratings are within the range of $2.50 - 3.49$ set as criterion

for accepting an item or cluster mean. The result implies that male students had higher mean ratings than female students on their perception in the use of CBT mode of examination in Prince Abubakar Audu University, Anyigba.

Ho$_1$: There is no significant difference in the mean ratings of male and female students' perception on the use of CBT mode of examination in Prince Abubakar Audu University, Anyigba

Table 3: t-test analysis of the significant difference between the mean ratings of male and female students' perceptions on the use of CBT mode of examination in Prince Abubakar Audu University, Anyigba

Gender	N	Mean	SD	Df	t-value	p-value
Male	650	3.20	0.28			
Female	850	3.01	0.26	1498	6.27	0.30

Result in Table 3 shows the t-test result of the difference in the mean ratings of male and female students' perceptions on the use of CBT mode of examination in Prince Abubakar Audu University, Anyigba. Result shows that t-test of 6.27 was obtained with a probability value of 0.30. This probability value was compared with 0.05 set as level of significance and it was found not to be significant. Thus, the null hypothesis was accepted. Inference drawn therefore is that 'there is no significant difference in the mean ratings of male and female students' perceptions on the use of CBT mode of examination in Prince Abubakar Audu University, Anyigba.

Discussion of the Findings

Table 1 revealed the mean and standard deviation of 100 and 200 Levels Science Education Students' perceptions on the use of CBT mode of examination in Prince Abubakar Audu University, Anyigba. The result implies that, students' perception on CBT mode of examination had higher mean ratings. This means that, Science Education students in the University prefer CBT mode of examination to other mode of examinations. This finding is in line with the finding of Yağcı, Ekiz and Gelbal, (2011). They found that students who had taken the computer assisted exam outperformed those who did not.

The result of Table 2 revealed that male students had higher mean ratings compared to their female counterparts on the perceptions of CBT of examination in Prince Abubakar Audu University. The finding of this study is in line with Makrakis and Sawada (1996). They found that male students expressed more interest than female students in computing, had greater access to computers, and have more confidence in their ability to work with computers. The result is also in line with Koohang (2004) who found that males had more positive perceptions than females towards the use of digital library.

Table 3 revealed the t-test analysis of the difference between the mean ratings of male and female student perceptions on the use of CBT mode of examination in Prince Abubakar Audu University, Anyigba. The result shows that, there is no significant difference in the mean ratings of male and

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female student perceptions on the use of CBT mode of examination. The result agree with Shashaani (1997), who concluded that students are aware of the importance of computer knowledge for obtaining jobs, saving time and work, processing data and solving problems. Also the result is in line with Wang, Jiao, Young, Brooks and Olson (2008), they conducted a study on the effectiveness of CBT and PBT mode of examinations by gender and found no difference in the assessment scores of the two modes of examinations by gender.

Conclusion and Recommendations

Based on the benefits of computer based examinations which includes, robust security measures proven to be an efficient process of measuring students' academic achievement that gives no room for disruption to operation to candidates, it can be asserted that this mode of assessment will generally become the main mode of assessment that will be practiced in the nearest future. It is therefore important to the University to pay more attention to developing computerized-assessment that can validly and reliably replace any other types of examinations in the institution.

From the findings of this study the following recommendations should be adhere to;

The University Management should find a lasting solution to some of the environmental and internal problems that may cause a hitch to the effective conduct of CBT examinations.

Students should be trained on how to use computer based examination during the process of studying GST courses in the university. Since they will be evaluate using CBT mode of examination.

University should employ adequate ICT staff who will help in the training of both University staffs and students

References

Alexander, M., Bartlett, J., Truell, A. & Ouwenga, K. (2001). Testing in a computer technology course: An investigation of equivalency in performance between online and paper and pencil methods. *Journal of Career and Technical Education*, *18*(1), 69-80.

Angell, J. (2018*). The mead project. retrieved on Monday 28 october 2019.* *https://brocku.ca/meadProject/Angell/Angell-1906/Angell-1906f.htmlat*

Baghdarnia, J. (2014). Gender and race differences in computing attitudes and experience. *Social Science Computer Review*, *8*(1), 42-64.

Barros, J. (2018). Students' perceptions of paper-based vs. computer-based testing in an introductory programming course. In Proceedings of the *10th International Conference on Computer Supported Education (CSEDU 2018) - Volume 2*, pages 303-308

Bodmann, S. M. & Robinson, D. H. (2004). Speed and performance differences among computer-based and paper-based tests. *Journal of Educational Computing Research, 31* (1), 51-60.

Bull, J. & McKenna, C. (2003). *A blueprint for computer-assisted assessment*. New York: Routledge.

Butler, D. (2003). *The technology source archives at the University of North Carolina, January /February.* Retrieved on October 20, 2019 from http://technologysource.org/article/impact of computer-based testing on students attitude and behavior/.

Chatzopoulou, D. & Economides, A. (2010). Adaptive assessment of students' knowledge in programming courses. *Journal of Computer Assisted Learning*, *26*(4), 258-269.

Chou, C. (2003). Incidences and correlates of internet anxiety among high school teachers in Taiwan. *Computers in Human Behavior*, *19*, 731-749.

Coniam, D., (2009). Subjects' reaction to computer-based tests. *Journal of Educational Technology Systems, 27(*3); 15-24

Croft, A., Danson, M., Dawson, B. & Ward, J. (2001). Experiences of using computer-assisted assessment in engineering mathematics. *Computers and Education*, *27*, 53-66.

DeRosa, J. (2007). *The green PDF: Reducing greenhouse gas emissions one ream at a time.* Retrieved on September 24, 2019 from http://www.scribd.com/doc/60779195/The-Green-PDF-Revolution.

FairTest, (2007). *The national center for fair and open testing, computerized testing: More questions than answers*. Retrieved on October 22, 2019 from http://www.fairtest.org/ computerized-testing-more-questions answers

Gvozdenko, E. & Chambers, D. (2007). Beyond test accuracy: Benefits of measuring response time in computerized testing. *Australasian Journal of Educational Technology*, *23*(4);47-53

Hakim, B. M. (2017). Comparative study of validity of paper-based test and computer-based test in the context of educational and psychological assessment among Arab students. *International Journal of English Linguistics, 8*(2), 85-91. Retrieved Monday 28 October 2019, http://doi.org/10.5539/ijel.v8n2p85

Hensley, K.K. (2015). *Examining the effects of paper-based and computer-based modes of assessment of mathematics curriculum-based measurement*. Unpublished PhD thesis, University of Iowa, Iowa.

Idialu, P. O. (2013). *English language proficiency and study habit as correlates of learning outcomes in literature in English in South Western Nigeria*. A Post-Field Doctoral Seminar Paper. Department of Teacher Education, University of Ibadan, Nigeria.

Jalali, S., Zeinali, M. & Nobakht, A. (2014). Effect of goal orientation on EFL learners' performances in CBT and PBT across gender. *Procedia-Social and Behavioral Sciences*, *98*, 727-734.

Koohang, A. (2004). Students' perceptions toward the use of the digital library in weekly web-based distance learning assignments portion of a hybrid program. *British Journal of Educational*

Technology, *35*(5), 617-626.

Logan, T. (2015). The influence of test mode and visuospatial ability on mathematics assessment performance. *Mathematics Education Research Journal, 27,* 423-441. doi: 10.1007/s13394-015-0143-1

Makrakis, V. & Sawada, T. (1996). Gender, computers and other school subjects among Japanese and Swedish students. *Computers in Education*, *26*(4), 225-231.

Marzieh, G., Marzieh, M., & Afshin, S. (2014) Comparing between computer- based test and paper-and –pencil based tests; *International Journal of Education & Literacy Studies 2*(1) 36-38

National Research Council (NRC, 2001). *Educational assessment theory and practice.* Retrieved Monday 28 october 2019*,* http:/www.nrc-cnrc.gc.ca/eng/about/

Ndume, V., Twaakyondo, H., & Tilya, F. N (2008). Challenges of adaptive e-learning at higher learning institutions: A case study in Tanzania. *International Journal of Computing and ICT Research, 2*(1): 47-59

Retnawati, H. (2015). The comparision of accuracy scores on the paper and pencil testing versus computer-based testig. *TOJET, 14*(4), 135-142.

Saad Al-Amri (2007) Computer-based vs Paper-based Testing: Does the test administration mode matter? *Proceedings of the BAAL Conference University of Essex*, UK101-110

Sadler, D. R . (2005). Ah!... so that's quality'. In P. Schwartz and G. Webb, Eds. Assessment: case studies, experience and practice from higher education. London Kogan Page; 130-136.

Shashaani, L. (1997). Gender differences in computer attitudes and use among college students. *Journal of Educational Computing Research*, *16*(1), 37-51.

Singleton, C. (1997). Computer-based assessment of reading. In Beech, J.R. & Singleton, C.H. (Eds.), *Psychological assessment of reading*. London: Routledge.

Wallace, P. & Clariana, R. (2005). Gender differences in computer-administered versus paper-based tests. *International Journal of Instructional Media*, *32*(2), 171.

Wang, S., Jiao, H., Young, M., Brooks, T. & Olson, J. (2008). Comparability of computer-based and paper-andpencil testing in K–12 reading assessments: A meta-analysis of testing mode effects. *Educational and Psychological Measurement*, *68*(1), 5-24.

Williams B. (2007). Students' perception of pre-hospital web-based examinations. *International Journal of Education and Development using Information and Communication Technology, 3*(1):54-63

Yagcı M., Ekiz. H., ve Gelbal, S. (2011). *Çevrimiçi sınav ortamlarının öğrencilerin akademik başarılarına etkisi.*5th international computer and instructional technologies symposium, Elazığ, Turkey, 22-24 September 2011.