COMPARATIVE ANALYSIS OF COMPUTER-BASED TESTS AMONG COMPUTER STUDENTS IN SECONDARY SCHOOLS IN JALINGO METROPOLIS

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ABSTRACT

This study compared the academic achievement of students assessed using computer-based tests. The study adopted expo-facto design. The population of the study comprised 197 SSS II students. All the population were used in the study. Two developed and validated instruments, Multiple Choice Test (MCT) and Computer Practical Test (CPT) were used for data collection. The reliability co-efficients of 0.91 and 0.95 were established for the two instruments respectively by using split- half method. Descriptive statistics and inferential statistics were used in this study. The results of the study revealed that the mean score of students in technology-based multiple-choice test is higher (Mean = 3.56, SD = 1.69) than their score in computer practical test (Mean = 1.76, SD = 1.3) which revealed that there is a significant difference in their achievement in multiple-choice test and computer practical test. Findings also revealed that the multiple-choice test is not adequate in assessing students' practical skills in computer science. The study concludes that other forms of question types should be integrated into computer-based tests so as to assess other domains of learning. It was therefore recommended that admission bodies, higher institutions and professional bodies should insist on practical examinations before admission, graduation or enlistment into a profession. School managers and supervisors should also insist on practical lessons and examinations in their computer-based examinations in the secondary schools.
Keywords: Technology based Objective test, Practical test, Secondary schools in Jalingo

Introduction

The main goal of education is to bring a desirable change in leaners' behaviour, skills and competences. The assessment of learner's achievement in terms of its quantity and quality has been a regular practise in every school in Nigeria, and Taraba state in particular. The expected change in learners is expected to be in line with the stated behavioural objectives as reflected in knowledge, skill and attitudinal status, which has been pre-determined before the instructional process (Anikweze, 2012). Assessment in Computer Science in secondary schools is a multi-dimensional task because it involves the measuring of student's ability in theories and practical aspect of computer. To assess these various components, different test types need to be employed so that the student's achievement level can be determined. Examination or test generally is fundamental to the practice of education as it determines whether or not the learner has actually learned. The feedback from the student's test should be able to provide not only information about the educational progress of learners in a systematic way, but also an indication of how

effective or otherwise the teaching-learning process has been. Therefore, the ability of learners to apply knowledge acquired is usually measured through test or examination. Consequently, the ability to apply the knowledge appropriately is directly proportional to the national growth and development of any nation or society.

Educational assessment in Nigeria has undergone some interesting metamorphosis over time. At the outset of formal education in Nigeria, summative assessment was adopted and pupils were assessed through a single examination administered at the end of the programme. Teachers gave tests and examinations, but the scores obtained from these exercises were only used for the purpose of promotion from one class to the other and they were not part of criteria for the final certification. In addition, with the increase in the number of students seeking admission into Nigerian Universities, as at the year 2000, it was over 50,000, but in the year 2003, it increased to 70,000. In 2019, it increased to 1,800,000 and 1,900,000 in 2020. Assessing such number of candidates can be cumbersome. This therefore, calls for technology-based assessment which Joint Admission and Matriculation Board (JAMB) in Nigeria envisaged years back and keyed into Computer-Based Test (CBT) to make organisation, administration and processing of such examination easier and less cumbersome (Oyeleke & Akinyele, 2013).

The use of technology in assessment has been a recent development in secondary schools in Taraba State. Paul, Mark and Pawar (2014) see technology as the systematic application of knowledge, tools, product and systems by people to make life easier and better. In recent time, it is obvious that technology has taken over all facets of human endeavour, which education and educational assessment is inclusive. Our classrooms are increasing with students on annual basis as a result of population growth despite inadequate educational facilities to cater for the increase in the population rate (Bassey, Akpama, Ayang & Iferi-Obeten, 2013). It is equally important to note that effectiveness of every educational programme is measured through assessment. However, the number of students in our classes or on our examination registers makes it so cumbersome to handle the organization, administration and processing of such examination manually.

The selection of question type in the use of technology for assessment has been a major issue in education. According to Polat (2020), the use of question type depends on their world-wide preference, popularity and extensive use. Multiple Choice Tests (MCT) are frequently preferred in technology-based examinations, especially the Joint Admission and Matriculation Board (JAMB) in Nigeria, which has its own strengths and weaknesses. Lee, Liu and Linn (2011) define MCT as test where the 'testee' selects an answer from the options provided by the 'tester'. Multiple choice test has been rated as the most frequent test type used in technology-based assessment in secondary schools in Jalingo metropolis. This type of test is judged to be easier for students to answer, easy to mark, answer to the questions can be memorized and suitable for large class or large population. Practical test is a type of test where work situation is replicated to test student's ability and skill in performing critical duties. This type of test helps a learner to quickly adapt to learning situation. It aids students' understanding level by developing students' skill and application of knowledge (Paul, Mark & Pawar, 2014).

Gender is one variable in this study which is closely related to an achievement test, for instance the question of whether essay questions (practical test) favour boys or vice-versa. Cohen, Manion and Marrison (2007) are of the opinion that essay questions favour boys if the items are concerned with impersonal topics; and girls if the items concerned personal and interpersonal topics. Boys perform better than girls on multiple-choice items on the one hand, and on the other hand, girls perform better than boys on essay types, especially in the personal and interpersonal topics.

The use of multiple-choice test has been criticized in some quarters, stating their inability to effectively assess learner's application of knowledge in classroom situation. Achor, Agogo and Orokpo (2011) and Patrick (2015) in their studies reveal that unguided multiple-choice test is not effective in the application of knowledge. It was revealed that multiple-choice tests are not adequate to measure the practical skills and knowledge acquisition of learners,\ especially in subjects that require the display of skill acquisition. However, the technology-based assessment carried out in our secondary schools in Jalingo Metropolis has focused mainly on multiple-choice tests, neglecting other test types. In addition, JAMB's Computer-Based Test is restricted to objective test which can also limit the assessment of student's practical skill in examination that involves the selection of students into higher institutions. The question then is 'would the objective test alone adequately address the three domains of educational or learning objectives?' This study was therefore carried out to compare the achievement of students in computer-based tests via multiple-choice test and practical test in Computer Science and to see the one that is more effective in the application of knowledge in secondary schools in Jalingo Metropolis.

Statement of the Problem

The advancement in science and technology and the introduction of technology-based assessment has encouraged many public and private schools in Jalingo Metropolis to adopt the use of Computer-Based Test (CBT) in their school examinations. Assessment should be comprehensive, in the sense that the three main domains of learning should be covered. It has been observed that these examinations conducted in these schools are mainly multiple-choice test neglecting other questions types. However, it is unfortunate that neglecting other question types in computer-based tests could deny the class-room teachers and school administrators the holistic information that could help in refining the students. Then, it is obvious that there are deficiencies in the current widely used technology-based multiple-choice test. Hence, there is the need for appropriate and inclusive technology-based assessment mode that can address the three domains of educational objectives. Therefore, this study examined if there are differences in the achievement of students in multiple-choice test and practical test and how effective the multiple-choice test is in the application of knowledge.

Research Questions

To guide the study, the following research questions were raised:

1   What is the mean score of students in multiple-choice test?
2   What is the mean score of students in computer practical test?

Hypotheses

Two null hypotheses were raised and tested at 0.05 level of significance:

1: There is no significant difference in the mean score of students in multiple-choice test and practical computer test.

2: There is no significant difference in the mean score of male and female students in computer practical test.

Methodology

The study adopted *ex-post facto* design because it established the differences in the achievement of students in multiple-choice test and practical test and none of the groups of students is manipulated. The study was carried out in the Jalingo metropolis of the Jalingo Education Zone of Taraba State. Jalingo was selected due to its well-equipped CBT facilities. It is also believed that students in the zone can respond to the examination questions administered to them since they have the same curriculum and scheme of work. The population of the study comprised 197 SSS2 computer students in all the public co-educational secondary schools in Jalingo metropolis (Taraba State Post Primary School Management Board (TSPPSMB, 2021). The study was carried out during the 2021/2022 academic session. The choice of SS2 students is because they are more stable in school than any other set of students. All the population of the study were used in the study. The three secondary schools that participated in the study were purposively selected because these schools have presented candidates for the senior secondary certificate Examination (SSCE) in Computer studies at least for five (5) years and also have well-equipped computer laboratory.

Two instruments were adapted from past WAEC question papers, from 2016-2020. The instruments are: Multiple-Choice Test (MCT) and Practical Computer Test (PCT). The multiple-choice test consists of twenty items while the practical computer test is made of ten items/ practical tasks to be performed by the students (not limited to typing, editing, and design). These two instruments covered the same topics but presented in different question types to the same group of students. These instruments were validated by experts from Faculty of Education, Taraba State University, Jalingo. To determine the internal consistency of the instrument, a pilot test was carried out on 30 SS2 students from a school that did not participate in the study. The pilot testing was carried out because the researchers did not have access to the initial reliability result. The data obtained were used in calculating the reliability of the instrument using half-split with Spearman-Brown formula. The reliability coefficient of 0.91 and 0.95 was obtained for the two instruments suggesting that the instruments are suitable for usage. The technology-based Objective Test was administered to all the students first and the Computer Practical Test with the same content as in objective test was later administered after some days. For comparability of results, the selected schools are well staffed with qualified teachers and well-equipped CBT facilities. The researchers also made sure that the topics covered in the tests are taught in the selected schools. Additionally, the maximum achievable score for both tests were set at 10

points. The data obtained from the test were analysed using mean and standard deviation to answer the research questions, while t-test was used in testing the null hypotheses formulated. All the hypotheses were tested at a 0.05 level of significance.

Results
Research Question 1
What is the mean score of students in multiple-choice test?

Table 1: Mean scores of students' achievements in multiple-choice test

Test type	Mean	Std. dev.
MCT	3.56	1.69

Table 1 shows the mean score of students in multiple-choice test. The mean score of students is 3.56 out of a maximum achievable score of 10, which is 35.6%, while the standard deviation is 1.69.

Research Question 2
What is the mean score of students in practical computer test?
Table 2: Mean scores of students in practical computer test

Test type	Mean	Std. dev.
CPT	1.76	1.30

Table 2 shows the mean score of students in practical computer test. The mean score of students is 1.76 out of a maximum achievable score of 10, which is 17.6%, with standard deviation of 1.30

Table 3: Mean scores of students' in multiple-choice test and practical computer test

Test type	Mean	Std. dev.	Mean diff.
MCT	3.56	1.69	1.8
CPT	1.76	1.30	

Table 3 shows the mean scores of students assessed in multiple-choice test and computer practical test. The mean achievement score of MCT is 3.56 with standard deviation of 1.69 while CPT mean score is 1.76 with standard deviation of 1.30, with mean difference of 1.8.

Table 4: Mean scores of male and Female students' achievements in practical computer test

Gender	Mean	Std. dev.	Mean diff.
Male	1.82	1.34	0.3
Female	1.52	1.11	

Table 4 shows the mean scores of male and female students assessed in computer practical test. The mean achievement score of male students in computer practical test is 1.82 (18.2%) with standard deviation of 1.34 while female students' mean score is 1.52 (15.2%) with standard deviation of 1.11, with mean difference of 0.3. This result implies that the mean achievement score of male students is higher than that of female students in computer practical.

The summary of the multiple-choice test and practical test mean scores in the three selected schools is shown in Figure 1
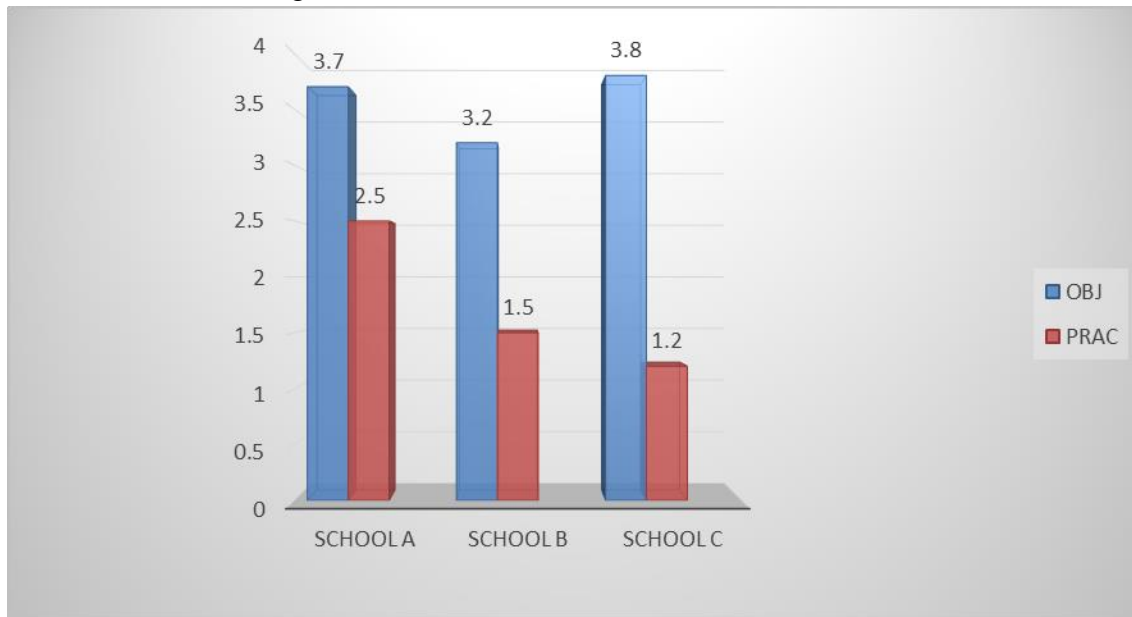

Figure 1: Multiple-choice test and computer practical test mean score in the three selected schools in Jalingo Metropolis

Figure 1 shows the mean achievement score of secondary school students in multiple-choice test and practical computer test in the three selected secondary schools where students have been presented for external examinations in the last five years. In school A, students mean score in multiple choice test is 3.7 (37%) and 2.5 (25%) in practical computer test. In school B, the multiple-choice test's mean score is 3.2 (32%) while the practical computer test is 1.5 (15%). In school C, the mean score in multiple choice test is 3.8 (38%) while that of computer practical test is 1.2 (12%). The chart above shows that the mean score of students were higher in multiple-choice than practical computer test.

Hypotheses Testing
Hypothesis 1. There is no significant difference in the mean achievement score of students in multiple choice test and practical computer test.
 Table 5: Independent sample t test of significance between mean achievement score of students in Multiple-choice test and computer practical test.

Test type	Mean	St. Deviation	t	df	Sig (2tailed)	Alpha
MCT	3.56	1.69	.918	195	0.000	0.05

CPT	1.76	1.30

Table 5 shows the independent sample t-test conducted to compare the mean achievement score of students in multiple-choice test and computer practical test. There was a significant difference in the student's score in the two tests for MCT (M=3.56, SD=1.69) and CPT (M=1.76, SD=1.30; t (28) =.918, p=.000 two tailed). The magnitude of difference was significant. Hence, the null hypothesis was rejected which implies that there is a significant difference in the mean achievement score of students in Multiple-choice test and practical computer test.

Hypothesis 2: There is no significant difference in the mean achievement score of male and female students in computer practical test.

Table **6:** Independent sample t test of significance between mean achievement score of male and female students in computer practical test.

Gender	Mean	St. Deviation	t	df	Sig (2tailed)	Alpha
Male	1.82	1.34	.723	195	.393	0.05
Female	1.52	1.11				
Mean diff	0.3					

Table 6 shows the independent sample t-test conducted to compare the mean achievement score of male and female students in computer practical test. There was no significant difference in the male and female student's score in computer practical score. For male students (M=1.82, SD=1.34) and female students (M=1.52, SD=1.11; t (28) =.918, p=. 393 two tailed). The magnitude of difference was not significant. Hence, the null hypothesis was rejected, which implies that there were no significant differences in the mean achievement score of male and female students in practical computer test.

Discussion

The study examined the differences in the academic achievement of secondary school students in technology-based multiple-choice test and computer practical test in Jalingo metropolis of Taraba State, and to established how effective they can help in the application of knowledge. Findings revealed that students in all the schools that sat for the test in Jalingo metropolis scored higher in multiple-choice test than in practical computer test. Analysis of students' score in multiple-choice test and practical test revealed that there was significant difference in the achievement of students in multiple -choice test and computer practical test. The result revealed that the student's high performance in multiple-choice test cannot be recorded in practical test which implies that the scores from objective test cannot be relied upon. This finding is in agreement with Achor, Agogo and Orokpo (2011) and Patrick (2015) who affirm that multiple-choice tests are not effective in the application of knowledge and adequate to measure the practical skills and knowledge acquisition of learners, especially in subjects that require the display of skill acquisition.

These findings also support the view of Oyeleke and Akinyele (2013) who reveal that some candidates, particularly those who scored 200 and above in UTME which are mainly multiple-choice test, performed below expectation in post-UTME, especially when they are asked to write practical test. This finding affirmed that the West Africa Examination Council (WAEC) and National Examination Council (NECO) which carried out different question types in their examinations provide the best predictor for future performances of students in higher institutions because different domains of education are being assessed, while JAMB only focused on multiple-choice test. The study also revealed that the mean score of male students were higher than that of the female students in practical computer test, but there was no significant difference in the mean achievement of male and female students in practical computer test. This implies that each gender has difficulties in the application of knowledge in Computer Science in Jalingo metropolis.

Conclusion
The study has revealed that reliance solely on multiple-choice test is not adequate in assessing the three domains of learning. There is the need to integrate other forms of question types into technology-based assessment in Jalingo Metropolis because there is empirical evidence that shows that students assessed through multiple-choice test and found to have passed the test cannot perfectly apply the said knowledge claimed to have possessed in practical skill. The application of appropriate knowledge in carrying out a particular task is linked to productivity, and productivity is directly proportional to national growth and development.
Conclusively, this study has revealed that:
    a. The mean score of students in multiple-choice test is higher than their mean score in practical computer test.
    b. There is a significant difference in the mean achievement score of students in multiple choice test and computer practical test.
    c. The male students performed higher in practical computer test than female students, but the difference in their mean score is not significant.

Recommendations
The research findings revealed that using practical form of assessment can lead to productivity which is instrumental to national development. In this respect, the following were recommended:
    a. Secondary schools' principals and teachers should prioritise practical application of knowledge in their assessment modes rather than just objective test.
    b. Government and donor agencies should focus on provision of computer laboratories and accessories in secondary schools, instead of building classrooms only
    c. School supervisors and inspectors should insist on practical lessons and judicious use of computer laboratories, where applicable.

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