ASSESSMENT OF SCIENCE EDUCATION UNDERGRADUATE STUDENTS' PERCEPTION ON THE EFFECTIVENESS OF COMPUTER- BASED TEST (CBT) AND PAPER- BASED TEST (PBT) EXAMINATIONS IN FEDERAL UNIVERSITY LOKOJA; KOGI STATE, NIGERIA

BIBIANAMwuese Penda Ph.D
Department of Science Education
Federal University Lokoja, kogi State
bibipenda@gmail. com

Abstract

The study assessed science education undergraduate students' perception on the effectiveness of Computer- Based Test (CBT) and Paper-Based Test (PBT) Examinations in Federal University Lokoja, Kogi State.Research design employed was an Ex-post facto design. Two research questions and two null hypotheses guided the study. Population of the study comprised of 1,500 science education undergraduates of 200 and 300levels from Faculty of Education. Stratified random sampling technique was used to select 1000 respondents. The instrument for data collection was questionnaire titled: Science Education Undergraduate Students' Assessment on the Effectiveness of Computer-Based Test (CBT) and Paper-Based Test (PBT) mode of Examination in Federal University Lokoja Questionnaire (SEUSPCTPBEFULQ).Croncbach's Alpha was used to determine the reliability of the instrument at 0.82 which was high and reliable for such a study. The research questions were analyzed using mean and standard deviation, while the hypotheses were tested using t-test statistics tested at 0.05 level of significance. The result of the study showed that students' assessment on CBT mode of examination had higher mean ratings than PBT mode of examination. Again, the result showed no significant gender difference of their assessment on the two modes of examination in FUL, Kogi State. Based on the study findings, it was recommended, among others that, undergraduate students across higher institutions should be trained on how to use computer based examinations during the process of studying their courses to help boost their performances since most students are currently assessed using CBT mode of examination in FUL.

Key words: Effectiveness, Science-Education, Undergraduate-students, CBT and PBT Examination.

Introduction

Assessment is an integral part of education that involves teaching and learning process. Assessment has so many stages: formative, summative and evaluative. Thus shows that the teaching and learning process begin and end with assessment (Hensley, 2021). Generally, assessment is referred to as the process of checking whether the students really understood what the teacher taught through judgment. Judgment simply means the quality and extent of students' achievement and performance in the course of their studies. Before engaging on such judgment, information will be made available to the students before during and after the instruction to obtain feedbacks. (Ohams,2020) observed that, an assessment can be made valid, ethical, feasible and an efficient tool for effective learning using multiple measures. Assessment maybe successful depending on efficiency and effectiveness used in selecting learning materials or instructions and the use of appropriate strategies as well as proper interpretation of students' performance and attitudes towards learning. Assessment also may entail gathering and interpreting information and evidence to make value judgment about a place of learning (Diwa, 2020). It is vital because, there is link among learning outcome, content teaching and learning activities.

Hensley (2020) asserts that assessment can be used to direct instructions. The researcher further states that the use of various assessment tools enables the teacher to differentiate the instructional strategies that are effective and those that need amendment. In total, assessment makes classroom practices and curriculum interesting, better, enjoyable and very effective. With the use of proper assessment, school administrators, parents and also undergraduate students can observe and control their own progress and acquire ability to be goal and result oriented, self-efficiency and self-directed in their studies of perception.

According to (Ibe, 2021), perception is the consciousness of particular materials present to sense of human generally. In simple terms, perception is the awareness of something using sense organs such as eye, ear, tongue, skin, how we respond to the information or happening around us that is stimulus. It also requires the process of getting interpreting, selecting and organizing sensory responses through information among students using either CBT or PBT.

Initially, PBT was one of the assessment tool used in school during and after teaching and learning, but it has some challenges such as scoring, administrative matter, protection of test and examination.Until recently, the use of CBT which is being used across schools including Federal University Lokoja and other Universities in Kogi-State and Nigeria at large. Now, the discovery of Information Communication Technology (ICT) which is widely used in FUL and various institutions in Kogi State has reduced some of the challenges of using paper based test for assessing students in some science education examinations and other general courses across board. The mode of ICT which is widely used today for assessment is referred to as Computer Based Test (CBT).

According to Gopal (2022), CBT is a system with an installed learning management that can only be accessed through internet facilities. It is an electronic method of administering, responding, documenting and processing test or examination. Retnawati, (2021) stated that adequate use of technologies such as computers enhances learning and teaching activities as well. This mode of assessment summarizes and improves learning because electronic devices like computers are used to administer test and examination which has numerous benefits.

The benefits 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, another benefit is that companies and organizations in Nigeria today, make use of CBT to recruit job seekers, higher institutions also apart from examinations, use CBT to employ the use of computer and internet facilities for registration of their students. Orji, (2021), observed that, the introduction of CBT helps evaluators to improve the quality of their tests and enables them set the same test conditions for the testees irrespective of the population size. Other benefits include low cost of administration, release of candidate results immediately, less time consumption on the part of students, lecturers and flexibility involved because it allows the candidate to select a data and location that is most convenient to them for their test. CBT also provide several advantages such as reducing paper consumption which indirectly reduces greenhouse cases and energy consumption (Moe,2020). Again, CBT assists students to evaluate their strength and weakness which may provide quantitative improvement in assessment for academics (Wusere, 2020). These improvements may bring keeping records for item analysis and reliability of scoring, increasing efficiency and providing immediate feedbacks to students (Minal, 2023).

Moreso, the CBT offers enormous score for innovation in testing and assessment (Chatzopoulou & Economides, 2021) measures complex forms of knowledge and reasoning which is not possible through PBT methods (Adeyemo, 2021). However, CBT might have some disadvantages such as lacking underlining or making notations on computer screen, been prone to cardiovascular cases in most time because of poor blood circulation, looking at the computer screen for long, sitting time and anxiety from changing the exam mode from PBT to CBT (Angell, 2020). However, prior research argued that students still prefer CBT to PBT as performance assessment because CBT is more promising, credible, objective, effective, fast, fun and less stressful (Sing ha priola, 2021).

In a similar study, Henseley (2021) carried out a study with 142 students in the department of mathematics in the University of Iowa with an aim to compare the students' testy 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 favour of CBT. In terms of gender, Jalai, Zeinali and Nobakht (20222) found that female students outperformed male students in both modes. Furthermore, (Orji, 2021) found that, male students outperformed their female peers on the initial assessment regardless of the test mode. The outcome of the above studies prompted the researcher to assess science education undergraduate perception on the effectiveness of CBT and PBT examination in Federal University Lokoja, Kogi State.

However, solutions to some of the environment and internal problems that may cause a hitch to the effective conduct of CBT examination are internal factors such as students' "phobia" for levels of computer literacy because of technical issues such as malfunctioning of the mouse, problem of font size, screen clarity, display rate, hanging, how to submit or login password and scrolling of document, deleting of some document unnoticed and even how to start a computer that may throw any students that lack knowledge on the use of computer off balance during such examinations. Other problems with CBT includes power supply during the assessment is a serious threat to CBT examination, lack of enough computers to test all the students art once in the institution, inadequate ICT staff, challenges of constructing valid and reliable questions that will be covered at all level of instructional objectives on CBT as compared to PBT is a problem confronting text developer since the feedback are required for both mode of examinations.

Research Questions

In order to assess the CBT and PBT, the following research questions guided the study.

1. What is the perception of science education undergraduate students on the effectiveness of CBT and PBT mode of examination in Federal University Lokoja?
2. What is the perception of science educationundergraduate students on gender effectiveness of CBT and PBT mode of examination in Federal University Lokoja?

Research Hypotheses

The following hypotheses were formulated and tested at 0.05 level of significance.

1. There is no significant difference between science education undergraduate students on the effectiveness of CBT and PBT mode of examination in Federal University Lokoja.
2. There is no significant difference in the science education undergraduate students on the effectiveness of CBT and PBT mode of examination in Federal University Lokoja.

Methodology

The design used for the study was Ex-post-facto. The population for this study consists of 1,500 students of 200 and 300 levels who had already offered science education courses in the University using CBT. A stratified sampling technique was used to select1000 undergraduate students from the two levels in Federal University Lokoja, faculty of Education. These two levels were selected because it is assumed they had more knowledge on CBT and PBT mode of examination having passed from 100 levels before. A 20- item structured questionnaire was developed by the researcher for the study. The instrument was titled: Undergraduate Science Education Students' Perception of the Effectiveness of CBT and PBT Modes of Examination Questionnaire (AESPECPEQ) was rated in a four pointlikert scale of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). The instrument was face and content validatedby three experts, two from department of Science Education and the others from Measurement andevaluation , the reliability was tested using Cronbach's Alpha, yielded 0.81 which is high and reliable. The

instrument was administered to the respondent by the researcher, mean and standard deviation was used to answer research questions while t-test was used to test the hypotheses.

Results

Research Question 1: What is the perception of science education undergraduate students on the effectiveness of CBT and PBT mode of examination in Federal University Lokoja?

Table 1: Mean responses of CBT and PBT modes of examinations.

Respondents	N	Mean	SD
CBT	520	3.08	0.27
PBT	480	2.44	0.28

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

Results in Table 1 shows the cluster mean and standard deviation of undergraduate science education students on the effectiveness of CBT and PBT mode of examination in Federal University Lokoja (FUL). The table shows that CBT had mean rating of 3.08 and standard deviation of 0.27 while PBT had mean ratings of 2.44 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 or cluster mean. The result implies that science education undergraduate perception of CBT mode of examination had higher mean rating than PBT mode of examination. This means that students in the FUL prefer CBT mode of examination to PBT mode of examination.

Research Question 2: What is the perception of science education undergraduate students on gender with the effectiveness on CBT mode of examination and PBT mode of examination in Federal University Lokoja?

Table 2: Mean responses of male and female science education undergraduate students on CBT and PBT mode of examination

Respondents	N	Mean	SD
Male	510	3.03	0.27
Female	490	2.99	0.29

The cluster mean ratings set as a criterion for accepting are within the range of 2.50-3.49.Results in Table 2: shows the cluster mean and standard deviation of male and female science education undergraduate students' perception on the effectiveness of CBT and PBT mode of examination in Federal University Lokoja (FUL). The table shows that male had mean rating of 3.03 and standard deviation of 0.27 while female had mean rating of 2.99 with standard deviation of 0.29. The mean ratings are within the range of 2.50- 3.49 set as criterion for accepting an item.

Table 3: t-test analyses of the difference in the mean rating of students' perceptions of CBT and PBT modes of examination

Respondents	N	Mean	SD	df	t-val	p-val
CBT	520	3.07	0.27	998	1.01	0.004
PBT	480	2.97	0.27			

Result in Table 3 shows the t-test result of the significant difference in the mean ratings of CBT and PBT mode of examination in FUL. Result shows that t-test of 1.01 was obtained with a probability value of 0.004. This probability value was compared with 0.05 set as level of significance and it was found to be significant. Thus, the null hypotheses was rejected, inference drawn therefore, is that there is significant difference on students' perception of the effectiveness of CBT and PBT mode of examination in FUL.

Hypothesis 2: There is no significant difference in the mean ratings of male and female students' assessment on the effectiveness of CBT and PBT mode of examination in FUL.

Table 4: t-test analysis of the significant difference in the mean ratings of male and female science education students' perception on CBT and PBT modes of examinations

Gender	N	Mean	SD	Df	t-value	P-value
Male	510	3.03	0.27	998	2.87	0.30
Female	490	2.08	0.28			

Result in Table 4 shows the t-test result of the significant difference in the mean ratings of male and female science education undergraduate studentsassessmentson CBT and PBT mode of examination in FUL. Result shows that t-test of 2.88 was obtained with a probability test of significance and it was found not to be significant. Thus, the null hypothesis was accepted. Inference drawn therefore is that, there is significant difference in the mean ratings of male and female science education undergraduate students' assessment on the effectiveness of CBT and PBT mode of examination in FUL.

Discussion of Findings

Table 1 revealed the mean and standard deviation of CBT and PBT mode of examination in FUL. The result implies that, science education undergraduate students' perception on CBT mode of examination had mean ratings than PBT mode. This indicates that science education undergraduate students in FUL prefer CBT mode of examination compared to PBT mode of examination.

The result in Table 2 showed that male science education undergraduate students had higher mean ratings compared to their female counterparts on the assessment on the effectiveness of CBT and PBT mode of examination in FUL. The finding of this study is in agreement with (Hakim, 2022). It was also 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.

Table 3: Indicates the t-test analysis of the significant difference between science education undergraduate students' assessment on the effectiveness of CBT and PBT mode of examination in FUL. This finding is in line with (Chatzopoulou& Economides, 2021), who found that there is a significant difference between CBT and PBT mode of examination.

Table 4: Revealed the t-test analysis of the significant difference between the mean rating of male and female science education undergraduate students' assessment on the effectiveness of CBT and PBT mode of examination in FUL. The results shows that, there is significant difference in the mean ratings of male and female science education undergraduate students' assessment on the effectiveness of CBT and PBT mode of examinations. The results agreed with (Logan, 2022) who concluded that students are aware of the importance of computer knowledge for obtaining jobs, saving time at work, processing data and solving problems. Also, the results is in

line with (Retnawati, 2021), who conducted a study on of the effectiveness of CBT and PBT and found no difference in the assessment scores of the two model of examination.

Conclusion

Computer- based Examinations over paper based examinations which includes enabling running of examinations off-shore, and more robust security-reassures has shown to be an effective and efficient process of measuring science education undergraduate students academic performance that may give no room for disruption to operation to students. It may bring to our senses that, this mode of assessment will generally become the main mode of assessment that may be practiced in almost every higher institution of learning. It is therefore, pertinent to draw closer and pay more attention to improving on computer Based Test (CBT) form of assessment that can clearly output Paper Based Test (PBT).

Recommendations

a. Science Education Undergraduate students should be trained on how to use Computer Based Test (CBT) Examination during the process of studying in FUL, since their evaluation is based on CBT mode of examination.
b. University should employ adequate ICT staff (man power) who will help in the training of both University staffs and students generally.

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