

**A SURVEY OF MATHEMATICS AND MATHEMATICS EDUCATION UNDERGRADUATE  
STUDENTS' PERCEPTION ON THE USE OF COMPUTER BASED TEST (CBT) IN  
FEDERAL UNIVERSITY OF TECHNOLOGY MINNA.**

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MINNA, NIGER STATE.**

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## ABSTRACT

*Assessments constitute a crucial part of an academic learning process due to its importance in evaluating students' knowledge and forming a basis for their grade. The rapid evolution of technology has influenced the way assessments are now being conducted in academic institutions. Tertiary institutions are adopting Computer-Based Test (CBT), in tandem with traditional Paper-Based Test (PBT), as the modern mode of assessing students. Recent studies have shown certain controversial reactions to the use of CBT over PBT. This study investigated Mathematics and Mathematics Education Undergraduate students' perceptions on the use of CBT in Federal University of Technology Minna. The research design used for this study was a descriptive survey research design with a population that consist of all 1070 Mathematics and Mathematics Education Undergraduate Students in Federal University of Technology Minna, of which 150 Five Hundred Level (500l) Students was used as the Sample size which was selected because they have written all the examination under study. Results obtained from the responses to the questionnaire were analyzed using Mean, Standard deviation and percentage which show that Mathematics and Mathematics Education undergraduate students in Federal University of Technology Minna prefer Paper Based Test (PBT) to Computer Based Test. Result also show that Computer based test (CBT) is the best form of assessment as perceived by Students' in Federal University of Technology Minna. More also the result of research question three (3) show that Mathematics and Mathematics Education undergraduate students of Federal university of Technology Minna perceive Computer Based Test to be problematic. Result gotten from the analysis of the hypothesis shows that there is a significant difference in the perception of Mathematics and Mathematics Education Undergraduate Students on the use of Computer Based Test (CBT) as a mode of assessment. Some possible Recommendations were also proposed among which include that Paper based test should be adopted and used in conducting Examinations that involves Calculations as perceived by Mathematics and Mathematics Education Undergraduate Students.*

## CHAPTER ONE

### INTRODUCTION

#### 1.9 Background of Study

The Educational system globally has been influenced by a rapid change in technology, as it is increasingly used in teaching and learning. Therefore, the evolution of computer based testing is a great plus to the educational sector which is been used widely as an alternative to paper type test due to its numerous benefits. The swift progress in the growth of information and communication technologies in teaching and learning process has been modified from paper and pencil-based test to computer-based test.

The use of computer-based test provides chances to measure complex form of reasoning that is not possible to engage and assess through traditional methods (Olafare, 2015). Abdullahi, (2016) has the view that societies and cultures have adjusted to meet the challenges computer age presents. Information and communication technology has established itself as an important component of our everyday activities by redefining the old concepts. E-mail, e-learning, mobile banking, Computer Based Tests etc. are now trending. These changes have affected the system that controls our knowledge, skills and behaviors generally in our lives. These changes have influenced our educational system due to technological advancements and inventions, the use of computers is now applied in conducting and grading examination around the world as stated by (Elliot, 2008). Successively, the speedy increase in the utilization of information and communication technology in learning setting has led to the need for computerized assessment.

Omemu, (2015) noted that teaching and learning became more effective when the students are subjected to an examination process to determine the extent to which the

student have assimilated the content of instruction and the teacher can also access himself or herself from the performance of the student. The result of the examination reveals to a great extent whether learning has taken place or not.

Conoleand Warburton (2005) defined Computer Based Test (CBT) as the use of computers for evaluating student's knowledge. It is necessary to reconsider and adjust the traditional test manners. Electronic examination tools have reduced the load of teachers and aid examination execution as a result of the introduction of Information and Communication Technologies in education. Computer Based Test (CBT) can be applied to promote further efficient learning by examining students' knowledge and understanding in many fields such as Mathematics courses. Computer based test method of assessment may not suit some students' learning styles. The primary factor which is used to determine if an assessment program is useful or not depends solely on the relevance of the assessment tasks to the purpose and learning result for the course.

In this study, student's perceptions and their attitudes towards computer based test will be investigated and also issues they face will be identified. Computer and related technologies provides a great tool to encounter the problems of employing assessments modes that exceeds the conventional practices and eases accessing a widely sources of information and knowledge. Computer based test enables educators and instructors to deliver and report on surveys, quizzes, tests and exams. Computer based test method can be divided into two main types and the most familiar type is that which the candidates are required to fill in responses on a paper form, which is then uploaded to a computer optical mark reader. This optical mark reader reads the form, scores the paper and reports on the test reliability. The other type of computer based test method is that which the system provides a task interface for students, they input their answers and receive feedback via a computer. (Jimoh,*et al.* 2012)

In recent years, the number of students in Federal University of Technology, Minna has greatly increased and the conventional examination method has become time consuming and difficult to collate the result of the large number of students using the paper type testing method. A solution to the high enrolment figure in universities is the computer based test system and this was introduced by the University in February 2010, primarily to address this concern and others. Computer Based Test is not just a substitute method for assessing students but it epitomizes a vital qualitative shift away from the traditional methods due to advances in technology. Several researches has been carried out by various researchers to compare the differences in performance of computer based test and paper type test means of assessing students and results have shown that there was a number of mixed reactions but the preference for computer based test over paper type test was much higher. Some studies have shown the main disadvantage to be anxiety among students unaccustomed with use of computer.

In education, the term assessment refers to the wide variety of methods or tools that educators use to evaluate, measure, and document the academic readiness, learning progress, skill acquisition, or educational needs of students. Hidden curriculum (2014). The primary purpose of assessment and evaluation is to improve students' learning, information gathered through assessment and evaluation helps teachers to identify student difficulties as well as to detect weaknesses in programs. Assessment and evaluation are important tools for adopting curriculum and instructional approaches to students' needs and for determining the overall effectiveness of programs and classroom practices.

Mathematics is viewed as the basics for science and technology and it is a tool for achieving scientific and technological development. Olusi and Anolu (2010) identify the importance of mathematics in the relationship among mathematics, science and

technology and concluded that without mathematics, there is no science. Gauss, (2011) also reiterates the fact that without modern technology there is no society. Eze, (2007) asserts that science evolved with the use of mathematical principles and mathematics is a necessary tool needed by individuals to be able to function effectively in the present technological age especially the use of ICT.

Mathematics is a science course that provides fundamental knowledge and skills for other school subjects, such as sciences, art, economy, etc. The study of mathematics is made necessary for almost every department because of its high level of significance in today's society.

In Federal University of Technology Minna Mathematics department is in the School of Physical Sciences (SPS) while Mathematics Education is in the School of Science and Technology Education (SSTE) both in Bosso Campus. Mathematics Students in Federal University of Technology Minna offer mathematics and statistics courses majorly but on the other hand, Mathematics Education students offer Mathematics and Education courses.

Therefore, the reason for this survey is to investigate their perception on the use of Computer Based Test (CBT) in Federal University of Technology Minna.

### **1.10 Statement of problem**

The use of Computer-Based Test and Examination constitute a great development in education to enhance improvement in assessing student. It is mostly adopted and used for first year students due to the high enrolment figure (High population) as we may call it, it is therefore adopted so as to reduce the time and stress allocated in the marking, assessing and computing the results for people in this category. Computer based test has been in use in Federal University of Technology Minna for over Nine (9) years now,

Over the years some Students grumbled over the results obtained while some on the other hand are happy and satisfied. Some feel it is not an effective means to measure students' knowledge as luck can give some edge over others. Over the years, The Researcher had come in contact with Students having different opinion about CBT, it is very common to hear things like 'I don't know why I failed this course', 'I like CBT because it saves time and energy', 'It is very difficult to use the system Calculator and it is time wasting', 'My grades are far more better when I use the Computer Based test method', 'Am sure I clicked the right answers but yet my grades came out very poor, The distress and opinion student have that the paper type testing mode would give a more nearly or accurate measurement of learning compared to the CBT. This study tends to survey the perception of Mathematics and Mathematics Education Undergraduate Students on the use of Computer-Based Test in federal University of Technology Minna.

### **1.11 Aims and Objectives of the Study**

The aim of the study is to investigate the perception of Mathematics and Mathematics Education Undergraduate Students' on the use of Computer Based Test in Federal University of Technology Minna.

The following Objectives are stated to guide this study:

1. To determine which examination approach is more preferred by Mathematics and Mathematics education undergraduate students in Federal University of Technology, Minna.
2. To determine whether Computer-Based Test (CBT) is the best form of assessment tool perceived by the Students' in Federal University of Technology Minna

3. To determine if Mathematics and Mathematics Education undergraduate students of Federal university of Technology Minna perceive Computer Based Test to be problematic.

### **1.12 Research Questions**

The questions were designed to tackle the problems identified for the Study.

1. Which exam approach is mostly preferred by Mathematics and Mathematics Education Students in Federal University of Technology Minna?
2. Is computer based test the best form of assessment as perceived by Students in Federal University of Technology Minna?
3. Do Mathematics and Mathematics Education undergraduate students of Federal university of Technology Minna perceive Computer Based Test to be problematic?

### **1.13 Research hypotheses**

Ho1: There is no significant difference in the perception of Mathematics and Mathematics Education Undergraduate Students on the use of Computer Based Test (CBT) as a Mode of assessment.

### **1.14 Significance of Study**

This research will help in obtaining useful information on the perception of Mathematics and Mathematics Education Undergraduate students towards computer based testing. The research work would eliminate as fast as possible the negative and positive notion about E-examination.

The outcome of this study would be useful to the Federal University of Technology Minna Examination Committee, School management, Mathematics and Mathematics

Education Undergraduate Students, Lecturers, Departmental Heads, Professional Organizations and Academic researchers.

The Study would also help the University Examination Committee to Find out which Assessment Mode or Mode of testing does the Students' perceived to be the most favorable for them, And also to improve on the university Mode of testing.

The outcome of the testing would be beneficiary to Mathematics and Mathematics Undergraduate Students in that it will give them the avenue to pour out their mind on their perception towards Computer Based testing and which of the Mode of testing best suit their Specialization.

The outcome of the study would be beneficial to various professional bodies as well as empower The Management of Federal University of Technology to formulate policy that would coherent with students 'interest in the use of Computer Based Test (CBT) as a way of accessing students.

The research findings would be beneficiary for Lecturers and Departmental Heads in that it would be a source of reference for them in the area of educational processes and products for planning befitting educational programmers for the University and Nation in the nearest future.

The study would provide researches in all areas of study with the opportunity to access empirical evidence in the quest for further studies on the perception of students on the use of Computer Based Test (CBT) as a mode of assessment.

### **1.15 Scope of the Study**

This Study would focus on all Mathematics and Mathematics Education Undergraduate Students of Federal University of Technology Minna

The scope of the study would be on 150 undergraduate Mathematics and Mathematics Education students in Federal University of Technology Minna Bosso Campus. The

target population is just centered on only Two Schools in Federal University of Technology Minna Bosso Campus, which are School of Physical Science (SPS) and School of Science and Technology Education (SSTE).

### **1.8 Definition of Major Terms**

The following operational definitions are used in this Survey:

**Perception:** A way of thinking or understanding a particular content or idea.

**Survey:** A process by which many individuals are asked questions or series of questions so as to get information about what they do or think about something.

**Computer-Based Test (CBT):** This is a method of assessing students' performance using computer as an integral fragment of delivering question, storing response, marking of answers and reporting of results from an exercise.

**Assessment:** is the systematic basis for making inferences about the learning and development of students. It is the process of defining, selecting, designing, collecting, analyzing, interpreting and using information to increase students learning and development.

## CHAPTER TWO

### REVIEW OF RELETED LITERATURES

#### 2.1 Conceptual Framework

##### 2.1.1 Meaning and History of Computer Based Test

Computer Based Test is a method of assessing students' performance using computers as an integral fragment of deliverance questions, storing response, marking of answers and reporting of results from an exercise. It can be in form of questions based on multiple choices which provides a simple operating environment for both those conducting the test and those taking the test. The key aim of Computer Based Test is to offer all the features that an examination system must have with the interface that do not frighten its operators (S.O. Kuyoro *et al* 2016). According to Taylor, (2014) a Computer Based Test could be administered on a stand-alone personal computer, within as isolated Local Area Network (LAN) or using online technologies such as web-pages over the Internet. The history of Computer Based Test can be traced to the use of computer in teaching and learning.

Among the first large scale Computer Based Test (CBT) programs to function was in 1985 was the College Boards ACCUPLACER test program. It entailed 4 tests which includes the reading sentence skills, comprehension, elementary algebra and arithmetic. This examination was formed to aid in placing fresh undergraduate students in Mathematics or any Science courses, although the test was only relatively low stake-test. The first high-stake Computer Adaptive Test was the novel cooperation Certified Network Engineer examination (CNE). CNE went on the world wide web at Drake Pro metric testing center in 1990 and transition to online CAT in 1991 (Foster 2011). After

CNE came Graduate Record Examination (GRE), Education Testing Service (ETS) which operationally was deployed as a CAT at sylvan testing center all over America in 1992 (Stanley and Glass, 2015). These tests are just a few examples of the large number of computer base test administered. Computer based test have also been employed for various types of employment as well as psychological tests.

Various researches have been made on computerized assessment and student's perception towards it and their performances, where results showed that students believed they perform better when they take their examination the traditional way while computerized assessment has an adverse consequence (George, 2011).

### **2.1.2 Concept of E-learning**

E-learning is a tool used to share knowledge amid different learners. E-learning is a method which is used to enhance and promote learning via a computer and communication technology (Veeramani, 2010). Veeramani further explained that e-learning can be represented as a virtual learning, online learning and distributed learning, web based or networked. E-learning is a wide range of application processes which is designed to deliver electronically which includes Web, CD-ROM or video conferencing with the use of satellite transmission. The growing interest in e-learning comes from various directions such as interest in e-learning surfacing from establishments which regards online learning as their repertoire extension of their distance learning activities. From the corporate point of view, e-learning is seen as a way to minimize costs in terms of training. In-house training can be conducted amongst employees within the corporate environment. Another area that has an interest in e-learning is residential campus-based educational organizations, they see e-learning as a way to improve access to their programs and a way to tap into growing niche markets

(Naidu, 2006). In recent times, the numbers of teachers that use e-learning as a way to aid their teaching has rapidly increased. The contemporary generation learners who have been using information and communication technology are also expected to use their experiences in the learning process which includes the use of Web, CD-ROM or video conferencing using satellite transmission (Oblinger, 2005).

Ayo (2007) defined Computer Based Test as a system that involves conducting examinations via intranet or the web. Joint information system committee defined Computer Based Test as a broad assessment covering a range of activities in where digital technology is used to assess students. Examples include the design and marking of assessment by computer or human supported by scanner. It encompasses reprinting, transferring and storing data that is associated with public and internet assessment. Computerized assessment is an end-to-end electronic assessment process in which information and communication technology is used in delivering assessment and recording responses.

Computer Based Test otherwise known as computer assisted instruction has different meanings to different individuals and comes under various names. Information and communication technology is used for many activities which involves the assessment of knowledge, understanding, skills, attitude and competency. Electronic examination is the use of computer and other ICT accessories to deliver a task or group of tasks to students and then collect their responses store them and allow the students to be marked and evaluated. It also involves capturing of work originally on paper that is scanned to a computer and marked using the same computer.

Wikipedia explains electronic examination as the use of information technology for any assessment related activities. It houses various learning activities which range from the use of word processor to screen test. As a result of its similarities with e-learning, it is

now used widely as an applicable term to describe the use of computer during the test process such as computerized classification testing and computerized adaptive testing. Therefore, E - examination can simply be described as the use of computer and its software to measure knowledge and skills in a specific area of interest. The process ranges from unscreened testing system that automatically marks learners test to electronic portfolio in which the learners' work can be marked, stored and evaluated.

### **2.1.3 Purpose of assessment**

Assessment is often used interchangeably with test, but not limited to tests (National Council on Measurement in Education, 2014). Assessment is one of the most significant areas of an educational system. It defines what students take to be important, how they spend much of their academic time and in many ways how they value themselves. The importance of assessment cannot be over emphasized, it is unavoidable by students and is a media of assessing students' performance.

He opined that assessment procedures provide answers to these questions: What achievement of the students are prized and valued by the system? Does it serve its purposes? To what extends are the aims and objectives professed by the system valued and employed by those who have made their ways within it?

Assessment serves two purposes, the first assists in learning process. From this perspective, we must endeavour to establish connection between assessment and general goals of the subject matter and in learning process, it must be considered as an integral part. The second reason which is to determine how effective the educational system is with a motive to improve the educational standards. However, we should be capable of determining the areas that are not effective and needs improvement and not

just place focus on achievements alone. The reason for assessing students is based on the following;

To grade students, to rank students, to pass students, to fail students, to help them in selecting future courses, to be able to predict future success or failure in courses, to provide a profile of what has been taught, to reveal areas where the student are strong and weak, to give students feed-back and increase their interest in learning, to aid students in developing skills of self-assessment, to encourage students to provide feed-back to teachers and as well as to be able to identify simple and difficult areas in a subject.

Prior to subjecting students to assessment, we should ask ourselves “What exactly it is that we are assessing in the students?”

The following assessments must be considered: What needs to be assessed? For what purpose is the assessment? And which of assessment is best adopted?

There is need to be specific in the part of students is essential, the following questions are also necessary: “why, what, and how” these questions must be related to the underlined objective of the course and learning outcome device for the students, this is to ensure that the assessment matches the educational purposes. Therefore, a most appropriate method of assessment should be used to assess the desired knowledge. Afterwards the strength and weakness of the students should not be far from thoughts.

Most importantly, students prefer to receive a lot of knowledge whether educational or social from online assessment so we should be mindful to assess them by similar means. Statistically as the number of learners has increased and staff proportion decreased, students need supplementary efforts and support to facilitate their learning and judgment of progress (Clerk 2004). From the inquired evaluation, it is indicated that

reinforcing the contact of lecture time through formative assessment can add to so many students understanding of important concepts and ideas.

Ramsden, (1992) was of the view that finding an assessment method that will satisfy the assessment of all the various intended learning outcomes for a course will be difficult, so it is best to consider a range of assessment methods for the students. Weaver, (2003). Pointed out that there are different kinds of assessment depending on the one that suits the learners style should be administered. The level to which the subject matter has been delivered to the students can be analysed using diagnostic assessment and it is used at the beginning of a course to be undertaken to determine the level of students' readiness to fully digest the course contents. However, this form of assessment does not provide the students with the tools to enhance their learning unless it is back up with some elements of feedback making it become formative in nature.

Formative assessment occurs during a course of study and provides periodic feedback to the students to help them improve their performance. This feedback is generated from the teachers and student's peers or external agent like placement supervisors and clinical tutor. It is paramount that the assessment should be given in relation with the criteria in lookout for. Involvement of students in peer assessment aids understanding (Brandford, 2003). Giving a students' work to be evaluated or defended by another student does not only increase a student's sense of control and responsibility over the work but it also shows the extent to which the subject matter has been understood clearly than any other method. Assessment which is summative sometimes includes or does not include a feedback. The sole difference in these forms of assessment is that formative is awarded and graded. The grades will indicate the performance against the set standard for the task and may form as part of assessment after the course module.

Bond, (2000) postulated that assessment activities has to include formative assessment for learning and summative for certification. However, it is important we move away from only providing summative assessment of our students' learning most especially when this occurs after delivering a subject matter because it will not help the students in improving their learning. Providing summative assessment of our students' learning most especially when this occurs after delivering a subject matter because it will not help the students in improving their learning.

#### **2.1.4 Limitation of paper type Test**

Paper type test is gradually becoming an old method of assessing students due to technological advancements and also limitations which allows widespread of malpractices during examination. According to Alabi *et al* (2012) problems of Paper and pencil test which was summarized as follows includes high cost of conduct of examination by the examination body, manipulation of results, late release of results, risk of accidents during travels by both the examination official and candidates for the examination, issues of missing results and tedious process involved in the compilation of examination results.

The major limitations of Paper type test can be narrowed down to the following:

1. Paper type tests does not give scope for larger sampling of the content. The course content cannot be sampled properly with six lengthy essay questions as you can with 60 multiple-choice test items.
2. Paper type testing method promotes selective reading and cramming.
3. In paper type test, mistakes in spelling, blunders in grammar, over-colored ink, length of the answer etc. may affect the score.

4. The long-answer type questions are less valid and less reliable and as such they have little predictive value.
5. Paper type test requires a lot of time on the part of students to write.
6. It can only be assessed by a skilled professional.
7. Ambiguous wording handicaps both the evaluators and as well as students.
8. The scoring of answer scripts can be affected by the mood of the teacher.
9. There is halo effect-biased judgment by previous impressions.
10. The scores may be affected by the teachers' partiality for a particular point of view, his way of understanding the question, his weightage to different aspect of the answer, favoritism and nepotism, etc.

Thus, the potential disadvantages of paper type tests are:

- I. Poor predictive validity
- II. Limited content sampling
- III. Scores unreliability, and
- IV. Scoring constraints.

### **2.1.5 Student's perception on Computer Based Test**

Computer based test contributes majorly to the quality of students learning experience which is a key issue in higher learning. A good number of researches have been carried out into the perception of instructors towards computer based test and only very few on what the learners actually think (Weaver, 2003). Assumptions are mostly made about student's perception towards computer based test but it would be necessary to hear from the students themselves about how they feel about computerized assessment. Moreover, the perception and view of test individuals are necessary because they affect an assessment's face validity (Anastasi, 2012).

Assessment methods used in the university has increased in recent years from the traditional methods of assessing to new modes of assessment (Sambell et al, 2007). According to Y. George (2011) portfolios, self and peer assessment, simulations and other innovative methods were introduced in higher educational contexts. These concepts make up the current evaluation context. Student's perceptions about these recent formats of computer based test and the more common multiple-choice and essay examinations constitute an important part of this review.

Entwistle's (2009) stated that how students learn depends on their perception towards the environment of learning and not really the educational context. Reality as experienced by the often forgotten student, is an intervening variable that cannot be ignored if the purpose our research is complete understanding of students learning. However, student learning has a relation to evaluation practices and this provides the rationale for the main focus of the present survey into student's perceptions about assessment practices and evaluation method in our current learning environments improving the quality of the student learning experience and it has been generally recognized that computerized assessment can contribute to this.

A survey was carried out to measure student's perception towards computer based test approach at the University of Bradford in 2008. Questionnaires were distributed to students that partook in the 2007-2008 online assessment. The aim of the survey included identifying the stumbling block to the utilization of computerized assessment, to evaluate the various assumptions about student's perception towards computerized assessment, to identify glitches in the utilization of CBT so as to be remedied for better utilization and particularly to inform an e-Learning Pathfinder Project to establish support systems for computerized assessment (Eyre 2008).

Phillip *et al* (2005) opined that the success of computerized assessment depends solely on how the method is organized and maintained. Areas where more understanding is needed is about how inexperienced evaluators on assessment can affect the final mark. Alternatively, Papinczak *et al* (2007) provided the development of student involved criteria but student's view towards computerized test experience remained negative. They suggested that those taking the test may need more time of practice in computerized test in order for the process to be easy for them and also comfortable.

### **2.1.6 Advantages and Disadvantages of Computer Based Test**

Many researchers have been made by scholars and they reviewed the advantages of the use of computer based test. Computerized assessment was implemented to address series of aberrations faced during the conventional testing method. He also noted that the use of computerized assessment removes all form of human errors recorded during the conventional testing method and creates a platform where students can access their results immediately. This has made examination malpractice difficult for students, also eased the difficulty of transportation examination question from place to place and eradicates the difficulty of compiling numerous answer scripts (Awosiyan 2010).

The following can be said to some of the advantages of computerized assessment which demonstrates similar benefits to both the instructor and test takers.

1. Marking the examination is done by the computer, thereby made easy for the instructor
2. It is more flexible than the conventional method pens and paper
3. Candidate get motivation due to examination method
4. The questions can be structure in such a way that multimedia contents might be included.
5. Distribution of assessment material is made easy and safe

6. Examination questions can be re-used without difficulty
7. Test takers can get instant feedback for questions if marked automatically

Only little can be said about the disadvantages of Computer based test as the advantages overweighs the disadvantages although these disadvantages stands as stumbling blocks to the implementation of the method of assessment in some universities

1. The unreliability of technology such as connection problems, internet glitches and power breaks.
2. It cannot be used to assess all types of assessment i.e. a computer does not mark essay examination well
3. Computer based test requires a lot of support. Centers for computer based examination needs to be well equipped. The infrastructure needed for the traditional method of assessment is already in place whilst that of computerized assessment is not in place.
4. Implementation of Computer based test is quite expensive and time consuming unlike the traditional method of assessment which is simple and easy.

### **2.1.7 Computer Based Test mode in Federal University of Technology, Minna**

Federal University of Technology, Minna adopted the use of computers to test student's knowledge in February 2010 and received approval to conduct continuous assessment and examination via computer in 4th march, 2011 which was done by the use of intranet setup facility within the university's premises. Since then, school has been conducting examinations for undergraduate students which initially began with only first year undergraduate students but shortly after included higher levels such as 200 level and 300 level. The Computer Based Test center in Federal University of Technology, Minna designed a workstation which uses data encryption so as to protect the questions sent to

the examination center via the use of intranet or internets and biometric fingerprint authentication to screen students. The center is managed by a private company based in Lagos and an agreement was reached in 2010 on private partnership with the university for the period of 10 years to build a standard assessment center which a lecturer from the university will be taught on how to conduct the examination after the partners have completely obliged for the agreed period (Rueben, 2017).

The computer based Centre in Federal University of Technology, Minna now has 4 buildings with 250 systems in each and a separate room where the server is located and staff stays in working period. The room where the server is consisting of two servers in which one is used to store questions and the other is used to keep biometric pictures of test takers. The server and computers are powered by an uninterrupted power supply in case of power failure that is experienced commonly. The Centre is also used as a screening for candidates applying for admission into the university. Examination bodies such as JAMB conduct examinations at the Centre and the also used by the university to conduct promotion examination for staffs. (Rueben, 2017). The Centre is used mostly first year undergraduate, sometimes second year and third year undergraduate students which is as a result of the huge number of student offering the same course.

The examination is conducted in such a way that the course lecturer is asked to submit the examination questions to the administrator at the Centre via the school's examination coordinator a day prior to the examination. The administrator then enters the pool of questions into the database and then uploads the questions into the intranet server for the examinees to answer. Students are then required to login by inputting their student's ID and matriculation number to begin examination.

All students take examination on the same day but at different time due to the large number of examinees, hence students are grouped according to their schools for courses scheduled on the time table. Results are not released immediately after submission of the examination, sometimes the result takes weeks before it is made available for the students to see online.

## **2.2 Empirical Studies**

Limet *al* (2006) examined the attitude of medical students about computer base test (CBT) and paper base test (PBT) through an online survey following the introduction of computer based test in the national university of Singapore. Final year medical students were tested, out of 213 (53.5%) students, 91 (79.8%) indicated that they preferred CBT, 11 (9.6%) preferred paper and pencil test type and 12 (10.5%) preferred neither of the test types. They further explained that 42 indicated that they preferred CBT because of good image quality and independent of assigned seating positions, 22 liked because they could move at their own pace, one stated that it is fun taking CBT examination, 4 enjoyed the convenience of CBT and 6 cited “equality” as the reason they preferred CBT over paper and pencil test type.

Bodmann and Robinson in (2004) carried out an experiment to compare both the speed and how computer base test (CBT) and paper and pencil test type differ in performance. A number of fifty-five undergraduate students of educational psychology participated in the studies, each of these students were conversant with both examination methods. The test consists of 30 MCQ items with a time limit of 35 minutes to attempt the questions. 28 students took the computer base test first while others preferred to take paper base test first, in a space of 14 days the procedure shifted for the second test where the first group took the paper based test and the second group took the CBT. A conclusion was drawn that undergraduate finished the computer base test (CBT) faster than the paper

based test with no difference in result as the two groups scored the same mark in the two test with difference of time only.

To examine the impact on student performance of computer base test as compared to traditional paper base test (PBT), three different research tools were used to collect and interpret results from students by Hollister and Koppel i.e. questionnaires completed by students to express their computer base test (CBT) experience, faculty interviews who had administered CBT to determine student's perception and analysis of student's test scores in the two test methods. (Jamil et al, 2012). 91 out of 133 students had no previous experience of computerized assessment and the other 42 had experienced the use of computer base test in previous courses taken. The Excel computer base test having 25 items was constructed. Students' scores on the CBT were automatically recorded by the computers which comprises of the overall scores. Grades on computer base test were based on the students' ability to perform and finish a specific skill in the operating Microsoft Excel software. Computer base test was conducted in a class period and at the end of the exam students reviewed their results immediately. Paper base test was administered to the same students in the next class period. The paper base test was examined manually by viewing the printout and actual Excel file containing the completed examinations some minutes later. The result of PBT was recorded manually by writing the necessary information in an Excel sheet distributed before the test. Grades on PBT were based on the final product submitted by each student as opposed to how each task was performed. The question of easy use, majority of the students (59%) responded that the software was easy to use, 29% moderate to use and 12% a little difficult. Interpreting the range of skills, 76% indicated that CBA was a better test method. Evaluating the difficult of question paper 65% indicated that question papers were moderated, 34% of the students opined that automatic grading system was okay

while 39% did not find the grading to be okay. Just 19% felt that CBT has a negative impact on their performance (Jamil, Tariq, Shami, 2012). Only 14% students found computerized assessment to be easier while 49% found it to be difficult. A sum total of 58% preferred the computerized assessment while 42% preferred PBT.

A survey by Calarina and Wallace (2002) was carried out to confirm several factors in CBT vs. PTT assessment and the design used for the study was a post-test only with a factor, test mode. Students' self-report on a distance learning survey and their score on 100-item multiple choice items were treated as dependent variables. The sample selected for the investigation was 4 sections of Computer Fundamental Course consisting of 105 students. The results of the study showed that computer-based test delivery had a positive impact on students' scores compared to paper-based test. The study showed the CBT group performed better than the PBT group. Familiarity with a computer and gender were not related to the difference in performance, although familiarity with the content was related (Jamil et al, 2012).

### **2.3 Summary of Related Literature Review**

Literatures related to the variables in this study were reviewed in this chapter. From the above literatures reviewed so far, it has been observed that the difference in performance between Computer Based Test and the traditional mode of assessment depends on the method of test taken and also the population tested. The effect of computerized test on examinee performance and score equivalence of students or group of students can be moderated by a number of variables. (Chekwe Daniel, 2017). Most universities in Nigeria such as FUT Minna, ABU Zaria, UDUSOK, UNILORIN, UNILAG amongst others have adopted computer based examination system and all of which makes use of intranet set up within the school premises in running the system

with the exception of NOUN (National Open University of Nigeria) that uses internet set up in running their program (Olawale and Shafii, 2011).

From research made, it was observed that the e-examination center at Federal University of Technology Minna is managed by a private company which is not too because changes may be made to the results which could alter the motive of the test.

## **CHAPTER THREE**

### **3.0 RESEARCH METHODOLOGY**

This chapter focuses on the technique the researcher adopted in collecting and analyzing data relevant to this research. The study is a survey research and questionnaire was used to collect information from the undergraduate students on their perception on computer based test approach in Federal University of Technology, Minna.

#### **3.1 Research Design**

This study used a descriptive survey research design where questionnaire was used to get relevant data and information about the student's perception towards computer based test in Federal University of Technology Minna.

#### **3.2 Population of the Study**

The population of this study consists of all 1070 Mathematics and Mathematics Education undergraduate students in Federal University of Technology Minna.

#### **3.3 Sample and Sampling Technique**

Taro Yamane formula was used to determine a reliable sample size for this research, the Taro Yamane formula was created by the statistician Taro Yamane in 1967 to determine the sample size from a given population. The sample for this study was selected from the department of mathematics in the School of Physical Science (SPS) and mathematics Education department from School of Science and Technology Education (SSTE). The questioner's was distributed to a total of 150 students, 90 students from mathematics and 60 students from mathematics Education all from 500 level. The 500

level was properly selected because they have written all the examinations under study which are Paper-Based Test (PBT) and Computer-Based Test (CBT)

### **3.4 Research Instrument**

A research designed questionnaire titled Mathematics and Mathematics Education Undergraduate Students' Perception on the Use of Computer Based Test (CBT) In Federal University Of Technology Minna Was used for collection of data. The Questionnaires was divided into two sections, Section A consists of personal data and is designed to collect information of the student's profile such as faculty (school), department and gender while section B consists of the questions designed for the students.

### **3.5 Validation of Research Instrument**

According to Casley and Lury (2007) validation of an instrument is one of the most important things to do as a researcher when constructing an instrument. As a result of this, absolute care was taken to validate the questionnaire. After drafting the instrument, it was taken to lecturers in the Department of Science Education of Federal University of Technology Minna, Niger State, as well as the supervisor of this study and their comments were used to readjust the instrument which is Mathematics and Mathematics Education Undergraduate Students' Perception on the use of Computer Based Test (CBT) in Federal University of Technology Minna.

### **3.6 Reliability of the Instrument**

The reliability of the instruments was determined by selecting 30 students from 100 level and 200 level Mathematics and Mathematics Education Undergraduate Students which are among the research population but excluded from the population sample, consisting of male and female to examine the reliability of the instrument. A reliability

coefficient of 0.75 was gotten using internal consistency technique, precisely Cronbach's alpha formula.

### **3.7 Method of Data Collection**

Duplicates of the instrument was distributed to Five hundred level (500L) Mathematics and Mathematics undergraduate students from School of Physical Sciences (SPS) and School of Science and Technology Education (SSTE) in Bosso Campus so that they can fill the contents of the Questionnaire raised on various components of Students' Perception towards Computer Based Test and submit back the questionnaire to the researcher for data analysis. First permission was sorted from the university administrator, thereafter copies of questionnaires were directly administered to the respondents to be filled and the data was collected. All copies of the instrument administered were retrieved with the aid of class representatives in various departments. The responses of the students were used for this analysis.

### **3.8 Method of Data Analysis**

The data collected were analyzed using mean, standard deviation and percentages to arrive at a generalization that described Mathematics and Mathematics Education Undergraduate Student's Perception towards Computer Based Test in the Federal University of Technology, Minna.

## CHAPTER FOUR

### 4.0 RESULTS AND DISCUSSION

This chapter presents the results of the data collected in line with the study using SPSS. In order to investigate the perception of undergraduate students of Federal university of Technology Minna Niger state, a researchers' designed questionnaire was administered to the respondents which were randomly selected. A total of one hundred and fifty copies of the questionnaires were sheared and retrieved after the respondents had filled them. The data obtained were analyzed using mean, standard deviation and percentage.

#### 4.1 Analysis of Research Questions

##### 4.1.1 Demographic Information of Respondent

The demographic information revealed that out of 150 respondents, male students participated more in the study with 70% representing 105 while their female counterpart with 30% representing 45 as shown in table 1.

**Table 4.1: Frequency counts and percentages of respondents based on gender**

<b>Gender</b>	<b>Frequency</b>	<b>Percentage (%)</b>
<b>Male</b>	105	70
<b>Female</b>	45	30
<b>Total</b>	150	100

**4.1.2 Research Question 1:** Which examination approach is mostly preferred by mathematics and mathematics education students in Federal University of Technology, Minna.

**Table 4.2: Table showing analysis of Research question one**

<b>RATING</b>									
<b>S/N</b>	<b>Items</b>	<b>SA</b>	<b>A</b>	<b>UD</b>	<b>SD</b>	<b>D</b>	<b>mean</b>	<b>Std.D</b>	<b>REMARK</b>
<b>1</b>	I prefer computer based test to paper type test	26 17.3%	42 28.0%	16 10.7%	54 36.0%	12 8.0%	3.11	1.286	Agree
<b>2</b>	My knowledge about computer makes me prefer computer base test (CBT) to paper base test (PBT)	32 21.3%	40 26.7%	21 14.0%	40 26.7%	17 11.3%	3.20	1.346	Agree
<b>3</b>	Computer based test is easy to use for my course of study	21 14.0%	29 19.3%	10 6.7%	66 44.0%	24 16.0%	2.71	1.328	Disagree
<b>4</b>	My using of computer based test require a lot of mental effort compared to paper type test with taking	32 21.3%	43 28.7%	19 12.7%	19 12.7%	37 24.7%	3.09	1.503	Agree
<b>5</b>	computer based test I am more comfortable (CBT) than paper type test (PPT)	13 8.7%	51 34.0%	14 9.3%	44 29.3%	28 18.7%	2.85	1.309	Disagree
<b>Grand Mean</b>							<b>2.992</b>		<b>Disagree</b>

From Table 4.2 above, Item one shows a mean rating of 3.11 which agrees and indicate that Mathematics and Mathematics Education Undergraduate Students' prefer computer Based Test to Paper type test, Item two of table 4.2 shows a mean of 3.20 which indicate and agree to the fact that Mathematics and Mathematics Education Undergraduate Students' knowledge about computer makes them prefer computer base test (CBT) to paper base test (PBT), Item three of table 4.2 shows a mean of 2.71 which disagree that Computer based test is easy for my cause of study, Item four of table 4.2 shows a mean of 3.09 which indicate and agree to the fact that Students' use of computer based test require a lot of their mental effort compared to paper type test, Item five of table 4.2 shows a mean of 2.85 which indicate that students are more comfortable with Paper base test(PBT) to Computer base test(CBT).

The grand mean of table 4.2 shows a mean of 2.992 which indicate that mathematics and mathematics Education students prefer Paper based test (PBT) to Computer based Test (CBT)

**4.1.3 Research Question 2:** Is computer based test the best form of assessment as perceived by Students' in Federal University of Technology Minna.

**Table 4.3 Table showing analysis of Research question two**

S/N	Items	RATING					mean	Std.D	REMARK
		SA	A	UD	SD	D			
1	The potential for immediate feedback with CBT could help me learn better than the delayed feedback of PTT	44	55	9	23	19	3.55	1.383	Agree
		29.3%	36.7%	6.0%	15.3%	12.7			
2	CBT makes examination writing easier for me	34	50	12	29	25	3.26	1.430	Agree
		22.7%	33.3%	8.0%	19.3%	16.7%			
3	CBT test knowledge of the subject as well as IT (Information Technology) skill	35	55	32	17	11	3.57	1.178	Agree
		23.3%	36.7%	21.3%	11.3%	7.3%			
4	CBT enables assessment of a wide range of topics more quickly than PTT	50	46	20	23	11	3.67	1.282	Agree
		33.3%	30.7%	13.3%	15.3%	7.3%			
5	CBT is not compatible with other test method I use	50	24	29	18	29	3.32	1.516	Agree
		33.3%	16.0%	19.3%	12.0%	19.3%			
<b>Grand Mean</b>							<b>3.474</b>		<b>Agree</b>

From Table 4.3 above, Item one shows a mean rating of 3.55 which indicate and agree that the potential for immediate feedback with CBT could help Mathematics and Mathematics Education Undergraduate Students' learn better than the delayed feedback of PBT, Item two of table 4.3 above shows a mean rating of 3.26 which indicate and agree that CBT makes examination writing easier for Mathematics and Mathematics Education Undergraduate Students', Item three of table 4.3 above show a mean rating of 3.57 which indicate and agree that CBT test knowledge of the subject as well as IT (Information Technology) skill, item four of table 4.3 above show a mean rating of 3.67 which indicate and agree that CBT enables assessment of a wide range of topics more quickly than PBT, item five of table 4.3 above show a mean rating of 3.32 which indicate that Mathematics and Mathematics Education Students perceive that CBT is not compatible with other test method I use.

The Grand mean of Table 4.3 above show a mean of 3.474 which suffice to show that computer based test is the best form of assessment as perceived by Students' in Federal University of Technology Minna.

**4.1.4 Research Question 3:** Do Mathematics and Mathematics Education undergraduate students of Federal university of Technology Minna perceive Computer Based Test to be problematic.

**Table 4.4 Table showing analysis of Research Question three**

		RATING							
S/N	Items	SA	A	UD	SD	D	mean	Std.D	REMARK
1	Computer Based Test (CBT) does not allow me to express my mind	76	42	0	23	9	4.02	1.293	Agree
		50.7%	28.0%	0%	15.3%	6.0%			
2	I find it hard to concentrate on the questions when doing CBT exams	47	39	13	27	24	3.39	1.483	Agree
		31.3%	26.0%	8.7%	18.0%	16.0%			
3	CBT assessment favors some students more than others	68	51	8	15	8	4.04	1.181	Agree
		45.3%	34.0%	5.3%	10.0%	5.3%			
4	CBT is not user friendly while answering questions that involves calculation	77	33	6	28	6	3.98	1.293	Agree
		51.3%	22.0%	4.0%	18.7%	4.0%			
5	CBT allows guessing	95	41	3	3	8	4.41	1.024	Agree
		63.3%	27.3%	2.0%	2.0%	5.3%			
<b>Grand Mean</b>							<b>3.96</b>		<b>Agree</b>

From Table 4.4 above, Item one shows a mean rating of 4.02 which indicate that Mathematics and mathematics Education students perceive that Computer Based Test (CBT) does not allow them to express their mind, item two of table 4.4 show a mean of 3.39 which indicate that Mathematics and Mathematics Education students' perceive that they find it hard to concentrate on the questions when doing CBT exams, item three of table 4.4above show a mean rating of 4.04 which indicate that students perceive that CBT assessment favors some students more than others, item four of Table 4.4show a mean of 3.98 which indicate that Mathematics and Mathematics Education Students' perceive that CBT is not user friendly while answering questions that

involves calculation, item five of Table 4.4 show a mean of 4.41 which suffice to show that Students' perceive that CBT allows guessing.

The Grand mean of Table 4.3 above shows a mean of 3.96 which suffice to show that Mathematics and Mathematics Education undergraduate students of Federal university of Technology Minna perceive Computer Based Test to be problematic.

## 4.2 Testing of research hypothesis

### 4.2.1 Research Hypothesis

There is no significant difference in the perception of Mathematics and Mathematics Education Undergraduate Students on the use of Computer Based Test (CBT) as a Mode of assessment.

**Table 4.5: Table showing analysis of Hypothesis**

Status	N	Mean	Std. D	S. E.M	Df	t-value	p-value
Mathematics	90	19.18	4.617	0.487	148	2.163	0.032
Mathematics Education	60	20.83	4.555	0.588			

The above table gives the number of Mathematics and Mathematic Education students with their mean and standard deviation at 0.05 level of significance.  $P < 0.05$  implies that there is a significant difference in the mean of Mathematics and Mathematics Education Students' perception on the use of Computer Based Test in Federal University of Technology Minna. This could be traced in table 4.5 above with the mean (19.18) score of Mathematics students and the mean (20.83) score of Mathematics Education students with a mean difference of 1.65 significance.

## 4.3 Discussion of Results

The data collected and analyzed provided a clear understanding into the key objectives of this study which is to investigate the perception of Mathematics and Mathematics

Education undergraduate student on the use of Computer Based Test in Federal University of Technology Minna. A total of 150 respondents from two (2) different schools in Bosso campus were used for this study [SPS and SSTE], 90 males and 60 females were selected at random from both faculties to examine the perception of both gender on the use of Computer Based Test in Federal University of Technology Minna.

From the result gotten above and from the data analysis it is clear that the result of result question 1 from table 4.2 shows that Mathematics and Mathematics Education undergraduate students in Federal University of Technology Minna prefer Paper Based Test (PBT) to Computer Based Test (CBT). It is also clear that the result of research question 2 from table 4.3 shows that Computer Based Test is the best form of assessment as perceived by students in Federal University of Technology Minna. More also it is clear that the result of research question 3 from the table 4.4 shows that Mathematics and Mathematics Education undergraduate students of Federal university of Technology Minna perceive Computer Based Test to be problematic based on the following constrain:

- i. Computer based test (CBT) does not allow them to express their mind.
- ii. They find it hard to concentrate on the questions when writing CBT exams.
- iii. CBT assessment favors some students more than others.
- iv. CBT is not user friendly while answering questions that involve calculation.
- v. CBT allows guessing.

Based on the research hypotheses, the results gotten above and from the analysis, it is clear that the hypotheses "there is a significant difference in the perception of mathematics and mathematics education undergraduate students on the use of Computer Based Test (CBT) as a mode of assessment is rejected. The result of the study are seen

in table 4.5 reviewed that the mean score of mathematics education students is greater than the mean score of mathematics students, hence there is significant difference in the perception of mathematics and mathematics education undergraduate students on the use of Computer Based Test (CBT) as a mode of assessment.

## **CHAPTER FIVE**

### **5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS**

This chapter presents the summary of the study, conclusion from the study, recommendations arising from the findings as well as suggestions for further research.

#### **5.1 Summary**

This study investigates Mathematics and Mathematics Education Undergraduate Students' perception on the use of computer-based test (CBT) in Federal University of Technology Minna, Niger State. Five chapters made up this research work.

In Chapter One, Background to the study, Statement of the problem, Aims and Objectives, Significance, Scope and Limitations of the Study were discussed.

Chapter Two reviewed related literatures which provided hints on how the researches that have been carried out in respect to the topic and also channel down to areas to really focus on.

Chapter Three comprises of the methodology which was used in carrying out this research work. A survey research design was adopted and the population consists of all Mathematics and Mathematics Education students in Federal University of Technology Minna, Niger State. A total of one hundred and fifty students (150) were randomly selected from two schools in Bosso Campus and the instrument used in gathering data was a structured questionnaire titled "Mathematics and Mathematics Education Undergraduate Students' Perception on the use of Computer Based Test (CBT).

In Chapter Four, the data collected was analyzed using mean, standard deviation and percentages.

Finally, Chapter Five is a summary of the whole research work, where conclusions were drawn from the survey research carried out and necessary recommendations for further studies

## **5.2 Conclusions**

The Study revealed that:

- i. mathematics and mathematics Education students prefer Paper based test (PBT) to Computer based Test (CBT)
- ii. Computer based test is the best form of assessment as perceived by Students' in Federal University of Technology Minna.
- iii. Mathematics and Mathematics Education undergraduate students of Federal university of Technology Minna perceive Computer Based Test to be problematic.

The result of the study also reveals that there is a significant difference in the perception of Mathematics and Mathematics Education Undergraduate Students on the use of Computer Based Test (CBT) as a Mode of assessment.

## **5.3 Recommendations**

The following are necessary recommendations of this research work:

1. The use of Computer Based Test as a means of assessing students in Federal University of Technology Minna should be continued by the management as a result of the responses of students.
2. Paper based test should be adopted and used in conducting Examinations that involves Calculations as perceived by Mathematics and Mathematics Education Undergraduate Students.

#### **5.4 Suggestion for Further Studies**

1. This work is limited to three hundred and Five hundred Mathematics and Mathematics Education Student only, thus a research could be carried out on how other levels and department perceive Computer Based Test.
2. This work is limited to students of Federal University of Technology Minna only, hence a similar research should be carried out in other Universities in Niger State and across the country.
3. A research should be carried out on the issue of system malfunctioning during the course of taking Computer Based Test in the University.

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