

**INFLUENCE OF COMPUTER SKILLS AND COMPUTER BASED TESTING ANXIETY
ON CBT PERFORMANCE AMONG SENIOR SECONDARY SCHOOL STUDENTS IN
MINJIBIR EDUCATION ZONE, KANO STATE, NIGERIA**

BY

AMINU ISYAKU ABDULLAHI

SPS/14/MED/00107

**A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES
THROUGH THE DEPARTMENT OF EDUCATION, BAYERO UNIVERSITY, KANO, IN
PARTIAL FULFILMENT OF REQUIREMENTS FOR THE AWARD OF MASTER OF
EDUCATION DEGREE IN TESTS AND MEASUREMENT**

SUPERVISOR

PFOF. KABIRU ISYAKU

OCTOBER, 2019

DECLARATION

I hereby declare that this work is the product of my research efforts made under the supervision of Professor Kabiru Isyaku and had not been presented anywhere for the award of a degree or for publication.

Sign

Aminu Isyaku Abdullahi
SPS/14/MED/000107

Date

CERTIFICATION

This is to certify that the research for this dissertation and the subsequent write-up for this dissertation by Aminu Isyaku Abdullahi (SPS/14/000107), were carried out under my supervision

Prof. Kabiru Isyaku
Supervisor

Date

Prof. Bello A. Bello
Head of Department

Date

APPROVAL PAGE

This dissertation has been examined and approved for the award of Master of Education Degree in Tests and Measurement, Bayero University, Kano.

Professor Bulama Kagu
External Examiner

Date

Dr. Abubakar Abdullahi
Internal Examiner

Date

Professor Kabiru Isyaku
Supervisor

Date

Dr Kabiru Bello Dungurawa
P. G. Coordinator

Date

Professor Bello A. Bello
Head of Department

Date

Professor Umar A. Pate
Dean School of Postgraduate Studies

Date

ACKNOWLEDGEMENTS

All praise be to Allah (SWT) May His peace, salutations and blessing be upon the prophet Muhammad (SAW), his household, his Companions and those who follow his path until the last day, I thank ALLAH for giving me the opportunity to accomplish this study. It is with a deep sense of gratitude that I acknowledge the wholehearted guidance and encouragement of my supervisor, Professor Kabiru Isyaku for his untiring guidance, who, despite his tight schedule, spared time to read through my work and give constructive corrections and criticisms. May Allah increase his knowledge and upgrade his health status, Ameen.

I wish to acknowledge, with sincere gratitude the immense contribution of Dr Abubakar Abdullahi, who read through my work and shared his invaluable knowledge and experiences and gave me indispensable advice and words of encouragement, I am truly humble by his efforts, May Almighty (Allah) always guide you. Aameen.

My gratitude is extended fully to Malama Binta Abba for her encouragement, assistance and invaluable technical advice that despite her tight schedule also spared time to read through my work and gave me her own valuable corrections and criticisms. May Allah continue to guide her activities and elevate her position. My gratitude is still extended to the Head of Department, Professor Bello A Bello and Dr Isa Abubakar, Dr Muhammad Adamu Kwankwaso, Dr Bello Shehu Kankarofi, Dr Kabiru Bello Dungurawa, Dr Nasiru Sa'ad, Malam Umar Tsiga and all staff of the Department of Education, Bayero University, Kano, who are too numerous to mention but no less important, May Allah (SWT) reward and bless your tireless efforts.

My gratitude also goes to my entire family, my wife Bilkisu Aminu, my children Rumaisa, Haajara, Fatima, Abdullahi, and Aisha, my sisters Haj. Hadiza Isyaku, Aisha Isyaku (Lami) and Hauwa Isyaku and my brothers Dr. Zubairu Yusuf Muhammad Abdullahi Isyaku, Yusuf Isyaku, Tijjani

Isyaku, Musa Isyaku and Mu'azzam Isyaku, for their love and word of encouragement, my friends at home and school in particularly M. Auwal Akil, M. Hafiz Yusuf M. Kabiru Tsoho, Mustapha Garba, Rudwan Yahya (staff officer KERD), Hamisu Dauda(JARIMI). Malam Umar Idris(Tallman) for always being there; thank you. And also to my colleagues at Gabasawa Local Government Education Authority (LGEA) staff especially Muhammad Kabiru Tsoho for his steadfast support and encouragement.

I also owe a great deal of gratitude, to the Minjibir Zonal Education Staff especially the Director, and his various principals for giving me the necessary data, required for this study, and Haj. Karimatu (Coordinator JAMB, Kano Office), especially for her kind assistance in facilitating the collection of JAMB data.

DEDICATION

This research work is dedicated to my beloved parents, Isyaku Abdullahi Gumawa and Binta Isyaku, for their good prayers, moral and material supports throughout my life and also their patience and financial support given during the period of my study.

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ABBREVIATIONS

CBT: Computer-Based-Tests

CAT: Computer Adaptive Testing

ECTAS: Elementary Computer Test Anxiety Scale

SSCE: Secondary School Education Curriculum

JAMB: Joint Admissions and Matriculation Board

NECO: National Examination Council

WAEC: West African Examination Council

KERD: Kano Educational Research Department

KSSSMB: Kano State Senior Secondary Schools Management Board

NTI: National Teacher Institute

PGDE: Post Graduate Diploma in Education

PPT: Paper and Pencil Tests

P&P: Paper and Pen

ICT: Information and Communication Technology

CRT: Cathode Ray Tube

SPSS: Special Package for Social Science

Operational Definition of Terms

Computer-Based-Test: tests and assessments conducted through the use of organized systems on computers as conducted by JAMB.

Computer Literacy: ability to use computers to perform a variety of tasks, as measured by ICT and Computer Competence Questionnaire.

Computer Anxiety: the fear or apprehension felt by SSIII Students in Minjibir Education Zone, Kano State, when they used computers, or when they considered the possibility of computer utilization, as measured by Elementary Computer Test Anxiety Scale.

CBT-Performance: refers to the JAMB scores obtained by SSIII Students of Minjibir Education Zone, Kano State, in 2017

Location: this is considered to mean schools from rural and urban areas of the Minjibir Education Zone.

Rural Schools: this is considered to mean schools located in rural areas of Minjibir Education Zone.

Tests administration: the act of giving tests items to testee (students) for them to respond back to the giver or tester.

Urban Schools: this is considered to mean schools located in the Kano metropolis and fall under Minjibir Education Zone.

Abstract

The study investigated the influence of computer literacy and Computer-Based Testing anxiety on performance in Computer-based tests among SSSIII students who sat for 2017 JAMB in Minjibir Education Zone, Kano State. There are six objectives, four hypotheses were formulated and tested at $p=0.05$. The population for the study was 438 with sample size determined using Research advisors table (2006) which suggested a sample of 196. This study reviewed related literature concerning computer literacy, computer-based testing anxiety and computer-based testing. The correlated research design (PPMC). And the statistical tool used was t-test. The stratified random sampling incorporated as sampling techniques. The data collection instruments used are ICT Skills and Competence and Elementary Computer Test Anxiety Scale (ECTAS) and SPSS software, correlation and t- test were employed as data analysis techniques. The findings of the study showed first a relatively weak relationship between computer literacy of the students and their performance in computer-based tests with r-value 0.335, secondly, a relatively weak negative relationship between computer-based testing anxiety and performance in computer-based tests with r-value - 0.076 a relatively weak relationship between computer literacy of the students and their computer-based testing anxiety with r-value of 0.124 and lastly no significant difference between Urban and Rural students in computer literacy with F-value of 0.001. From the outcomes of this study, it is concluded that, Computer Literacy and CBT Anxiety influence or affects students' performance in CBT JAMB and that it can be reduced by various efforts of the stakeholders. The findings suggest that there should be enough computers, CBT software, qualified computer education teachers and standby generator for use in Senior Secondary Schools of Kano State and the study should be carried out on this topic by incorporating other design such as regression analysis with different population in other zone or state.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Testing is an unavoidable process in the teaching-learning environment. Tests are so fundamental in the process that most times, evaluative judgments are based wholly on measurements obtained from test scores. Promotion, selection, diagnosis and so on are almost entirely based on tests score. Tests are commonly used in association with cognitive goals in order to review student achievement with respect to a common body of knowledge associated with a discipline or program. Testing in school is usually done for purposes of assessment, to assign students grades (from tests in classrooms) or rank them in terms of abilities (in standardized tests). Many scholars believed that the main purpose of testing in education is to determine how well the objectives of instruction have been attained. Yet tests can serve other purposes in educational settings that greatly improve performance. Therefore, it become mandatory to take all necessary measures to ensure that test scores are valid. They should not reflect the level of students' knowledge of the test content as well as related skills. This implies that students should lose points only because they do not know the information and not for unrelated reasons.

In Nigeria Students are assessed using paper and pen on cognitive abilities.

This mode of assessment is however, characterized by different forms of examination malpractices. The threat of the malpractices on the validity of examination outcomes has resulted in some examination bodies adopting a different mode of tests administration. One of such bodies is the Joint Admissions and Matriculation Board (JAMB) that has introduced Computer-Based-Testing (CBT) in the conduct of Unified Tertiary Matriculation Examination (UTME).

Federal Government of Nigeria in 2011 introduced a new Secondary School Education Curriculum (SSEC) which made computer education a compulsory subject to secondary school students. Graduates of the new SSEC were expected to possess relevant information and communication technology skills and become well prepared to live and contribute meaningfully in a globalized computer society. The expectation is that computer education would make the students computer literate in line with the computer revolution permeating the globe.

With the introduction of Computer-Based-Tests in Nigeria, unfortunately students especially in Kano State seem to be lacking the needed computer basic skills and awareness necessary for them to cope with recent e-assessment demand. They also seem to be anxious whenever confronted with the Computer-Based-Test, as a new form of assessment and the fear of losing the traditionally familiar method. This, as justified by the statement

of the JAMB Boss, Professor Is-haq Oloyede, were he decried "lack of valuable information on JAMB activities: computer-based tests and misconception cut-off point were major challenges to have affected the board image negatively". According to him, "many parents and candidates have not recovered from what many called 'technophobia'¹ the fear of technology, which makes them think CBT method is cumbersome". (Agency Report in Premium Times, May 9, 2017 retrieved on 8th November, 2018) This situation became alarming. It was based on this background that the researcher investigated the influence of computer literacy, computer-based-testing anxiety on performance in computer-based-tests of senior secondary school students with a chosen case study of Kano State Minjibir zonal education area.

Computer is one of the most important innovations of the 20th century and has dramatically and irrevocably changed the way we live. The educational sector is not left out of the computer revolution affecting every facet of human existence. The importance of computer education to students cannot be over-emphasized especially now that the world has been reduced to a global village by technology. The use of computer plays important role in all tiers of education and Computer-Based-Testing (CBT) is increasingly being used for assessment of students' knowledge in many examination Computer-Based-Tests offer several benefits over traditional paper-and-

pencil or paper-based tests. Technology based assessment provide opportunities to measure complex form of knowledge and reasoning that is not possible to engage and assess through traditional method. Therefore, technology today offers many new opportunities for innovation in educational assessment through rich new assessment tasks and potentially powerful scoring, reporting and real-time feedback mechanisms (Scalise and Gifford, 2006). Computer Based Tests have emerged as one of the recent “innovative” approaches to assessments, and examination bodies are moving from paper and pencil standardized testing to the electronic format in order to eliminate materials and provide more timely feedback, cheaper and speedier test delivery. Computer based testing vastly expands testing possibilities beyond the limitations of traditional paper-and-pencil tests.

Computer literacy is the ability to use computers to perform a variety of tasks and is becoming fundamental to the learning process (Osuji, 2010). It is also the ability to tell the computer what you want it to do and understand what the computer says. Computer literacy can be defined in terms of the amount of knowledge and skills acquired by an individual to perform a given task using a computer system. Computer literacy is being able to handle a wide range of varying computer applications for various purposes. Two distinct components to computer literacy are awareness and competence. Awareness requires a person to have understanding of how computers

impact their day to day life as well as the larger society while competence is the ability to handle various computer operations. For students, the acquisition of computer skills is indisputably a *sine qua non* for survival in today's world. It has become very indispensable in order to be competitive in today's labour markets. Increasingly, an individual is today considered to be truly literate if he or she combines the ability to read and write with the capability to use a computer.

Nigerian students must soon be computer literate to acquire higher education as the Joint Admissions and Matriculation Board (JAMB), which examines students for higher education in Nigeria partially introduced CBT in 2013 which was fully implemented in 2015 through 2016. Similarly, the West African Examinations Council (WAEC) and National Examinations Council (NECO) are also planning for CBT. This has generated apprehensions and anxieties on students' ability to participate in CBT bearing in mind the low computer proficiency of the students coupled with a number of other problems to include: non availability and accessibility of computers to classrooms, teacher quality and teaching method, learning environment and learner characteristics. Other problems include erratic power supply, poor maintenance of computers, low computer literacy of teachers and students and high classroom population.

Computer anxiety, with the introduction of Computer Based Testing, has been among the major academic problems leading to poor academic performance among senior secondary school students as a result of fear of computers. Fear and anxiety are considered closely related to each other and thus it is very difficult to draw any sharp line between the two. However, psychologists suggest that fear is a reaction to a specific stimulus, while anxiety is vague and its cause is not always apparent. Those who are computer anxious may experience fear of the unknown, feeling of frustration possible embarrassment, failure and disappointment. Students' reaction and anxieties to computer may have effect on test scores. Studies on computer anxiety is necessary as research reports have shown that computer anxiety makes users to avoid computers and computer anxiety is a phobic condition that is amenable to change.

1.2 Statement of the Problem

Immediately with the declaration to introduce Computer-Based Test (CBT) mode of tests administration in the conduct of Joint Admissions and Matriculation Board (JAMB) test in Nigeria by the management of JAMB, most parents and students became scared of how to get the cut-off point through electronic-based assessment, bearing in mind the epileptic situation of computer education in our secondary schools which left the prospective

JAMB candidates in low computer literacy. This, as justified by the statement of the JAMB Registrar, Professor Is-haq Oloyede, were he decried "lack of valuable information on JAMB activities: computer-based tests and misconception cut-off point were major challenges to have affected the board activities negatively" (Agency Report in Premium Times, May 9, 2017 retrieved on 8th November, 2018). According to him, "many parents and candidates have not recovered from what many called 'technophobia'¹ the fear of technology, which makes them think CBT method is cumbersome". This situation became alarming, as such therefore, the researcher became interested in investigating the influence of computer literacy, computer-based testing anxiety on CBT performance among SSSIII students in Minjibir Education Zone.

Meanwhile, the registrar, Joint Admissions and Matriculation Board(JAMB), disclosed at a news briefing on Tuesday 9th May, 2017 in Bwari during its 2017 JAMB preparation, that the Board registered a total of 1,736,571 candidates for the 2017 UTME. As he said, the total figure marked a deviation from the past. Imo State had the highest applicants, having 101,868 followed by Osun, Oyo, Ogun, Delta, Anambra, Kaduna and Kano with 70, 276 then Kogi and Benue to complete the top ten consecutively. (Agency Report in Premium Times, May 9, 2017 retrieved

on 8th November, 2018). From the forgoing, one can deduce that, despite Kano the most populated state in Nigeria, according to the current National population statistics became at the eighth position, while, Imo which among the less populated state earned the first position with over thirty thousand difference in terms of candidate registered. What is the reason for these disparities? The outcomes of this study will shade light for the possible answer to this question.

The use of computer has become an important component of education as it plays significant role in all tiers of education. The aim of enacting a policy on computer education in Nigeria in the first place was to establish pilot school and diffuse computer education innovation first to all secondary schools, and then to primary schools. Unfortunately, the project did not take off beyond the distribution and installation of personal computers. To further institutionalized computer education in Nigeria, the Federal Government in 2011 introduced a new Secondary School Education Curriculum (SSEC) where computer education was made a compulsory subject to all secondary school in Nigeria. Computer education before 2011 was a pre-vocational elective at the junior secondary school and a vocational elective at the senior secondary school level. How have these efforts of government enhanced computer literacy of students and prepared them for

CBT? Computer education in Nigeria is bedeviled by many problems such as availability and accessibility of computers to classrooms, teacher quality and teaching method, learning environment and learner characteristics. Other problems include erratic power supply, poor maintenance of computers, low computer literacy of teachers and students and high class population. Despite these shortcomings, JAMB has introduced CBT, WAEC and NECO are also planning to introduce same in their examinations. What are secondary school students perceived level of Computer Literacy (CL) and CBT anxiety in Kano State? Does this affect performance in CBT.

This research therefore, adopted two different scales, one to assess senior secondary school students' computer literacy and the other to assess their state of computer anxiety when confronted with Computer Based Test in Kano State. The adopted scales had been taken to the relevant expertise and face validity was assured. Students were asked to respond to each question on both the two scales/instruments and their relationship between computer literacy, computer-based-tests and their performance in CBT was established.

1.3 Objectives of the Study

The study was designed to achieve the following objectives:

- i. To find out the level of Computer Literacy of SSSIII Students in Minjibir Education Zone, Kano State.
- ii. To find out the level of Computer-Based Testing Anxiety of SSSIII Student in Minjibir Education Zone, Kano State.
- iii. To find out relationship between Computer Literacy and performance in computer-based-tests of senior secondary school students in Minjibir Education Zone, Kano state;
- iv. To find out relationship between computer-based-testing anxiety and performance in CBT of senior secondary school students in Minjibir Education Zone, Kano State;
- v. To find out relationship between computer literacy and computer-based-testing anxiety of senior secondary school students in Minjibir Education Zone of Kano state.
- vi. To find out the difference in Computer Literacy between Urban and Rural SSSIII Student in Minjibir Education Zone of Kano State.

1.4 Research Questions

The following questions guided the study:

- i. What is the level of Computer Literacy of SSSIII Student in Minjibir Education Zone, Kano State?
- ii. What is the level of Computer-Based Testing Anxiety of SSSIII Student in Minjibir Education Zone of Kano State?

1.5 Hypotheses

The following hypotheses were tested at 0.05 level of significance:

HO₁ There is no significant relationship between Computer Literacy and performance in computer- based-tests of senior secondary school students in Minjibir Education Zone, Kano State.

HO₂ There is no significant relationship between computer-based-testing anxiety and performance in CBT of senior secondary school students in Minjibir Education Zone, Kano State;

HO₃ There is no significant relationship between computer literacy and computer-based-testing anxiety of senior secondary school students in Minjibir Education Zone, Kano state.

HO₄ There is no significance difference in Computer Literacy between Urban and Rural SSSIII Student in Minjibir Education Zone, Kano State.

1.6 Significance of the Study

The finding of this research work will be useful to the various categories of people to include: government, examination bodies, school administrators, teachers, students and subsequent researchers. Each will be discussed briefly to give it more meaning. And in a separate paragraph as follows:

The research work will help the students in knowing their situation, which constitute the overall difficulties that hindered them for a successful

examination. This will help them in taking correct measures to curtail such anxiety whenever confronted with the Computer-Based Test (CBT). So that their performance will be improved.

The research work will be useful to the government especially since the government is expected to have the responsibilities of providing the schools with adequate and qualified computer education teachers to teach students, and make computers available and accessible to students to enable them learn and practice computer skills. It equally has the responsibility of ensuring that the rural schools are not left behind in the provision of computer infrastructures.

The research work in another look will be useful to school administrators since they are free to give students training on how to confront and answer e-assessment. It will help school administrators by stimulating them to create some form of Computer Based Test and be introduced in schools' assessment systems in order to acquaint students with the rubrics of the CBT.

This research work will equally be useful to teachers. Their work always is to impart knowledge to learners and they have a very important role to play in facilitating learning. They are considered ambassadors of knowledge as such, they need to be encouraged to integrate computer in their teaching, students will easily profit and acquire the needed skills to confront CBT

successfully.

Generally speaking, the conduct of research is a life-long activity, and the essence of conducting every research is to add something new to the existing body of knowledge. Therefore, this piece of intended work if conducted will be exposed to subsequent researchers who could read and be benefited. They can also find out where the researcher stopped and where o continue on the area under study.

The research will also be useful to examination bodies who have introduce the new electronic method of assessment. It will help them to inspire students, school administrators as veil as the government on what to do to achieve successful e-assessment. At the end of this finding Examination bodies will be advised to provide some sort of facilitative guide to students, such as, tutorial packages on their examinations to schools for students to practice before the actual examination.

1.7 Scope and Delimitation of the Study

The research work was concerned with the influence of computer literacy, computer-based- testing anxiety on CBT performance. Hence, the study was only concerned with CBT performance in 2017 JAMB , computer literacy and CBT anxiety, based on gender and location of the respondents, among Senior Secondary Schools in Minjibir Education Zone under the Kano State

Senior Secondary Schools Management Board. The study was delimited to Paper and Pen rests and all other variables that may influence CBT performance. Likewise, the researcher is not interested in schools under the Science Board, Private schools and schools under Federal Government.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

Although the primary uses of computers in education are instructional and administrative, the expansion of computer technology has created many possibilities for computer applications in the area of testing and assessment. The use of computer plays important role in all tiers of education and Computer Based Testing (CBT) is increasingly being used for assessment of students' knowledge in many examinations (Fadeyi, Desalu, Ameen, and Adebayo, 2010). Many important issues have to be considered when administering tests by computers. Among these are the equivalence of scores obtained in computerized testing compared with conventional paper- and-pencil tests, and the impact of computerization on the test-taker. This chapter discussed these issues as well as the current applications of the computer in testing, advantages and disadvantages of computerized testing, and the effects of administering tests via the computer.

2.2 Conceptual Framework

2.2.1 Computer Literacy

Remarkably, the definition of computer literacy varies widely. It can be referred to as the comfort level someone has with using computer programs and other applications that are associated with computer. This includes

knowing how computers work and operate, retrieved on November 9th, 2016 from www.dtic.mil/dtic/tr. In the view of Aquino (2013) Computer literacy is the ability to communicate using appropriate and accurate terminology and basic computer skills. He also asserted that students must be able to demonstrate rudimentary competency in: keyboarding; word processing and information retrieval, in order to meet the computer literacy requirement. Retrieved on November 9th 2016 from <https://www.notebook.lausd.net/REF.913.!.> Oluwatayo (2012) defined computer literacy in terms of the amount of knowledge and the skills acquired by an individual to perform a given task using a computer system. For students, the acquisition of computer skills is indisputably a *sine qua non* for survival in today's world. It has become very indispensable in order to be competitive in today's labour market. Increasingly, an individual is today considered to be truly literate if he or she combines the ability to read and write with the capability to use computer.

2.2.2 Testing

Tests are detailed or small scale task carried out to identify the testee's level of performance and to find out how far the person has learnt what was taught or be able to do what he/she is expected to do after teaching. Tests are carried out in order to measure the efforts of the testee and characterize the performance. Whenever someone is tested, it is to find out what he knows,

what he does not know, or even what he partially knows. Test is therefore an instrument for assessment. Assessment is broader than tests, although the term is sometimes used to mean tests (NTI/PGDE, 2010). On the other hand, **Testing** is the process of administering the test on the testee. In other words, it is the process of making testee or letting him take the test in order to obtain a quantitative representation of the cognitive or non-cognitive traits he possess (NOUN, 2006).

2.2.3 Current Applications of the Computer Testing

The computer is currently being used in many areas of testing and assessment. In addition, to the already established uses of computers for test scoring, calculation of final grades and test score reporting, computers can also be used for the determination of test quality, test item banking and test assembly, as well as for test administration Orianshlay, 2015.

2.2.4 Test Administration

The computerized administration of tests has also been considered as an attractive alternative to the conventional paper-and-pencil mode of administration (African Journal of Computing & ICT retrieved 19th October, 2016 from www.ajocict.net). In a computerized test administration, the test-taker is presented with items on a display device such as a cathode-ray tube (CRT) and then indicates his or her answers on

a response device such as a standard keyboard. The presentation of test items and the recording of the test-taker's responses are controlled by a computer. Most of the attention to computerized test administration however, has been directed towards psychodiagnostic assessment instruments such as psychological tests and personality inventories (Orianshlay, 2015). Even in the case of education-related ability and achievement tests, testing (as part of computer-assisted instruction or computer-managed instruction) has mostly been used as the basis for prescribing remedial instructional procedures to determine if the student has achieved mastery, and also to provide the student with some feedback of how he or she performed. Christine (2011).

Four main computer-administered testing procedures used in educational assessment settings include computer-based testing, computer adaptive testing, diagnostic testing and the administration of simulations of complex problem situations. Computer-Based Testing (CBT) generally refers to "using the computer to administer a conventional (i.e. paper-and-pencil) test" (Wise & Plake, 2009). That is, all examinees receive the same set of test items. Unlike conventional testing where all test-takers receive a common set of items, computer adaptive testing (CAT), or "tailored testing", is designed so that each test-taker receives a different set of items with psychometric characteristics appropriate to his or her estimated level

of ability. Aside from the psychological benefits of giving a test that is commensurate with the test-taker's ability, the primary selling point of adaptive testing is that measurements are more precise when examinees respond to questions that are neither too hard nor too easy for them (Millman, 2004) cited by Orianshlay, 2015. This test involves making an initial ability estimate and selecting an item from a pool of test items for presentation to the test-taker. According to Green, Bock. Humphreys, Linn, & Reckase (2004) each person's first item on an adaptive test generally has about medium difficulty for the total population. Those who answer correctly get a harder item; those who answer incorrectly get an easier item. After each response, the examinee's ability is re- estimated on the basis of previous performance and a new item is selected at the new estimated ability level. The change in item difficulty from step to step is usually large early in the sequence, but becomes smaller as more is learned about the candidate's ability. The testing process continues until a specified level of reliability or precision is reached and the testing process is terminated. This testing is based on Item Response Theory "which provides the mathematical basis for selecting the appropriate question to give at each point and for producing scores that are comparable between individuals" (Ward. 2004). Adaptive testing allows the tailoring of the choice of questions to match the examinee's ability, It adjust item difficulty based on students' responses to

previous items, incorrect responses evoke less difficult items, while correct responses evoke increasingly difficult items. This results in a more refined profile of skill levels for each student (Kozina, 2009).

Another promising use of computer-administered testing is in the area of diagnostic testing. McArthur and Choppin (2004) cited *Journal of educational measurement & ICT*, 2014 retrieved July 15, 2016, describe the approach to educational diagnosis as "the use of tests to provide information about specific problems in the performance of a task by an individual student, information that will point to some appropriate remedial treatment". Diagnostic testing is based on the identification and analysis of errors exhibited by students. Analysis of such misconceptions can provide useful information in evaluating instruction or instructional materials as well as specific prescriptions for planning remediation for a student. Research in this area has mainly been in mathematics education. According to Ronau (2006). "a mistake is an incorrect response, whereas an error is a pattern of mistakes indicating a misunderstanding of a mathematical operation or algorithm. It is believed that a student's systematic errors, which are commonly known as "bugs" are not random but rather are consistent modifications of the correct procedure. The microcomputer has been used to provide a rapid analysis of errors and a specification of the errors that a particular student is making (Orianshlay, 2015).

A current application of computer-administered testing is in the presentation of branching problem simulations. This method however, is not used widely in educational settings but rather in medicine and other health-related field in professional licensing and certification testing (Christine (2011)).

2.2.5 Advantages of Computerized Testing

The potential benefits of administering conventional tests by computer ranges from opportunities to individualize assessment, to increases in the efficiency and economy with which information can be manipulated. Several of these advantages offered by computerized test administration over printed test administration have been described by Ward (2004), Fletcher & Collins (2006), and Wise & Plake (2009). Much of educational testing has traditionally been managed on a mass production basis. Logistical considerations have dictated that all examinees be tested at one time. The computer as test administrator offers an opportunity for more flexible scheduling; examinees can take tests individually at virtually any time. During testing, examinees can also be given immediate feedback on the correctness of the response to each question. However Computer-based tests, and particularly computer adaptive tests, have been shown to require less administration time than conventional test. For example, using achievement tests with third and sixth graders, Olsen, 2009 reported that the

computerized adaptive tests required only one-fourth of the testing time required by the paper-and-pencil administered tests, while the computer-based tests required only half to three-quarters of the testing required by the paper-and-pencil administered tests, while the computer-based tests required only half to three-quarters of the testing required by the paper-and-pencil administered tests. Hence, when computerized tests are used, students can spend more time engaged in other instructional activities, and less time taking tests. Christine (2011).

Another advantage of computerized testing is the capability to present items in new, and potentially more realistic ways (Wise & Plake, 2009). A printed test has display limitations. While it can present text and line drawings with ease, it cannot provide timing of item presentation, variable sequencing of visual displays, animation or motion. The graphics and animation capabilities of computers provide the possibility of presenting more realistically simulated actions and dynamic events in testing situations. Assessment of science process or problem-solving skills, in particular, is areas where this type of application can be useful. Variables can be manipulated and the corresponding outcomes portrayed as they are measured. What results is a more accurate portrayal of situations that rely less heavily than conventional assessment procedures on verbal understanding. For example, the change in length of the shadow cast by a

stick at various times of the day can be observed. (Wise &Plake, 2009) On a physics test, instead of using a completely worded text or a series of static diagrams to present an item concerning motion, a high-resolution graphic can be used to depict more clearly the motion in question. This should represent a purer measure of the examinee's understanding of the motion concept because it is less confounded with other skills such as read-trig level. This implies a higher degree of validity for the computerized test item. Computer-animated tests such as this, may have special applications with students who have reading comprehension problems or difficulty translating words into images. Printed tests may therefore not provide an accurate measure of the true ability of the student. Christine (2011)

The elimination of answer sheets in computer-administered tests can eliminate some traditional errors such as penciling in the answer to the wrong item number, failing to erase an answer completely, and inadvertently skipping an item in the test booklet but not on the answer sheet. By presenting only one item per screen, the computer automatically matches responses with the item number; examinees can also focus on one item at a time without being distracted, confused, or intimidated by the numerous items per page for paper tests. Computerized tests may therefore provide more accurate measures of performance for students who have lower reading ability, lower attention span, and higher distractibility.

Moreover, convenient features for changing answers can replace time-consuming erasing on printed answer sheets. Christine (2011)

The administration of tests by computer also allows the collection of data about examinee response styles. These include information such as which items are skipped, how many answers are changed, and response latencies. The latter may refer to the time it takes an examinee to answer an item; analysis time for any complex drawing, graph, or table; reading time for each option; response selection time, or response speed. Precise measurement of any of these latencies is virtually impossible with paper-and-pencil tests. Christine (2011)

Other attractive features of computerized testing include more standardized test administration conditions and immediacy of score reporting. Within a few minutes after completing the test, the examinee or the test administrator can receive a score report and prescriptive profile. There are no paper copies of the tests or answer keys to be stolen, copied or otherwise misused. The computer-administered test can include multiple levels of password and security protection, to prevent unauthorized access to the testing materials, item banks or answer keys. Christine (2011)

2.2.6 Disadvantages of Computerized Testing

Despite the many advantages associated with computer-administered tests,

potential problems exist as well. Use of the response entry device, whether keyboard, touch screen, or mouse can introduce errors. Pressing a wrong key in response to a question results in an error, and the validity of the individual's results is compromised. The amount of printed text that can be shown on a monitor screen can limit both the length of the question and possible responses. The need for multiple computer screens to read lengthy comprehension items might introduce a memory component into the construct being measured (Bunderson, 2009).

Another problem involves the time lag between an individual's answer to an item and the resulting response from the computer. Long time lags between responses can result in negative user attitudes, anxiety and poor performance. Another source of anxiety for individuals using a computer concerns with their often mistaken perception that the system will require an inordinate amount of mathematical or computer skills to operate, or that the system can be easily harmed if an error is made by the user (Samson, 2003). Anxiety and the possible resulting negative impact on performance can occur as a result of poor system design or inaccurate user perceptions or both. Further shortcoming of computer-administered tests, especially in psycho-diagnostic assessment, concerns the use of norms in the interpretation of test scores. Most of the tests that are currently administered by computer were originally developed for a traditional paper-and- pencil

approach. Differences in mode of administration may make paper-and-pencil norms inappropriate for computer-administered tests. (Samson, 2003). There are also measurement problems associated with the use of computer-administered tests. These are related to item types, item contamination that arises from certain test design strategies, and the non-equivalence of comparison groups in item analyses (Sarvela & Noonan, 2008). With regard to item type, difficulties arise when constructed-response items (such as fill-ins and short answers) as compared to selected-response items (for example multiple-choice, matching and true/false) are developed for the computer. It becomes almost impossible to program all the possible correct answers, when considering alternative correct answers, wording, spacing and spelling errors. A tremendous amount of programming is involved for even a partial subset of all possible correct answers. There are psychometric implications as well. Students could supply correct answers that simply are not recognized by the computer; the result could be lower reliability and poorer discrimination indices. Because of these reasons, computer-administered tests are mainly restricted to multiple-choice items. Christine (2011)

Another psychometric issue in computer-administered testing is the problem of item contamination if instructional design capabilities are incorporated. It is then possible to allow students to preview test items,

receive feedback on the correctness of their answers while items are still being presented, or retake items which were drawn randomly from an item pool. In this situation, items which are dependent upon each other (for example, an item which requires the student to use the result from item 3 to compute item 4) would be contaminated if a student receives feedback after each item. Or, the correct answer for one item could provide subtle clues to the correct answer on another item. There are motivational concerns as well. If a student is consistently answering items incorrectly, the negative feedback might be detrimental to motivation on future items. Likewise, a series of correct-answer feedbacks can promote greater motivation in future items. The problem is in the differential effects of item feedback across high and low achieving students. One other contamination problem results from the practice of selecting items randomly from an item bank for a particular test. There is a possibility that a student may see the same items on a second or third try. This problem is exacerbated when item feedback is given. If item feedback is provided, subsequent attempts at tests should contain new items. Furthermore, when test items are drawn randomly from an item pool, for a given test different students may see different items or items presented in a different order. Consequently, there is non-equivalence of comparison groups. Unless the items administered to one student are equal in difficulty to items that are presented to another student, it becomes extremely difficult

to compute item and test statistics (for example, total score, point bi-serial coefficient, estimate of reliability). The problem is that there is no sensible total score. With random item selection, a total test score is defensible for item analysis only if every item is of equal difficulty and equal discrimination. Christine (2011).

2.2.7 Effects of Administering Tests via Computers

Computer-Based tests emerged as a new mode of tests administration to replace the conventional paper and pen. Most standardized tests items written on paper are converted to computer screen for administration. When a conventional paper-and-pencil test is transferred to a computer for administration, the computer-administered version may appear to be an alternate form of the original paper-and-pencil test. However, the scores achieved with computer presentation may not necessarily be comparable to those obtained with the conventional format, and empirical verification is necessary before a claim of equivalent validity is justified. Even though the content of the items is the same, mode of presentation could make a difference in test-related behaviors, such as the propensity to guess, the facility with which earlier items can be reconsidered, and the ease and speed of responding (Green et al, 2006). Wilson, Genco.&Yager (2005), has suggested that there may be cognitive differences in the manner in which a person approaches computer-administered and paper-and-pencil testing

tasks. The manipulation necessary for working with a computer, and the stimulus value of the computer itself may alter the manner of cognitive functioning exhibited by the test-taker. They also noted that, test performance may well be influenced by such seemingly minor differences as the formatting of a microcomputer screen display. One way to look at the issue of empirical validation of an equivalent form of a test is from the point of parallel tests in classical test theory. Following from the definition of parallel tests, the subtest and total test scores for a paper-and-pencil test and its computer administered counterpart should yield equal means, equal variances, and equal correlations with the scores on any other criterion variable (Alex & Ben, 2009). If the scores from the computer-administered test version are intended to be interchangeable with scores obtained by the paper-and-pencil test, then the two test versions can be evaluated against the criteria for parallel tests. Green et al, (2004).have suggested some possible ways in which the psychometric characteristics of tests might be altered when items are switched from paper-and- pencil to computer administration. First, there may be an overall mean shift resulting from a change in the difficulty of the test, with the items being easier or harder. Tests of speed performance in particular, where response time is a determining factor, would be expected to show an overall mean shift, because the time to respond depends critically on the nature of the response.

Second, there could be an item-by-mode interaction. Some items might change, others might not, or some might become harder, others easier. This would be most likely to occur on tests with diagrams; the clarity of the diagrams might be different on the screen. Items with many lines of text, such as paragraph comprehension items, might also show this effect. Third, the nature of the test-taking task might change. For example, students who are more familiar with computers may perform somewhat better on the computer-administered version of the test than equally able students who are less familiar with computers. As a result, the test may unintentionally measure computer literacy along with the subject matter.

Green, et al, (2004) several factors influencing the equivalence and psychometric properties of tests from the two formats have been proposed. One variable that has been used to explain medium effects or differences on examinee scores is the differences in test-taking flexibility and amount of control (Spray, Ackerman, Reckase & Carlson, 2009). This refers to whether examinees are allowed to skip items and answer them later in the test, return to and review items already answered, and change answers to items. If computerized versions of tests do not provide these features and instead display individual items in a single-pass, no-return mode, then this may result in differences in item characteristics, such as the difficulty and discrimination indices (Spray et al, 2009). Individual differences in test

anxiety, computer anxiety and attitudes toward computerized testing, and amount of previous computer experience have also been hypothesized to affect the comparability of scores (Liabre, M.M, Clements, N.E, Fitzhugh, K.B, Lancclolta, G, Mazzagtti, R.D, & Quinones, M, 2007). If these variables differentially affect examinee performance to a significant degree, then they may have implications for equity issues in testing. Other factors that have been suggested to affect the equivalence of scores include the difficulty of the test and the cognitive processes required by the test (Lee, Moreno, & Sympson, 2006), as well as test structure (discrete items versus sets of items based on a common reading passage or problem description), item content (items containing graphics versus items containing only verbal material), test timing (speed versus untimed tests), and item feedback on the test performance (Mazzeo& Harvey, 2008).

2.2.8 Test Anxiety

Although the primary determinant of examinee responses to items on cognitive tests is knowledge or aptitude, other factors such as test anxiety have been shown to be related to test performance. Dusek (2000) defined test anxiety as "an unpleasant feeling or emotional state that has physiological and behavioral concomitants, and that is experienced in formal testing or other evaluative situations. Test anxiety is a special case of general anxiety and has been conceptualized as a situation-specific

anxiety trait. Two meanings of the term anxiety can be distinguished: anxiety as a state and anxiety as a trait. The state-trait model of anxiety set forth by Spielberger (2002) described state and trait anxiety as follows: State anxiety (A-State) may be conceptualized as a transitory emotional state or conditions of the human organism that varies in intensity and fluctuates over time. This condition is characterized by subjective, consciously perceived feelings of tension and apprehension, and activation of the autonomic nervous system. Level of A-State should be high in circumstances that are perceived by an individual to be threatening, irrespective of the objective danger; A-State should be low in non-stressful situations, or in circumstances in which an existing danger is not perceived as threatening. Spielberger (2002) Trait anxiety (A-Trait) refers to relatively stable individual differences in anxiety proneness, that is, to differences in the disposition to perceive a wide range of stimulus situations as dangerous or threatening, and in the tendency to respond to such threats with A- State reactions. Spielberger (2002) Although test situations are stressful and evoke state anxiety (A-State) reactions in most students, the magnitude of the response will depend on the student's perception of a particular test as personally threatening. Individuals with high test anxiety generally perceive tests as more threatening than low test-anxious individuals and respond with greater elevations in state anxiety to the evaluative threat that is inherent in

most test situations (Spielberger, 2002).

The generally accepted current explanation of the negative effects of test anxiety is that they result from ineffective cognitive strategies and attentional deficits that cause poor task performance in evaluative situations. Children with low anxiety level appear to become deeply involved in evaluative tasks but highly anxious children do not. Highly anxious children seem to experience attentional blocks, extreme concern with autonomic and emotional self-cues, and cognitive deficits such as misinterpretation of information. The highly anxious child's attentional and cognitive deficits are likely to interfere with both learning and responding in evaluative situations and result in lowered performance (Orienshlay 2015). Wine (2001), suggested an "attentional" interpretation of the debilitating effects of test anxiety. She contends that, during examinations, highly test-anxious individuals divide their attention between task requirements and task-irrelevant cognitive activities, such as worry. These worry cognitions distract students from task requirements and interfere with the effective use of their time, thereby contributing to performance decrements. Wine (2001) According to Wine, the highly test-anxious person responds to evaluative testing conditions with ruminative, self-evaluative worry, and thus, cannot direct adequate attention to task-relevant variables. Sex differences in test anxiety have also been consistently obtained, with females having higher

levels of anxiety. Given the fact that research has provided evidence of a negative relationship between test anxiety and test performance, an important issue related to the use of computers in testing is whether computer-administered testing will increase test anxiety and depress test performance, particularly in examinees who are relatively unfamiliar with computers

2.2.9 Computer Anxiety

Various phrases have been used in place of computer anxiety: computer stress: computer phobia: technostress; technophobia. Use of technology sometimes has unpleasant side effects, which may include strong, negative emotional states that arise not only during interaction but even before, when the idea of having to interact with the computer begins. (Journal of Information Technology Education, 2009 retrieved on 5th October. 2016). As noted previously, individual differences in computer anxiety has been hypothesized as a factor affecting the performance of an examinee on a computer-based test. This hypothesis rests on the assumption that examinees must feel comfortable with the computer and confident about their ability to work with a computer before being able to use the computer effectively to take a test. As anxiety towards using computers may influence the testing process, such an affective reaction may therefore be an important

factor in whether computer-based testing becomes an accepted component of the evaluation of a school system.

Computer anxiety is generally perceived as a situational manifestation of a general anxiety construct, fitting into the category of anxiety state rather than anxiety trait (Raub. 2001). Cambrc and Cook (2005), defined computer anxiety as "the complex emotional reactions that are evoked in individuals who interpret computers as personally threatening. "Simonson. Maurer, Montag- Torardi, & Whitaker (2007) described it as "the fear or apprehension felt by individuals when they used computers, or when they considered the 'possibility of computer utilization.'" Manifestations of computer anxiety may thus be triggered by consideration of the implications of utilizing computer technology by planning to interact with a computer, or by actually interacting with a computer. Factors such as gender and prior computer experience have been identified as being related to computer anxiety. The amount of experience with computers is also a significant factor in computer anxiety because anxiety is produced in part, by a lack of familiarity with computer use. Chen, (2006) viewed that, manifestations of computer experience could be having access to a computer at home, participating in computer-related courses, playing computer games or knowing how to work with computers. Students who have a computer at

home tend to have lower computer anxiety than those who do not. Boys are also more likely to have used computers more frequently at both home and school, as well as in informal settings. Chen further added that, Perhaps because of this, those that have computer at home are often found to be less anxious about using computers and more self-confident about their abilities with computers. Since computer anxiety might negatively affect one's performance, this variable was hypothesized to exacerbate score differences between computer-administered and paper-and-pencil testing modes.

2.2.10 Impact of Computer Anxiety on CBT Performance

It would be particularly important to establish measures of psychological constructs that impact an individual's use of computers or performance for computer-based tasks like CBT. Two such variables are computer self-efficacy and computer anxiety. Anxiety has been argued to affect computer-based testing by affecting levels of self-efficacy. Reduced anxiety and increased experience only facilitate performance upon tasks indirectly by increasing levels of self-efficacy which, in turn, leads to improved performance. (Bandura, 1986; Sckunk, 2000) cited in Journal of Educational Technology and Society, 2005. Previous research has confirmed that high levels of computer anxiety reduce levels of self-efficacy which in turn lowers computer-based performance attainment. Similarly,

experience with computers also only improves subsequent computer performance if the experience leads to increased levels of self-efficacy (McInemy, McInemy and Sinclair, 1994) cited in Journal of Information Technology Education, 2007.

2.2.11 Effects of Computer Experience on Computerized Test

Performance

Another individual difference variable, is the amount of previous computer experience which has also been hypothesized to have an effect on computerized test performance. Inexperience and unfamiliarity with computers may increase anxiety and interfere with test-taking. If this were the case, then computerized testing may discriminate against examinees who have not worked with computers prior to testing. Those who have more past experience with computers would then be at an advantage when taking a computerized test. Thus individual differences in terms of past access to computers may be an important issue in computer-based testing. Christine (2010).

2.3 Theoretical Framework

2.3.1 Theories of Anxiety

Theories of anxiety are categorized in to psychoanalytic, learning / behavioral, cognitive and uncertainty. There are representative theories

within each category. For the purpose of this chapter. The researcher used three different theories of anxiety developed by different scholars in the field of psychology. Because of their relevance to the topic of this research. Two of these theories of anxiety will be summarized while elaborating on the third showing how it helps in explaining the concept of anxiety in relation to a given stimulus.

The theory of Hans Eysenck (1957) perhaps was considered under the learning / behavioural heading. His learning theory of anxiety rests more on his fundamental personality theory which depends on two major dimensions, extroversion / introversion and neuroticism. In this context, the neurotic individual is particularly sensitive to anxiety-provoking stimuli, this sensitive being based on the automatic nervous system. So, from this perspectives, anxiety-proneness is inherited. However, anxiety can also be learned. Traumatic events lead to unconditioned fear, but can then become conditioned, resulting in new stimuli producing the original maladaptive anxiety responses. Here, then, anxiety is viewed as conditioned fear. There is also another possible stage in the anxiety process according to Eysenck. A person inherits an excitation- inhibition imbalance, if this prompts the person to be at the mercy of the influences of social learning, that is to be introverted, then that person is more prone to anxiety, as well other emotions

such as guilt. From Eysenck's perspective then anxiety is partly inherited and partly learned. The learning part depends firstly on conditioned fear and secondly on the state of the nervous system, *retrieved on 24th November, 2016 from* www.psychology.org.nz/.../NZJP-Vol 24. Another theory was developed by Michael Eysenck (1990) known as cognitive theory of anxiety. He argued that the cognitive system acts as a gateway to the physiological system, so in understanding anxiety it is important to consider both systems, *retrieved on 24th November, 2016 from* www.psychology.org.nz/.../NZJP-Vol. 24. As a background to his theory, M. Eysenck shows that there are difference between people who are high and low in trait anxiety in the information that they have stored in long-term memory. People who are high or low in anxiety also vary in their mood state and so the content of their memory also vary. This also deal with the fact that some people are anxious in some stress-producing situations but not in others. M. Eysenck also argues that those who are highly or low in trait anxiety may also differ in the process side as well as the structure of their cognition system, *retrieved on 24th November, 2016 from* www.psychology.org.nz/.../NZJP-Vol. 24

2.3.2 Lazarus (1991) Theory of Anxiety

This is also known as the 'Appraisal theory. The original version of appraisal theory was put forward by Lazarus (1982). According to this theory,

cognitive appraisal can be subdivided into three more specific forms of appraisal:

- i. Primary appraisal: an environmental situation is regarded as being positive, stressful, or irrelevant to the well-being.
- ii. Secondary appraisal: account is taken of the resources that the individual has available to cope with the situation.
- iii. Re-appraisal: the stimulus situation and the coping strategies are monitored, with the primary and secondary appraisals being modified if necessary

The descriptions of these forms of appraisal seem to imply that they involve deliberate conscious processing. However, that is not necessarily the case. For example, Lazarus (1991) referred to “two kinds of appraisal processes—one that operates automatically without awareness or volitional control, and another that is conscious, deliberate, and volitional”. There are two major developments in appraisal theory since the theoretical formulation of Lazarus (1982). It is claimed that each distinct emotion is elicited by a specific and distinctive pattern of appraisal. For example, Smith and Lazarus (1993) argued that there are six appraisal components, two involving primary appraisal and four involving secondary appraisal:

- Primary: motivational relevance (related to personal commitments?).

- Primary: motivational congruence (consistent with the individual's goals?).
- Secondary: accountability (who deserves the credit or blame?).
- Secondary: problem-focused coping potential (can the situation be resolved?).
- Secondary: emotion-focused coping potential (can the situation be handled psychologically?).
- Secondary: future expectancy (how likely is it that the situation will change?). *retrieved 19/12/2016 from*
www.psypress.co.uk/ek5/.Jchap18.pdf

According to Smith and Lazarus (1993), different emotional states can be distinguished on the basis of which appraisal components are involved and how they are involved. For example, anger, guilt, anxiety, and sadness all possess the primary appraisal components of motivational relevance and motivational incongruence (these emotions only occur when goals are blocked). However, they differ in terms of secondary appraisal components. Guilt involves self-accountability, anxiety involves low or uncertain emotion-focused coping potential, and sadness involves low future expectancy for change.

Lazarus (1991) in his explanation to the concept of anxiety associated it

with uncertainty. He brackets anxiety with fright. According to him fright occur when there is imminent physical harm, whereas he believes anxiety to be characterized by uncertain, ambiguous, existential threats. Lazarus (1991) described anxiety as a unique emotion because of its characteristic association with ambiguity and uncertainty. He further added that it plays a central role in terms of an individual's sense of well-being and is often regarded as 'the key emotion' in adaptation. Lazarus (1991) believed that anxiety is of two types, that is, Trait anxiety denoted (A-trait) and a state anxiety (A-state). He defined state anxiety as “an unpleasant emotional arousal in face of threatening demands or dangers”. Conversely, trait anxiety has been defined as reflecting stable individual differences regarding the tendency to respond with state anxiety in anticipation of a threatening situation, *retrieved 24th November, 2016 from [https://www.timu.edu/educction/..](https://www.timu.edu/educction/)*

As an appraisal theorist, Lazarus suggests that there are various primary appraisals that might contribute to anxiety. The advantage of working at the level of individual appraisal components and by having data hierarchically ordered, provides the opportunity to use the analysis informatively to explore 'the theoretical logic of appraisals'. Thus if there is perceive to be a goal incongruence, then only negative emotions will result, including anxiety. Finally, and most importantly is that, if the ego involvement is

protection of personal meaning and the protection of ego-identity against existential threat, then anxiety is the only possible emotional reaction, *retrieved 24th November, 2016 from* [https://www.nmu.edu/education/.../...](https://www.nmu.edu/education/.../)

Uncertainty, as the core of anxiety, produces a strong drive to objectify it, to make whatever the threat is external and objective in order to reduce the uncertainty. The person's ability to cope is also uncertain. The problem with anxiety, as Lazarus sees it, is that once one objective threat has been coped with another takes its place since the basic problem is existential, *retrieved 24th November, 2016 from* [https://www.nmu.edu/education/.../...](https://www.nmu.edu/education/.../)

Relevance of Lazarus Theory of Anxiety to the Topic of this Research Work

Lazarus (1991) defined state anxiety as “an unpleasant emotional arousal in face of threatening demands or dangers”. Conversely, trait anxiety has been defined as reflecting stable individual differences regarding the tendency to respond with state anxiety in anticipation of a threatening situation. This is very relevant.

According to Lazarus anxiety was characterized by uncertain, ambiguous and existential threat which is relevant to this work. Accordingly, Lazarus suggested that there are various primary appraisals that might contribute to anxiety. Thus, if there is perceived to be goal relevance, then any emotion might ensue, including anxiety.

According to this theory anxiety possess the primary appraisal components of motivational relevance and motivational incongruence because anxiety only occur when goals attainment are blocked by a threat. This is backed by Smith and Lazarus (1993), who opinioned that "different emotional states can be distinguished on the basis of *which* appraisal components are involved and *how* they are involved. For example, anger, guilt, anxiety, and sadness all possess the primary appraisal components of motivational relevance and motivational incongruence (these emotions only occur when goals are blocked). However, they differ in terms of secondary appraisal components. Guilt involves self-accountability, anxiety involves low or uncertain emotion-focused coping potential, and sadness involves low future expectancy for change." *retrieved 19/12/2016 from www.psypress.co.uk/ek.5/.. /chap 18.pdf*

2.4 Review of Empirical Studies

This section involved review of some research studies carried out in educational institutions that are relevant and related to this study.

Rufa'i (2010), carried out a survey research design on the topic "Influence of Test-taking Strategies on Test Anxiety Among Senior Secondary School Students in Kano Metropolis. The population of the study consisted of forty-one thousand, nine hundred and seventy-four senior secondary school students from which simple random sampling technique was employed to

draw the sample of three hundred and eighty (380) students within the sampled area. With regard to data obtained from the research finding, it showed that there was a significant negative relationship between student's test-taking skills and test anxiety in Kano municipality. Some of the recommendation offered were that test-taking skills are taught hand in hand with subject matter knowledge.

A study done by Dangut and John (2014), investigated on the topic "assessment of computer literacy skills and computer based testing anxiety of senior secondary school students in Adamawa and Taraba states. The population included one thousand five hundred and ninety-five final year senior secondary school students in one hundred and six randomly selected senior secondary schools in Adamawa and Taraba States. Result revealed that students have low competence in basic computer literacy skills and high level of anxiety toward Computer-Based Test. There was also a weak positive relationship between computer competence and computer anxiety among the students in the two states.

In recent study by Orianshlay (2015), set out to find out the impact of computer based test on senior secondary school students in Lagos State. The targeted population used was all respondents in some select secondary schools in Agege Local Government Area of Lagos State. The sample of this investigation consists of 100 respondents selected from five schools in the

local education district mention above. The sample schools were drawn from the entire local district using the simple random sampling technique which appears most effective to select groups of respondents with respect to the two gender (i.e. male and female) without biases. Hence, a total of twenty (20) respondents from each school were randomly selected for one sample of this study. Questionnaire is the main research instrument use to collect information from the respondents. The finding of this study has shown that Nigeria secondary schools are lagging behind in the level of application of ICT in the teaching- learning process. The ICT facilities are lacking in schools, the capacity for using ICT by both teachers and students is also very low.

Joshua, Akon, and Ikiroma (2014), investigated on Computer-Based Testing in Nigeria's University Entrants' Matriculation Examination: Readiness and Acceptability of Critical Stake- Holders (students). The purpose of the study was to determine the acceptability and readiness levels of critical stake-holders i.e. the students to this innovation. The research design was survey. The sample for the study comprised 600 final year students in 10 secondary schools in Cross River State, Nigeria. The results of the study indicate that the level of readiness for CBT is high, but that of acceptability is moderate, with a relatively higher preference by student's federal government owned and privately owned schools.

Mohammad and Sanni (2015), Investigated on Computer Based Testing: An Assessment of Student Perception of JAMB UTME in Nigeria. Survey research method was used. The study investigated the perception of student on the use of CBT in examinations, problems encountered by the student and prospective methods of enhancing CBT acceptance in Nigeria. A total of 300 students that sat for 2014 UTME at ABU Zaria were used as the sample. The findings revealed among others, that majority of the respondents confirmed that CBT can curb examination malpractice. Majority of them were also found to prefer CBT than the conventional way of writing examination. Chi square and Pearson's correlation analysis showed that the respondents preferences for CBT was sensitive across gender, age distribution and student faculty. While improving electricity supply was identified as the major problem facing the implementation of JAMB CBT Exam. There is significant difference between students brought up in urban and rural settings in their exposure and use of computers. '

John and Johnson (2014), Examine the impact of computer literacy on students' academic performance in Senior Secondary Schools in Esan West Local Government Edo State. 120 out of 1200 final year students (10%) from the 14 existing secondary schools in the Esan West was participated in the study. Data were obtained using a questionnaire titled: Questionnaire on Students' Computer Literacy Level and Computer Usage(QSLLCU). The

findings revealed that; computer literate students perform better than non-computer literate: computer literate female students in co-educational secondary schools perform slightly better than those in single sex schools.

Chin (2011), in his own part investigated on the effects of Computer-Based Tests on the achievement, anxiety and attitudes of grade 10 science students. The study assessed the equivalence of the computer-based and paper-and-pencil tests in terms of achievement scores and item characteristics, exploring the relationship between computer anxiety and previous computer experience, and investigated the effective impact of computerized testing on the students. A survey design was used and a sample of 105 students participated in the study fifty-four of them are male and fifty-one female. The result indicates that the mean achievement score on the science test was significantly higher for the group taking the computer-based test. No significant difference in mean scores between sexes was observed; there was no interaction effect between mode of test administration and gender. The test anxiety level was not significantly different between the groups taking the two versions of the test. A significant relationship existed between students' prior computer experience and their computer anxiety before taking the test. However, there was no significant relationship between previous computer experience and the computer anxiety evoked as a result of taking the test on the computer.

Likewise, research conducted by Grubb, Faculty of the College of Education Ohio University, April 2013 investigated on the topic "Does the Use of Computer-based Assessments Produce Less Test Anxiety Symptoms than Traditional Paper and Pencil Assessment?" The sample of this study comprised of 335 participants. Result showed that students who took the CBT received lower average grades than the Paper and Pencil group, the researcher believes further research on CBT and P&P assessment across the curriculum could point educators in the right direction when it comes to determining what subject matter is best suited to CBT when it comes to reducing test anxiety and maximizing student scores.

Dingler (2014) conducted a study on the topic "How is student achievement on assessment impacted by the use of computer Based Tests? at Montana State University, Bozeman, Montana. Survey design was used and a sampled participant of 101 5th grade students. The study compared between paper-and -pencil and computer-based test and the outcomes showed that majority of the student prepared CBT version of the test and performed better.

Fulton (2016), carries out a survey research on the "Relationship between test anxiety and standardized test scores" in Walden University, New York. The population of the study involved three classes of fourth graders comprising of 600 students in a public elementary school and the sample

size was 75 students which was relatively small. Correlational design was used to identify the relationship between the students' responses to a Test Anxiety Questionnaire and their test scores. With regard to the data obtained from the research finding, it shows that highly anxious students do not perform well on standardized tests. The researcher recommended that the results of this study will contribute to the knowledge and literature in the field of education.

2.5 Summary and Uniqueness of the Study

Information and Communication Technology (ICT) play vital and copious roles in teaching and learning, specifically the importance of Computer-based test as a form of ICT in the area of learning assessment can never be over emphasized. This chapter started with a general review of studies related to assessment of computer literacy skills and computer based testing anxiety. It was found that since the inception of CBT in 2013 by JAMB in Nigeria a lot of scholars carried out empirical studies to assess its impact, readiness of both teachers and students as well as provision of relevant ICT materials, anxiety to CBT and the equivalence with traditional form (PPT). Variations in finding occur in some different research works carried out in different part of the country. Most of the findings confirmed low readiness of teachers and students to CBT and lack of ICT gadgets especially in public secondary schools. While almost all stake-holders agreed with roles that this

innovation will continuous to offer in terms of curtailing examination malpractice in Nigeria and timely speed of administration and scoring of the test items and many other advantages. Despite all the advantages, scholars confirmed that CBT has some disadvantages, thus, Inexperience and unfamiliarity with computers may increase anxiety and interfere with test-taking. If this were the case, then computerized testing may discriminate against examinees who have not worked with computers prior to testing. Christine (2010) asserted that those who have more past experience with computers would then be at an advantage when taking a computerized test. Thus individual differences in terms of past access to computers may be an important issue in computer-based testing.

The uniqueness of this study is somewhat hinged on the relationship of the computer literacy, computer based testing anxiety and performance in CBT. The delimitations of previous studies in terms of geographical coverage differ in location, time and sizes from this study. The selection of sample subjects for this study is uniquely different from the sample sizes of previously conducted similar studies. The restriction of the variables of this study to two - gender and location - show some uniqueness of this study. Correspondingly, the variations or differing findings of this study from the findings of some previous studies make this study distinctive.

CHAPTER THREE

METHODOLOGY

3.1. Introduction

The chapter deals with the methodology adopted by the researcher in carrying out the entire research work, which covers research design, population, sample and sampling techniques. Measuring instruments, procedure for data collection and statistical methods in analyzing the collected data will also be discussed.

3.2. Research Design

The research designs for this study are correlation and t – test design was used for strutting the collection, analysis and interpretation of data. Correlation research design involves collecting data to determine to what extent a relationship exist between two or more variables, as such, it reveals a clear relationship and provides an estimation of how related the two variables. (Tichapondwa 2013). Therefore, the research found this particular design relevant to establish the relationship between senior secondary school students' computer literacy (CL), Computer-Based testing anxiety and performance in CBT.

3.3. Population and Sample

3.3.1. Population of the Study

The population of the study comprised all students in public senior secondary schools in Minjibir Zonal Education Kano State who sat 2017 CBT version of the JAMB for entry into Nigerian Universities. An estimated total population of four hundred and thirty-eight (438) students comprised the study population.

The table below show the breakdown of the number of students in Minjibir Education Zone by each school in the four Local Government of the zone who faced with CBT by JAMB in the 2017 JAMB.

Table 3.1 Population of the students.

S/N	Name of School	Local Govt	Population
1.	GSS Minjibir	Minjibir	54
2.	GGSS Minjibir	Minjibir	21
3.	GSS Zakrai	Gabasawa	11
4.	GGSS Zakirai	Gabasawa	15
5.	GSS Gunduwa	Gezawa	20
6.	GGSS Jogana	Gezawa	42
7.	GGC Gezawa	Gezawa	37
8.	GSS Yola Wangara	Gezawa	09
9.	GGSS Kadawa	Ungogo	63
10.	GSS Ungogo	Ungogo	34
11.	JAMBAKI GGSS	Ungogo	61
12.	GSS Rimin Gata	Ungogo	30
13.	GSS Rijiyar Zaki	Ungogo	40
		TOTAL	438

Source: Minjibir Education Zone Office, KSSSMB Kano (2016)

3.3.2. Sample size

The required sample size is one hundred and ninety-six (196). Research advisor (2006) table for determining sample size from a given population was used for selecting the sample size.

The researcher used Minjibir zonal education and the number of senior secondary schools who sat 2017 JAMB from the Local Governments involved in the education zone and the size of Sample (196) from the schools using the sampling techniques stratified random sampling as shown in the table below.

Table 3.2: Distribution of sampled schools by Local

Governments			
S/N	Name of Local Government	Total Number of Schools in L.G	Number of Schools Sampled
1	Minjibir	6	2
2	Gabasawa	6	2
3	Gezawa	13	4
4	Ungogo	17	5
	TOTAL	42	13

Table 3.3 Distribution of sample schools and sample size.

S/N	Name of School	Local govt.	Population	Sample
1.	GSS Minjibir	Minjibir	54	24
2.	GGSS Minjibir	Minjibir	21	10
3.	GSS Zakirai	Gabasawa	11	05
4.	GGSS Zakirai	Gabasawa	15	07
5.	GSS Gunduwawa	Gezawa	20	09
6.	GGSS Jogana	Gezawa	42	19
7.	GGC Gezawa	Gezawa	17	17
8.	GSS Yola Wangara	Gezawa	09	04
9.	GGSS Kadawa	Ungogo	63	28
10.	GSS Ungogo	Ungogo	34	15
11.	JAMBAKI GGSS	Ungogo	61	27
12.	GSS Rimin Gata	Ungogo	30	13
13.	GSS Rijiyar Zaki	Ungogo	40	18
		TOTAL	438	196

3.3.3. Sampling Technique

Stratified random sampling technique was used on the basis of urban and rural location of schools in determining the choice of the sample from the population. This is because the total population of students who faced the CBT differ from school to school and from location to location. According to Alley (1998) stratified random sampling is a sampling strategy (a method for gathering participants for a study) used when the population is composed of several subgroups that are vastly different in number. The number of participants from each subgroup is determined by their number relative to their entire population.

Therefore, the researcher drew the proportion of each population of the school under study randomly as a sample. This gave the researcher room for more representation of the population. The sampling identified urban and rural school males and females students. This was used for the study.

Table 3.4: Distribution of sample by location

Location	S/N	Name of School	Population	Sample Total
Urban	1	GGSS Kadawa	63	28
	2	GSS Ungogo	34	15
	3	JAMBAKI GGSS	61	27
	4	GSS RiminGata	30	13
	5	GSS Gunduwawa	20	09
	6	GSS Rijiyarzaki	40	18 110
Rural	7	GSS Minjibir	54	24
	8	GGSS Minjibir	22	10
	9	GSS Zakirai	11	05
	10	GGSS Zakirai	15	07
	11	GGSS Jogana	42	19
	12	GGC Gezawa	37	17
	13	GSS YolaWangara	09	04 86
		GRAND TOTAL	438	86 196

3.4 Instrument for data collection

Two instruments were used to collect data.

3.4.1 Elementary Computer Test Anxiety Scale (ECTAS).

The first instrument was Computer Anxiety Subscale of the Computer Attitude Scale (CAS) by Loyd and Gressard (1984), it consisted of 10 items and presented positively and negatively

Worded statements measuring anxiety towards adopted.

Scoring Procedure

The instrument is of likert-type, the options are Disagrees (SD), Disagrees (D), Agrees (A), and Strongly Agrees (SA). For each of the items, the respondents were asked to choose from the options against each statement. The following point values are attached to the options: for positive statement, SD (1), D (2), Agrees (3) and SA (4). For negative statement, the reverse is the case. Therefore, the highest possible score a respondent can obtain is 40 (i.e. 4×10). While the lowest score is 10 (1×10), the range is 30 (i.e. $40-10$), the mid-point of range is 15. The cut-off point is therefore 25 i.e. maximum score minus the mid-point of the range ($40-15=25$) or minimum score plus the mid-point of the range (i.e. $10 + 15 = 25$) in which either case is 25. Thus, respondent who obtain scores from 25 to 40 is considered as having high anxiety, while those who score below 25 is considered as having low anxiety towards Computer-Based Test.

3.4.2 Computer Skills and Competence Questionnaire.

The second instrument was ICT Skills and Competence Questionnaire by Albirini. (2005). The instrument consist of two sections; section A was designed to solicit demographic information of the respondents i.e. name of school, class and gender. Section B contains 15 items designed to measure computer competence.

Scoring Procedure

The 15 items in section B have four options for each item i.e. a) no competence attracts 0 value, b) little competence attracts 1 point, c) moderate competence attracts 2 points and d) much competence attracts 3 points. I therefore, the highest possible score a respondent can obtain is 45 (i.e. 3×15), while the lowest score is 0 (0×15). The range is 45 (i.e. $45 - 0$). the mid-point of range is 23. The cut-off point is therefore 22 i.e. maximum score minus the mid-point of the range ($45-23=22$) Thus, respondent who obtain scores from 22 to 45 is considered to become competent, while those who score below 22 is considered to be less competent.

3.5 Validation of the instruments

3.5.1 Validity

The items that were adopted for both the two instruments were validated by previous researchers. The initial validity was face and

content types of validity. Nevertheless, the instruments were validated again using factor analysis to give it construct validity. An instrument is said to be valid when the Cronbach Alpha is more than 0.8 and not less than 0.6 (Teo & Fan, 2013). The Cronbach Alpha for all the items in the instruments are more than 0.6, which shows that the instruments used has a high internal validity. The factor loading ranges from 0.719 - 0.074 for CAS; for the ICT Skills and Competence Questionnaire the factor loadings ranges from 0.444-0.986. This indicate that the instruments are constructs valid.

3.5.2 Reliability

The initial alpha coefficient reliability of this CAS was reported by Loyd and Gressard (1984) to be 0.86. The reliability coefficient of the ICT Skills and Competence Questionnaire was 0.94 as reported by Albirini, (2005). The instruments were subjected to internal consistency reliability sorted by Cronbach's. The CAS has an alpha of 0.806 and ICT Skills and Competence Questionnaire have an alpha of 0.873. The Cronbach's alpha values for instruments were found to be quite large. This indicated that the instruments were quite reliable and are obviously in the region suggested by Field, (2005) that a value of 0.7 - 0.8 is an acceptable value for Cronbach's alpha.

3.6 Procedure for Data Collection

The researcher visited Minjibir Education Zone in Minjibir Local Government with an introductory letter collected from the department of education Bayero University, Kano. This officially gave the researcher access to the data on the SS3 who sat 2017 CBT JAMB including their JAMB scores, under the zone. Then the researcher visited each sampled secondary school after formal introduction to the Principals and the Examination Officers access were given to the Students and the researcher administered the instruments personally by himself and with assistance of colleagues in the sampled secondary schools in the zone. The researcher offer some brief explanation to the Students on how to respond to the items as contained in the Questionnaires. The questionnaires were retrieved, scored and student's scores on computer literacy and the CBT anxiety were collected by means of Proforma.

3.7 Procedure for Data Analysis

The researcher used descriptive statistics to summarize the data generated with means and standard deviations. In the vein, frequency counts and percentage were used to answer the first and second research questions. Pearson Product Moment Correlation (PPMC) was employed to test the first, second and third hypotheses. The

fourth hypotheses were tested using independent sample t- test. Gay (1996) described correlation research as that involving the collection of data in order to determine whether as to what extent or degree a relationship exists between two or more quantifiable variables. And the t-test independent sample to analyze the difference between urban and rural respondent in the possession of computer literacy in urban and rural respondent in exhibition of CBT anxiety.

C HAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1 Introduction

This chapter presents the results and interpretations of findings from the study. The data collected were analyzed and presented in tabular forms for easy interpretation. Descriptive statistic using frequency counts, percentages were obtained. Similarly, PPMC was performed to find the relationships between variables of interest. In the vein. T-test for independent sample was obtained to sort for differences between the variables of interest at 0.05 significant levels.

4.2 Summary of Data

Table 4.1 Frequency distribution of Computer Literacy Scores

Table

Class	Frequency	CF
10-19	33	033
20-29	92	125
30-39	53	111
40-49	18	"I

The table above represents the cumulative frequency Distribution of the Computer Literacy scores of the respondents.

Table 4.2 Frequency distribution of CBT Anxiety Scores table

Class	Freq	C/F
0-9	1	001
10-19	3	004
20-29	147	151
30-39	43	194
40-49	2	196

The table above represents the cumulative frequency Distribution of the CBT Anxiety raw scores of the respondents.

Table 4.3 Frequency distribution of CBT Scores Table.

Class	Freq.	C/F
120-179	144	144
180-239	52	196

The table above represents the cumulative frequency distribution of the CBT Scores in 2017 of Minjibir Education Zone.

Table 4.4 Descriptive Statistics of Computer Literacy and ICT Score Table

Variables	N	Mean	SD
Computer Literacy		27.20	8.013
CBT Scores	196	170.90	20.964

The descriptive statistics table above shows the mean and the standard deviation 27.20/170.00 and 8.013/20.964 of computer literacy of the respondents and their scores in computer-based- tests respectively.

Table 4.5 Descriptive Statistics of CBT Anxiety and CBT Scores

Variables	N	Mean	SD
CBT Anxiety		27.05	4.209
CBT Scores	196	170.90	20.964

The descriptive statistics table above shows the mean standard deviation 27.20/27.05 and 8.013/14.209 of computer literacy of the students and their anxiety to CBT scores respectively

Table 4.6 Descriptive Statistics of Computer literacy and CBT Anxiety

Variables	N	Mean	SD
Computer Literacy		27.20	8.013
CBT Anxiety	196	27.05	4.209

The table above shows the mean and the standard deviation 27.20/27.05 and 8.013/4.209 of computer literacy of the students and their anxiety to IBT scores respectively.

Table 4.7 Descriptive Statistics of Computer Literacy between Urban and rural Respondents.

Variables	N	Mean	SD
Urban	103	26.93	7.913
Rural	93	27.49	8.154

The table above shows the number, mean and standard deviation 103/26.93/7.913 and 93/27.498.154 of Urban and Rural Respondents respectively.

4.2.1 Data Analysis

4.3.1. Answers to Research Questions

Question 1: What is the level of Computer Literacy of SSSIII Student in Minjibir Education Zone of Kano State?

Table 4.8 Level in Computer Literacy f the respondent Table

N	Frequency	Percentage
More Competent	132	67.3
Less Competent	064	32.7
Total	196	100.0

The table above represents a summary of the respondents' level in computer literacy, where 67.3 and 32.7 represent the percentage of the respondents level of computer literacy respectively.

Question 2: What is the level of Computer-Based Testing, Anxiety of SSSIII Student in Minjibir Education Zone of Kano State.

Table 4.9 Level of CBT Anxiety of the respondent Table

N	Frequency	Percentage
High Anxious	025	S3.0
Low Anxious	17!	87.0
Total	1%	100

The table above represents a summary of Anxiety loci to CBT of the respondent, where 13 and 87 represent the percentage of high and low anxious student respectively.

4.3.2. Hypotheses Testing

Four hypotheses were tested. The first three, using Pearson Product

Moment Correlation to find the relationship between the three variables of interest at 0.05 level and t-test (independent sample) to test the fourth hypothesis.

H₀ There is no significant relationship between Computer Literacy and performance in computer-based-tests of senior secondary school students in Minjibir Education Zone of Kano state;

Table 4.10 Correlation between Computer Literacy and Performance in CBT.

Variable	N	r	P-value	Direction
Computer Literacy Performance in CBT	196	0.335	0.000	Weak relationship

Correlation is significant at the 0.05 level (2-tailed).

As shown in the table, the r is 0.335 which indicate a 'weak relationship between computer literacy and performance in CBT JAMB. The Pearson product Moment Correlation was used to compute the relationship between computer literacy scores of the respondents and their scores in CBT JAMB using the SPSS mechanism. The relatively low coefficient obtained (0.335) is greater than the p-value (0.00). From the result above null Hypothesis is thus rejected given p- value is less than 0.01 this means that there significant relationship between computer literacy and performance

in CBT of the students.

HO₂ There is no significant relationship computer-based testing anxiety and performance in CBT of senior secondary school students in Minjibir Education Zone of Kano state;

Table 4.11 Correlation between CBT Anxiety and Performance in CBT.

Variable r	P-value Direction
CBT Anxiety Performance in CBT 196	0.290 Negative Relationship

The table above presents the summary of Pearson Product Moment Correlation performed with SPSS. The result from the analysis showed that $r = -0.076$ and p-value of 0.290. The relationship is negative (-0.076), indicated that when anxiety is high, performance is low and vice versa. From the result above, the null hypothesis is thus accepted given the p-value greater than -0.076.

HO₃ There is no significant relationship between computer literacy and computer-based-testing anxiety CBT of senior secondary school students in Minjibir Education Zone of Kano state;

Table 4.12 Correlation between Computer Literacy 2nd CBT Anxiety.

Variable	Nr	P-value	Direction
Computer Literacy			
CBT Anxiety	196	0.12-	0.083 Weak relationship

The table above depicts the summary of Person Product Moment Correlation of computer literacy and CBT Anxiety performed with SPSS Version 20, the r was found to be 0.124 and P- value of 0.083. The relatively low coefficient obtained (0.124) is greater than the p- value (0.083), this means that there is no significant relationship between computer literacy and anxiety to CBT JAMB of the students. The null hypothesis is rejected

HO₄ There is no significance difference in Computer Literacy between Urban and Rural SSS1I1 Student in Minjibir Education Zone of Kano Stale

Table 4.13 t-test analysis between urban and rural SSSIII student in computer literacy

Location	N	t-value	p-value	Decision
Urban	103			
Rural	93	0.01	0.625	Accepted

As shown in the table above, t-calculated value of 0.01. From the result above, the null hypothesis is thus accepted given p-value 0.62

is greater than 0.05.

4.3 Summary of Findings

Findings deduced from the data analysis can be briefly summarized as;

- i. There is significance relationship between computer literacy and performance in CBT JAMB. The relationship is thus weak.
- ii. There is significant relationship between CBT anxiety and performance in CBT JAMB. The relationship is thus weak.
- iii. There is significant relationship between computer literacy and CBT anxiety. The relationship is thus weak.
- iv. There is no significant difference in the mean computer literacy of Urban and Rural SSIII students in Minjibir Education Zone of Kano State.

4.4 Discussion of Results

This section discusses the test of the four hypotheses. Similarities and differences between the study and earlier works are elucidated. Where differences to earlier research are found, reasons for the disparity are given.

The first research question in this study was concerned with the

relationship between the first two variables thus: What is relationship between Computer Literacy and performance in computer-based-tests of senior secondary school students in Minjibir Education Zone of Kano state? As an answer to this research question, the study found that relationship though weak existed with an average of 27.20 to computer literacy and 170.90 to performance in CBT JAMB. This piece of information can be found in table 4.2.3 shown above. The cut-up mark to pass CBT JAMB in the year 2017 is 180, this comparing 170.90 implies that the average performance was below the required pass mark in this year. On the other hand, 27.20 as the average of computer literacy when compared with the range i.e. 30 from the highest mark of 45 and the lowest 15 the students are found to have moderate literacy in computer proficiency in that year. Therefore, moderate or low literacy can be considered as the oases of failure for the average students to possessed with the cut-up mark. To test the hypothesis, students' scores on the Computer Skills and Competence Questionnaire were correlated with their scores on the CBT JAMB. From table 4.3.1 a weak relationship was found between the two set of scores. With calculated 'r' being (0.335) it can be clearly seen that there is relatively weak relationship. Therefore, the null hypothesis H_{01} is rejected to uphold that there is weak

significant relationship between computer literacy and performance in CBT JAMB. The relationship being weak means that there is indication positive impact of the various training and orientations SS3 students are receiving before seating for CBT JAMB since its inception in year 2013. This result is in line with the majority previous studies, like those of John & Johnson (2014), who in their study found positive relationship between computer literacy and students' academic performance in SSS saying that computer literate student performed better than non-computer literate with relative high r value than what was obtainable for this work, this can be possible since student differ in term of orientation received. Dangut and John (2014), found in their studies that students have low competence in basic computer literacy skills toward CBT. This among other things leads to poor performance in their CBT. This indicated positive relationship between literacy in computer and performance in CBT. Thus, performance may improve with the improvement in computer literacy.

The second research question asked: What is the relationship between CBT anxiety and performance in CBT JAMB of senior secondary school students in Minjibir Education Zone of Kano State; as an answer to this question, the study found 27.05 as average in CBT

anxiety and 170.90 in CBT JAMB. The expected range in anxiety is 30 compared with the mean 27.05 it shows that students still have anxiety to CBT which was below average.

To test this hypothesis, students' scores on the Elementary Test Anxiety Scale (ETAS) were correlated with their scores on CBT JAMB. From table 4.3.2 a weak negative relationship was found between the two set of scores. With calculated 'r' being (-0.076) it can be clearly seen that there is relatively weak negative relationship. Therefore, the null hypothesis HO2 is accepted to uphold that there is no significance relationship between computer-based-tests and performance in CBT JAMB. The relationship being weak means that there is positive impact of the various training and orientations SS3 students are receiving before seating for CBT JAMB since its inception in year 2013. This result is opposed to the majority of previous studies, like those of Rufa'i (2010), found significant negative relationship between students' test taking skills and test anxiety to show that when skills are high anxiety will be low and when skills are low anxiety will be high. This finding of this work also revealed similar relationship between CBT anxiety and performance in CBT, as anxiety is high to CBT. Performance will be low in CBT. Fulton (2016). In his finding discovered that anxious

students do not perform well on standardized tests. This is also true to the finding of this work. Chin (2011) that investigated on the effect of CBT on Anxiety, achievement and attitude of grade 10 science students, found among others that the mean achievement score on the science test was significantly higher for the group of students taking the CBT, this is showing that the student are better enjoying CBT than the traditional mode of taking CBT. And by extension it shows the extent of their anxiety, and Grubb (2013), such study suggest that students received lower average grades as a result of anxiety to CBT. This indicated negative relationship as the computer literacy is high on one hand anxiety will be low on the other hand. The negative weak relationship obtained on this research work indicated a sort of development students incurred from various efforts of the stake holders aim at improving students' literacy in computer skills as well as curtailing unnecessary anxiety disturbing them as a result of transition from paper-and-pencil to computer-based-tests mode of tests administration.

The third research question asked: What is the relationship between computer literacy and CBT anxiety of senior secondary school students in Minjibir Education Zone of Kano state. As an answer to this question, the study found 27.20 and 27.05 average in Computer

literacy and CBT anxiety respectively. The expected anxiety range is 30 compared with the mean 27.05 it shows that students still have anxiety to CBT which was below average. This piece of information can be found in table 4.3.3 shown above.

To test this hypothesis, students' scores on the ICT Skills and Competence Questionnaire were correlated with their scores on the Elementary Test Anxiety Scale (ETAS). From table 4.3.3 a weak relationship was found between the two set of scores. With calculated 'r' being (0.124) it can be clearly seen that there is relatively weak relationship. Therefore, the null hypothesis H_{03} is rejected to uphold that there is relationship between computer literacy and CBT anxiety only that the relationship is weak. The relationship being weak means that there is positive impact of the various training and orientation SS3 students are receiving before seating for CBT JAMB since its inception in year 2013. This result is opposed to the majority of previous studies, like those of Fulton (2016), with regard to the data obtained from the research finding, it shows highly anxious students do not perform well on standardized tests Dangut and John (2014), reported that student have low' competence in basic computer literacy skills. This is almost similar to the finding of this work which found students with moderate literacy in computer as this can be seen from

the mean score of computer literacy (table 4.3.3 above) when compared with overall score 45 obtained from the overall highest score in ICT and Computer Competence Questionnaire. John and Johnson (2014), Orianshlay, (2015), such studies suggest that students have low' competence in basic computer literacy skills toward CBT and that low literacy in computer increase the level of anxiety towards CBT this among other things leads to poor performance in their CBT. This indicated negative relationship between literacy in computer and CBT anxiety, that is, when competency is higher in computer usage the anxiety to CBT will be low and when it is low anxiety will be high.

The findings from hypothesis four showed no significance difference in computer literacy between urban and rural respondents. This supports the work of John and Johnson (2014) that investigated on the impact of computer literacy on student's academic performance in senior secondary schools in Esan West Local Government Edo state, reporting there was no significant difference between urban and rural respondents in computer literacy Likewise, the finding of this study opposed to what was revealed by Josh, Akon and Ikiroma (2014), that investigated on Computer-Based Testing in Nigeria's Universal Entrances' Matriculation Examination: Readiness and

Acceptability of Critical Stake-Holders (Students), that found students in urban areas performing better than their counter parts in rural areas.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

Based on the analysis of data in the previous chapter, this chapter presents a summary of the findings of the study, the conclusions deduced from the findings as well as recommendations. Hence this section includes a brief restatement of the problem and the most important findings of the study. The results are pulled together and examined as a whole. Important facts revealed by the data are highlighted and their relationships are pointed out. Recommendations both from the study and for further research are suggested, going by implications of the study.

5.2 Summary

With the introduction of CBT by Joint Admission and Matriculations Board (JAMB) in 2013 SSS III students in Nigeria became scared of this modification from paper-and-pencil mode of tests administration to computer-based-tests. Many of such students perform far below their full potential, bearing in mind low computer proficiency of the students as well as the teachers. This problem was attributed to the lack of availability and accessibility of computers to classrooms, lack of qualified enough computer teachers, poor maintenance of computers, erratic power supply, to mention but main. This study investigated on the influence of computer literacy,

computer-based-testing anxiety on CBT performance among SSSIII Students in Minjibir Education Zone. For this purpose, two different scales as Well as students' performance in 2017 CBT JAMB were used to correlate each other. The general outcome of this research showed a weak relationship between computer literacy and performance in CBT JAMB ($r = 0.335$), a very weak negative relationship between CBT anxiety and performance in CBT JAMB ($r = -0.076$). a weak relationship between computer literacy and CBT anxiety ($r = 0.124$) and finally with no difference between urban and rural students in the possession of computer literacy with t - cal.value of 0.001.

5.3 Conclusions

From the outcome of this study, the following conclusions were drawn:

Computer literacy do have a weak effect on students' performance on CBT JAMB. The weak relationship means that the effect of computer proficiency is no longer detrimental on CBT JAMB and this by extension means that the training students are receiving before taking CBT JAMB as part of preparation is of paramount important, because it is showing positive result. There exists negative relationship between CBT anxiety and performance in CBT JAMB. This is because the higher the anxiety the lower the performance in CBT JAMB. Although the coefficient here is very small, this also justify the fact that the students are feeling very less anxiety with the

regard to CBT JAMB.

Relationship also does exist between computer literacy and CBT anxiety. The coefficient found in this study is very small to show that the relationship has a very minimal effect. Therefore, majority of the student are now capable to use computer for e-assessment especially in JAMB.

5.4 Recommendations

For so long, the issue of students' assessment in various level of education have been done through paper and pencil mode until recently JAMB introduced CBT to replace the current mode in use this issue now has taken centre stage in researches in the educational area especially test administration in the field of test and measurement. There are many studies whose targeted at investigating assessment, transition, advantages and disadvantages, of CBT in relation to P&P. Each study suggests measures and remedies to improve the new e-assessment and appreciate the innovation based on the findings of the study. This research is no different. The study was designed to investigate the relationship in order to suggest ways to improving student's achievement by increasing their computer proficiency and lowering their tests anxiety levels.

Based on the findings of the research, the following recommendations are made:

5.4.1 Recommendations from the study

The following recommendations were made based on the findings of the study:

1. Government should continue to make computers available and accessible to students to enable them learn and practice computer skills
2. Adequate and qualified computer education teachers should continue to be engaged to teach students.
3. CBT practice software should continue to be made available and accessible to students to enable them practice and be acquainted with the rubrics of CBT.
4. Government should continue to give equal treatment in the orientation and training of both urban and rural students in terms of computer education to see that no differences emerge between urban and rural areas.

5.4.2 Recommendations for further studies

1. Gender issues should also be dissected by interested researchers to determine whether differences exist with regard to possession of computer literacy and the levels of anxiety between male and female students.
2. Prospective researchers are also argued to try another research design to find out whether significant relationship may exist between the

variables

- 3.** It is also recommended that the scope of research be widened to cover all students in Kano State and all other States in Nigeria for the sake of generalization.
- 4.** In conclusion, it is recommended that each individual or group get involved in matters of educational progress. Measures on such matters are not left to policy makers, educationists or parents. Education is everybody's concern and a matter of national as well as self-interest. In this field indeed, everybody is a stakeholder.

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APPENDIX I
Required Sample Size

Population Size	Confidence = 95% Margin of Error				Confidence = 99%			
	5.0%	3.5%	2.5%	1.0%	5.0%	3.5%	2.5%	1.0%
10	10	10	10	10	10	10	10	10
20	19	20	20	20	19	20	20	20
30	28	29	29	30	29	29	30	
50	44	47	48	50	47	48	40	50
75	63	69	72	74	67	71	77	n
100	80	89	94	99	87	93	96	00
150	108	126	137	148	122	135	142	149
200	132	160	177	196	154	174	186	198
250	152	190	215	244	182	211	229	246
300	169	217	251	291	207	246	270	295
400	196	265	318	384	250	309	348	391
500	217	306	377	470	285	365	421	485
600	234	340	432	565	315	416	490	579
700	248	370	481	653	341	462	554	672
800	260	396	526	739	363	503	615	763
1 000	278	440	606	906	399	575	727	943
1 200	291	474	674	1067	427	636	827	1119
1 500	306	515	759	1297	460	712	959	1376
2 000	322	563	869	1700	498	819	1100	1785
2 500		597	952	1984	524	879	1280	2173
3 500	646	641	1068	2565	558	977	1510	2890
5000	357	678	1176	3288	586	1066	1730	3842
7 500	365	710	1275	4211	610	1147	1960	5165
10 000	370	727	1332	4899	622	1193	2090	6239
25 000	378	760	1448	6939	646	1285	2390	9972
50 000	381	772	1491	8056	655	1318	2500	12400
100 000	382	776	1506	8514	658	1330	2560	14220
250 000	383	778	1513	8762	659	1336	2580	15550
500 000	384	782	1527	9248	662	1347	2620	16050
1 000 000	384	783	1534	9512	663	1352	2640	16310
2 500 000	384	784	1536	9567	663	1353	2650	16470
10 000 000	384	784	1537	9594	663	1354	2650	16580
100 000 000	384	784	1537	9603	663	1354	2650	16580
300 000 000	384	784	1537	9603	663	1354	2650	16580

APPENDIX II

Computer Skills and Competence Questionnaire

Dear Sir/Madam

LETTER TO RESPONDENTS

I am a postgraduate student of education department, Bayero University, Kano (BUK) undertaking a dissertation on "relationship between computer literacy, computer-based testing anxiety and performance in CBT on senior secondary school students of Kano State. This questionnaire is aimed at soliciting responses on the relationship between computer literacy, computer-based testing anxiety and performance in CBT on senior secondary school students of Kano state with a chosen case study of Minjibir Education Zone. Please carefully read and respond to the following items in the questionnaire. Your responses will be purely for academic purposes and kept confidentially.

SECTION 'A'

Respondent's information

Please complete the information below as

appropriate SCHOOL CLASS -----

GENDER ----- JAMB SCORE

SECTION 'B'

ICT Skills and Competence

Questionnaire Instruction

Select and strike appropriately what is true of you from the following options lettered (a) to (d) (a) No competence (b) Little competence (c) Moderate competence (d) Much competence

1. Install new software on a computer

(a) (b) (c) (d)

2. Use a printer

(a) (b) (c) (d)

3. Use a computer keyboarding

(a) (b) (c) .(d)

4. Operate a word processing program (e.g. MS-word)

(a) (b) (c) (d)

5. Use Power Point for presentation

(a) (b) (c) (d)

6. Operate Excel

- (a) (b) (c) (d)
7. Operate database program (e.g. Access)
- (a) (b) (c) (d)
8. Use email in Communicating with others
- (a) (b) (c) (d)
9. Use the World Wide Web to access different types of information
- (a) (b) (c) (d)
10. Solve simple problems in operating computers
- (a) (b) (c) (d)
11. Operate a Graphic program (e.g. Photoshop)
- (a) (b) (c) (d)
12. Use computers for grade keeping
- (a) (b) (c) (d)
13. Select and evaluate educational software's
- (a) (b) (c) (d)
14. Create and organize computer files and folders
- (a) (b) (c) (d)
15. Remove computer viruses
- (a) (b) (c) (d)

APPENDIX III

ELEMENTERY COMPUTER TEST ANXIETY SCALE

Instruction

Select and strike appropriately what is true of you using these codes:
Strongly disagree (SD), Disagree (D), Agree (A), Strongly agree (SA).

1. Using the computer for taking a test did not scare me at all.

SD D A SA

2. Taking the test on a computer made me very nervous.

SD D A SA

3.1 would not feel threatened even if my classmates liked taking the test on the computer.

SD D A SA

4.1 felt aggressive and hostile toward the computer when taking the test on it.

SD D A SA

5.1 would have felt better if I had taken a paper-and-pencil test instead of a computerized test.

SD D A SA

6.1 felt uncomfortable using a computer for this test.

SD D A SA

7. Now that I've finished this test by computer, I would feel at ease in taking other tests on the computer.

SD D A SA

8.1 got a sinking feeling when i saw that i had to use a computer.

SD D A SA

9.1 felt comfortable working with a computer.

SD D A SA

10. Using a computer made me feel uneasy and confused.

SD D A SA

CORRELATIONS
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CBTSCORES
/PRINT=TWOTAIL NOSIG
/STATISTICS
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/MISSING=PAIRWISE.
Correlations

NOTES

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MISSING value handling		are treated as missing.
	Cases Used	Statistics for each pair of Variables are based on all the cases with valid data for that

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Descriptive Statistics

	Mean	Std. Deviation	N
COMPUTER LITERACY	27.20	8.013	196
CBT SCORES	170.90	20.964	196

Correlations

	COMPUTER LITERACY	CBT SCORES
Pearson Correlation	1	.335**
COMPUTER LITERACY Sig. (2-tailed)		.000
N	196	196

CBI SCORES	Pearson Correlation	.335**	1
	Sig. (2-tailed)	.000	
	N	196	196

****.** Correlation is significant at the

0.01 level (2-tailed).

[DataSet]

CORRELATIONS

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CBTSCORES

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/STATISTICS

DESCRIPTIVES

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Correlations

Notes

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<p>Input Activated Database File Writer Weight</p>	<p>Missing Cases Used</p> <p style="text-align: center;"><small>Missing Value Handling</small></p> <p style="text-align: center;"><small>Syntax</small></p> <p>Processor Time Elapsed Time</p> <p style="text-align: center;"><small>Resources</small></p>	<p style="text-align: right;">25-JAN-2018 14:04:42</p> <p>Data Set 1</p> <p><none></p> <p><none></p> <p><none></p> <p>User-defined missing values are treated as missing.</p> <p>Statistics for each pair of variables are based on all the cases with valid data for that pair.</p>

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Correlations

Descriptive Statistics			
	Mean	Std. Deviation	N
CBT ANXIETY	27.05	4.209	196
CBT SCORES	170.90	20.964	196

Correlations

		CBT ANXIETY	CBT SCORES
CBT ANXIETY	Pearson Correlation	1	-.076
	Sig. (2-tailed)		.290
	N	196	196
CBT SCORES	Pearson Correlation	-.076	1
	Sig. (2-tailed)	.290	
	N	196	196

CORRELATIONS
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T CBTANX
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Correlations

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Data	Missing Value Handling	
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Descriptive Statistics

	Mean	Std. Deviation	N
COMPUTER LITERACY	27.20	8.013	196
CBT ANXIETY	27.05	4.209	196

Correlations

		COMPUTER LITERACY	CBT ANXIETY
COMPUTER LITERACY	Pearson Correlation	1	.124
	Sig. (2-tailed)		.083
	N	196	196
CBT ANXIETY	Pearson Correlation	.124	1
	Sig. (2-tailed)	.083	
	N	196	196

Appendix V

T-TEST

GROUPS=LOCATION(1

2)

/MISSING=ANALYSIS

/VARIABLES=COMLIT

/CRITERIA=CI(.95).

T-Test

Notes

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Missing Value Handling	Cases Used	Statistics for each analysis are based on the cases with no missing or out-of-range data for any variable in the analysis.

Syntax		T-TEST GROUPS=LOCATIO N(1 2) /MISSING=ANALYSI S /VARIABLES=COMPL IT /CRITERIA=CI(.95).
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	Elapsed Time	00:00:00.13

[DataSet1]

Group Statistics

	LOCATIO N	N	Mean	Std Deviation	Std. Error Mean
COMPUTER LITERACY	URBAN	103	26.93	7.913	.780
	RURAL	93	27.49	8.154	.840

Independent Samples Test

	Levene's Test for Equality of variances		t-test for Equality of means
	F	Sig.	t

COMPUTER LITERACY	Equal variances assumed	.001	-.490-
COMPUTER LITERACY	Equal variances not assumed		-.489-

Independent Samples Test

		t-test for Equality of Means		
		df	Sig. (2-tailed)	Mean Difference
COMPUTER LITERACY	Equal variances assumed	194	.625	-.363-
COMPUTER LITERACY	Equal variances not assumed	190.645	.625	-.363-

Independent Samples Test

		t-test for Equality of Means		
		Std. Error Difference	95% Confidence Interval of the Difference	
			Lower	Upper
COMPUTER LITERACY	Equal variances assumed	1.148	-2.828-	1.702
COMPUTER LITERACY	Equal variances not assumed	1.150	-2.831-	1.706

Appendix VII

GET FILE='C:\Users\Aminu\Documents\Aminu Reliability data CCS.sav'.

DATASET NAME DataSet1 WINDOW=FRONT.

RELIABILITY

/VARIABLES=item1 item2 item3 item4 item5 item6 item7 item8 item9
item10item11 item12 item13 item14 item15

/SCALE('ALL VARIABLES') ALL

/MODEL=ALPHA

/STATISTICS=DESCRIPTIVE SCALE

/SUMMARY=TOTAL.

Reliability

[DataSet1] C:\Users\EducDept\Documents\Aminu Reliability data

CCS.savScale: ALL VARIABLES

Case Processing Summary

	N	%
Valid	40	100.0
Case Exclude ^s	0	.0
Total	40	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.873	15

Item-Total Statistics

	Scale Mean if Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 1	35.2750	54.922	.689	.857
Item 2	35.2750	60.563	.307	.875
Item 3	36.1750	59.071	.384	.872
Item 4	35.2500	60.090	.670	.865
Item 5	35.3250	61.404	.230	.878
Item 6	35.3500	54.079	.746	.854
Item 7	35.5250	52.769	.730	.854
Item 8	35.4000	53.733	.770	.853
Item 9	35.2750	59.487	.407	.870
Item 10	35.4500	53.485	.677	.857
Item 11	35.6250	56.497	.406	.874
Item 12	35.3000	64.164	.058	.881
Item 13	35.4750	52.615	.760	.852
Item 14	35.2750	56.512	.636	.860
Item 15	35.3250	59.302	.416	.870

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
37.9500	65.126	8.07005	15

Reliability

[DataSet3]

Scale: ALL VARIABLES

Case Processing Summary

	N	%
Valid	40	100.0
Case Excludes	0	.0
Total	40	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.806	10

ai Statistics

Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
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Item 10

30.8250

8.610

.843

737

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
34.2250	12.846	3.58406	10