COMPUTER BASED TEST IN UNIFIED TERTIARY MATRICULATION EXAMINATIONS AS ANTECEDENTS FOR ENHANCING HIGHER ORDER THINKING SKILLS AMONG UNDERGRADUATES IN THE UNIVERSITY OF LAGOS.

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Abstract

21st century educators believe that higher order thinking is more valuable because such skills are more likely to be usable in real life situations in order for learners to be more effective and skillful thinkers. It is in line with this that this research work examined the Impact of Computer Based Test in Unified Tertiary Matriculation Examinations as antecedents for enhancing higher order thinking skills among undergraduate students in the University of Lagos, Akoka. The descriptive research design was adopted in the study. The population for the study includes all the undergraduate students in the University of Lagos, Akoka. Muiti-stage sampling techniques was used to select three faculties and one hundred and ninety eight (198) participants comprising males and females undergraduates. The instrument used for data collection was a self-developed Likert-scale type questionnaire (ICBTAEHOTS). The instrument had a reliability coefficient of 0.77 when tested during the pilot study. Four hypotheses were tested in the study, two of the hypotheses were accepted and two of the hypotheses were rejected at 0.05 level of significance. The results of the data analyses revealed that: there was a significant impact of computer based test in UTME on higher order thinking skills and cognitive skills of undergraduate students, there was no significant impact of computer based test in UTME on the critical and creative thinking of undergraduate students, also, there was no significant gender differences on the higher order thinking skills of undergraduate students. Based on the findings, the study recommended among others that school teachers should constructs and assess their students using more of multiple choice items in their classroom tests, as this will help to stimulate more displays of students' higher order thinking skills and critical skills.. Also, curriculum planners should ensure that all textbooks used in our schools are revised and updated (in terms of adopted examples and scenarios) to meet up with the present-day life situation.

***Keywords**: Computer-Based Test, Unified Tertiary Matriculation Examinations, Thinking Skills, Undergraduates*

Background to the Study

Thinking skills are the heart of learning. Hence, it is impossible to consider learning without thinking. Research suggests that these skills are essential for effective learning which the central goals of education. It has been observed in the world today that it is necessary for the students to develop their higher order thinking skills and to be effective and skillful thinkers. (Abubakar&Adebayo, 2014)..Thinking validates existing knowledge, enables individuals to create new knowledge, build ideas and make connections between them. Thinking entails reasoning and inquiry together with processing and evaluating information. It enables the exploration of perceptions and possibilities. It also involves the capacity to plan, monitor and evaluate one's own thinking, a with a view of refining and transforming ideas and beliefs (Rania, 2015). The thinking skills required by the student in the ongoing globalization system are associated and enhanced by computer knowledge century which could be seen in the assertion of Dangut and Sakiyo (2016).

Higher-order thinking is a perplexing concept and could be defined as the use of critical and creative thinking, which enables one to solve complex problems (Rania,2015). Higher order thinking encompasses a more

complex means as it requires conceiving, manipulating and dealing abstractly with ideas. Nurturing young students' higher-order thinking capability is a major goal of the recent curriculum reform of the world and is crucial for a knowledge-based society. It is a fact that asking students open-ended questions can engage them in making comparisons, providing justification or conducting inquiry based on prior knowledge. This also helps to develop their higher-order thinking skills. Apart from effective questioning strategies, active learning strategies could be adopted to promote higher-order thinking.

Research findings also show that higher-order thinking can be promoted through the flipped classroom as students can pause videos to think about the learning content (Rania,2015). Moreover, some researchers have suggested that Bloom's taxonomy can be used as an effective protocol in assessing students' knowledge which is also possible with the application of computer-based test (Kin-yuen & Yiu-chi, 2016). This assertion suggests that in recent time, higher order thinking has become a recurring decimal in the educational literature as scholars think of harnessing it with the introduction of computer-assisted test in the educational system. To further buttress the importance of computer-based test in harnessing the higher order thinking skills of students, Dangut and Sakiyo (2016) opined that there is a general consensus that computer is the most important innovation in the 21st century and has dramatically and irrevocably changed the way one thinks and lives. The educational sector is not left out of the computer revolution spreading 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 examinations. Technology today offers many new opportunities for innovation in educational assessment through rich assessment tasks and potentially powerful scoring, reporting and real-time feedback mechanisms. CBT has 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 based tests. This indicates that in this era of computer, things are done faster than before and also human resources are saved as it reduces cost, time of conducting examinations and makes the students to think better as undergraduates. The above fact gives a clarion call for everyone who wants to survive in this era to be computer literate, or else such an individual would be left behind.

Computer literacy as name implies is the ability to use computers to perform a variety of tasks and this is becoming fundamental to the teaching and learning process. Computer literacy is being able to handle a wide range of varying computer applications for various purposes. Dangut and Sakiyo (2016) considered computer literacy as educators' belief about their computer knowledge and skills. There are two distinct components to computer literacy: 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. Nigerian students' needs to be computer literate in order to acquire higher education as the Joint Admissions and Matriculation Board (JAMB) which conducts the Unified Tertiary Matriculation Examinations (UTME) to examine students for admission into tertiary institutions in Nigeria partially introduced CBT in year 2013 with a planned full implementation in year 2015. Similarly, the West African Examinations Council (WAEC) and National Examinations Council (NECO) are also planning for

the implementation of CBT in future examinations. This has generated apprehensions and anxieties on many students' ability to participate in CBT bearing in mind of the low computer proficiency of some students.

The historical background of CBT in JAMB dates back to year 2012 when JAMB introduced CBT and Dual Based Test (DBT) forms for UTME; candidates were given the opportunity to use paper /pencil, CBT or DBT forms of the examination. Similar opportunities were given in year 2013 and year 2014 sessions. In 2015 UTME, JAMB restricted every candidate to the use of computer based test format. The introduction of the CBT examinations has attracted comments from researchers. This is because there were a lot of flaws in the conduct of the examination. Some candidate failed CBT form of UTME examination because of incompetence in use of computer, the epileptic power supply and poor level of economic situation in Nigeria which poses challenges that hinder the effective use of CBT for Unified Tertiary Matriculation Examinations in the present Nigerian situation (Nkwocha, Akanwa & Nkwocha, 2015). This shows that adequate preparation with test running of the systems and structures were not in place before the execution of the plan. In the Western nations, where they use computer based examinations, it is clear that the average person in the nation has the knowledge of the computer system and programmes. It would be that the person has been acquainted with the computer before and not to practice for just a short time before the examination. In the Nigerian contexts, research have shown that some students have not actually seen nor work with a computer system before, therefore the introduction of CBT into the UTME increased the fear of UTME candidates.

A critical appraisal of JAMB in years 2015, 2016 and 2017 UTME experiences showed that there were anomalies associated with the use of CBT in JAMB examination. Records showed that some candidates who took UTME in UNIPORT using CBT complained that systems were 'doing off and on magic' and that the systems were insufficient. Some candidates got fatigued as they waited for their turn to use the computer and no JAMB official attended to people's complaints. It was identified that power failure is a problem encountered in computer based tests in Nigeria. A faulty generator at a center in Owerri zone one damaged the computer systems in the center, the candidates in the centre were directed to transport themselves quickly to another center in Orlu where they took the examination.

It is noteworthy that statistics obtained from the office of the Director, JAMB office Abuja, revealed that eighty-two thousand, four hundred and forty-four candidates (82,444) took the UTME in the whole of Imo state which is called Owerri JAMB zone one. Only twenty-two (22) computer centers were made available for the 82,444 candidates. In Owerri senatorial zone which consists of five local governments, forty-five thousand and five (45,005) candidates took the UTME in 2015. Only twelve computer centers were provided for them. Majority of the centers did not have more than 150 computers (Nkwocha, Akanwa & Nkwocha, 2015). If this was the situation with the experience of CBT in JAMB examinations thus far, it would be natural for the students to be frightened whenever they heard of CBT; it would definitely increase their examination phobia with already highlighted shortcomings in the organization of the examination. Experience in the postgraduate studies even showed that as adults, men and women were frightened when they were informed that they were going to use CBT in FED 840 (Quantitative research methods) at the masters' level in the Faculty of Education of University of Lagos. When the day finally came, the examination started, not quite long the light went off for about two minutes and everybody shouted, it took over five minutes for the system to re-function effectively.

It has been observed that despite the numerous advantages of automating examinations, there are still reservations about its viability in Nigeria. It is not uncommon for automated assessment to be received with

mixed reactions by stakeholders. It is on record that while students readily embraced online learning and assessment programme, some teachers did not. Foremost amongst the reasons for doubting the viability of automated assessment in Nigeria is dearth of infrastructures required for its successful uptake. Much of the infrastructures for automated examinations are either obsolete or overstretched in terms of capacity, accessibility reliability and security. Still associated with infrastructure for the automation of examinations is the absence of internet facilities in rural areas requiring that candidates travel long distances to get internet access; and the challenge of erratic power supply (Obioma, Junaidu & Ajagun, 2013). The problems associated with CBT in UTM examinations are enough to increase the fear of the examination in the students and once the fear of the examination is on the extreme, they will not be able to reason or think effectively while solving the examination questions because of their tensed state at the time of taking the examination. The fact is that, with the introduction of CBT in UTME, there are still people with little or no knowledge of the computer especially those in the rural areas, and there are cases of insufficient facilities and unstable power supply which is a major challenge.

One of the advantages of the automated examinations and assessments involve on-the-spot scoring, prompt release of examination results and accurate assessment feedback. These calls for functional state of the art Information and Communications Technology (ICT) hardware and database software; internet connectivity in most schools irrespective of location and constant electricity supply to power the computers. There is also the issue of resistance to change by stakeholders that could constitute stumbling block to automation of public examinations in Nigeria. For school proprietors and other education services providers, expressed resistance could be as a result of the implicit cost of preparing schools for the uptake of automated assessments. While parents and other stakeholders, may express apprehension that students' performance in automated assessments and examinations are more likely to be influenced by individual computer competencies or any other systematic differences than a true expression of knowledge of the subject matter being measured by the examination (Obioma, Junaidu & Ajagun, 2013).

It could be submitted here that in spite of many potentials of CBT, many learners are hesitant to using it. This is due to the fact that many factors affected the acceptance such as perceived usefulness, social influence, perceived playfulness, perceived ease of use, facilitating condition, emotional feedback, content, computer self-efficacy, perceived fairness, goal expectancy, behavioural intention which have been empirically investigated (Hakami, Hussei & Adenuga, 2016). One of such other factors which have not fully received academic attention in information systems research using theoretical model is test anxiety which is part of examination phobia. Test anxiety is regarded as an exceptional instance of fear that arises in evaluation settings especially in the Nigerian situation where things are done for personal interest. In information systems study, anxiety has been identified as a characteristic variable that influences system used. Test anxiety can be defined as a set of philosophical, physiological, and behavioral feedback that usher interest about negative consequences or failure in an appraised situation. Test anxiety primarily depends on the magnitude to which students perceive assessments as threatening, and both personal and environmental attributes can influence the emergence. A number of studies have provided evidence supporting a direct relationship between computer anxiety and computer utilization. The computer anxiety research clearly shows that a highly computer apprehensive individual would be at a great disadvantage compared to his/her peers especially in cases where the user is not competent enough. The use of CBT in UTME for conducting entrance examination for all Nigerian students seeking admission into various institutions of higher learning, undoubtedly aimed at improving the higher order thinking skills of the Nigerian undergraduate students. On the basis of the underline facts, this study was undertaken to examine the impact of the CBT in UTME as

antecedents for enhancing higher order thinking skills among undergraduate students in the University of Lagos, Akoka.

Statement of Problem

Fostering students' Higher Order Thinking Skills (HOTS) has always been an important aim of education. Thinking validates existing knowledge and enables individuals to create new knowledge and to build ideas and make connections between them. Thinking entails reasoning and inquiry together with processing and evaluating information. It enables the exploration of perceptions and possibilities. The implication of this is that computer-based test in UTME could enhance the higher thinking order skills of the undergraduate students in Nigeria. It could also be attested to that right from the inception of CBT in JAMB UTME in Nigeria, the programmes has been saddled with myriad of problems which serve as encumbrance against its optimal performance and growth. These problems as some test takers reported is that, it is more difficult to navigate back to previous questions, about grades, attitudes about convenience, control and validity. Some examinees have a general anxiety about the computer itself, while others are more concerned about their level of computer experience. Some other technical issues in CBT that affect students' response to the designed questions are: Use of the mouse, font size, screen clarity, screen size, screen resolution, display rate and scrolling. The system was supposed to be designed to minimize examinees' frustrations and to limit the sources of examinees anxiety. These additional test design steps are well worth taking because of the effective and measurement improvements they offer. CBT implementation has also been beset by inadequate infrastructures, unstable power supply and even unwillingness of stakeholders to adapt to the new era.

The present status quo of CBT in UTM examination is associated with the higher order thinking skills of the Nigerian undergraduate students. CBT in UTME should be constructed to meet the standard requirements such as that of International Test Commission (ITC) and has been summarized under four issues. These are: the Technology, Quality, Control, and Security. It is against these backdrops that this study was designed to investigate CBT in UTME as antecedents for enhancing higher order thinking skills of undergraduate students in the University of Lagos, Akoka.

Purpose of Study

The overall purpose of this study is to determine the impact of Computer Based Test (CBT) in UTME as antecedents for enhancing higher order thinking skills among undergraduate students of the University of Lagos, Akoka. Other objectives of the study include to

1. Examine whether the use of CBT in UTME enhances the cognitive skills of undergraduate students.
2. Determine the extent to which CBT in UTME enhances critical and creative thinking among undergraduate students.
3. Investigate the impact of gender on the higher order thinking skills of undergraduate students.

Research Hypotheses

The following null hypotheses were postulated for this study:

1. There is no significant impact of CBT in UTME as antecedents for higher order thinking skills of undergraduate students.
2. There is no significant impact of CBT in UTME on the cognitive skills of undergraduate students.
3. There is no significant impact of CBT in UTME on the critical and creative thinking of undergraduate students.

4. There is no significant gender difference on their higher order thinking skills among undergraduate students'.

Research Methodology

The study adopted a descriptive survey research design, utilizing the quantitative approach. The design entails the collection and use of data systematically from a given population to describe certain characteristics features of the population. The design is considered appropriate for this study being that the work is intended to collect certain data from small group with view to describing the whole population vis-à-vis determining the impact of Computer -Based Test in Unified Tertiary Matriculation Examinations as antecedents for enhancing higher order thinking skills among undergraduates in the University of Lagos.

The target population of this study comprised all the undergraduates in the University of Lagos, Akoka, Yaba, Lagos.. Hats and draw method was used in selecting three Faculties from the twelve Faculties in the University of Lagos. Multi-stage sampling technique was used to select one hundred and ninety eight (198) participants for the study. Simple random sampling was used to select three Faculties (Education, Science and Social Science)while stratified sampling techniques was used to select sixty six (66) undergraduates comprising thirty three (33) males and thirty three females (33) from each of the Faculty totaled (198) participants.

Research Instrument

The instrument used for data collection was a self-constructed instrument titled 'Impact of Computer Based Test in UTME for Enhancing Higher order thinking skills (ICBTAEHOTS). It consists of two sections, section A and section B. Section A contains students' demographic variables with items for eliciting the bio-data of the response, while the section B contained statement each of the four (4) subscales respectively measure the concept of CBT in JAMB UTME; CBT and higher order thinking skills of undergraduate students; CBT and cognitive skills of undergraduate students and CBT in relation to creative and critical thinking skills of undergraduate students.

The questionnaire consists of Likert-type of measuring scales which has four (4) response keys that is, (Strongly Agree, Agree, Disagree and Strongly Disagree). It is worthy to note that all the items in the subscales of the questionnaire are positively-keyed items; this means that there is no reverse in the scoring of the items.

Validity of Research Instrument

The research instrument was given to experts in the field of measurement and evaluation. The experts helped to ascertain whether the items in the instruments were well structured to measure the variables of interest in the study, thereby ensuring the content validity of the research instruments.

Reliability of the Research Instrument.

A pilot study was conducted by administering 20copies questionnaire to undergraduate students in Lagos State University, Ojo. After this, Cronbach's Alpha reliability analysis was employed with the aid of Statistical Package for Social Sciences (SPSS) to determine the reliability coefficient of the research instrument. The choice of this method is because it measures the internal consistency of the items on the research instrument. The reliability coefficient of the Cronbach's Alpha value is 0.77 which was considered

adequate for use as it conformed to Ogbazi and Okpala (1994) which stated that if the reliability coefficient is 0.60 and above, the instrument is deemed appropriate.

Results.

Descriptive Analysis of Data

Table 1: Distribution of Students based on their Gender

Gender	Number of Students	Percentage (%)
Males	99	50.0
Females	99	50.0
Total	198	100.0

Table 1 informs that equal number (99, 50.0%) of male and female undergraduate students of the University of Lagos were involved in the study.

Hypothesis 1: There is no significant impact of CBT in UTME on higher order thinking skills of undergraduate students.

Table 2: Analysis of relationship between CBT in UTME and Higher Order Thinking Skills among undergraduate students

Variables	***N***	***Mean***	***SD***	***df***	***r-cal.***	***Sig. (p)***
CBT in UTME	**198**	**17.46**	**1.52**			
				196	**0.33***	**0.01**
Higher Order Thinking Skills						
	198	**16.98**	**1.73**			

$p = \mathbf{0.01} < 0.05$

As revealed in the table above, it was observed that there was a small positive as well as direct relationship between the appreciation of CBT in UTME and students' display of higher order thinking skills during the conduct of the examination. This was evidenced with a yield of the calculated "r" (r-cal. = 0.333*) at 196 degrees of freedom given that the obtained level of significance (p-value) is $0.01 < 0.05$ *(statistical benchmark).* By implication, the null hypothesis is therefore rejected; hence, there is significant impact of CBT in UTME on higher order thinking skills of undergraduate students.

Hypothesis 2: There is no significant impact of CBT in UTME on the cognitive skills of undergraduate students.

Table 3: Analysis of relationship between CBT in UTME and Cognitive Skills among undergraduate students.

Variables	*N*	*Mean*	*SD*	*df*	*r-cal.*	*Sig. (p)*
CBT in UTME	**198**	**17.46**	**1.52**			
Cognitive Skills				**196**	**0.21***	**0.05**
	198	**17.02**	**1.46**			

***p*< 0.05**

From the table above, it was observed that there was a small positive as well as direct relationship between the appreciation of CBT in UTME and students' display of cognitive skills during the conduct of the examination. This was evidenced with a yield of the calculated "r" (r-cal. = 0.21*) at 196 degrees of freedom given that the obtained level of significance is p>0.05. By implication, the null hypothesis is therefore rejected; hence, there is significant impact of CBT in UTME on the cognitive skills of undergraduate students.

Hypothesis 3: There is no significant impact of CBT in UTME on the critical and creative thinking of undergraduate students.

Table 4: Analysis of relationship between CBT in UTME and Critical and Creative Thinking among undergraduate students

Variables	*N*	*Mean*	*SD*	*df*	*r-cal.*	*Sig. (p)*
CBT in UTME	**198**	**17.46**	**1.52**			
				196	**0.032**	**0.653**
Critical and Creative Thinking	**198**	**16.37**	**1.39**			

***p*> 0.05**

From table 4,it was observed that there was a positive as well as direct relationship between the appreciation of CBT in UTME and students' display of critical and creative thinking during the conduct of the examination. This was evidenced with a yield of the calculated "r" value of 0.032 given critical r-value of 0.65 at 0.05 level of significance.. By implication, the null hypothesis is therefore retained hence, there is no significant impact of CBT in UTME on the critical and creative thinking of undergraduate students.

Hypothesis 4: There is no significant gender difference in higher order thinking skills among undergraduate students'

Table 5: Independent *t*-test analysis of gender difference in Higher Order Thinking Skills among undergraduate students

Gender	**N**	**Mean**	**Std. Dev.**	**d.f.**	**t-cal**	**Sig. (p)**
Male	**99**	**17.12**	**1.73**			
				196	**1.11**	**0.27**
Female	**99**	**16.85**	**1.72**			

***p* >0.05;**

The numerical evidences from table 5 shows that there was a meager mean difference (2.63) between the male and female students in their display of higher order thinking skills during the conduct of CBT in UTME (although the male students displayed more higher order thinking prowess than the females, yet both of their responses were well above the *expected mean of10.00* (from a 5-item subscale rated on a 4-point response keys),. Observing the meager mean (average) difference in the display of higher order thinking skills during the CBT in UTME under the t-test Analysis of mean difference, there was a yield of t-*calculated* value 1.112 whose significant level *(p-value)* was 0.267 > 0.05 (statistical benchmark) This *p-value* (as a probability value) of 0.267 implies that the null hypothesis needs to be accepted, hence, there is no significant difference between male and female on their higher order thinking skills.

Discussion of Findings

Findings revealed that the obtained level of significance is 0.01<0.05 *(statistical benchmark).* Hence, there is a significant impact of CBT in UTME on higher order thinking skills of undergraduate students. Uso of (2012) asserted that, higher order thinking skill is one of the types of existing cognitive skills. Considering recency of empirical result, Abubakar and Adebayo (2014) noted that technology-based assessment provide opportunities to measure complex form of knowledge and reasoning (i.e. higher order thinking skills) that is not possible to engage and assess through traditional methods of assessment. Since, the present research result also admitted that the undergraduate students appreciated and appropriated the use of CBT in UTME, it is pertinent to recall what Sanni and Mohammad (2015) which stated that computer based test could enhance the cognitive skills (higher order thinking skill) of the students in undergraduate studies.

Further findings from hypothesis two revealed that there is a significant impact of CBT in UTME on cognitive skills of undergraduate students. Since students' academic performance could be measured in terms of cognitive abilities, it then goes well to state that this present empirical result fine-tunes with that of Uso of (2012) who hinted that computer-based test enhances the cognitive skills of the students which could improve the higher order thinking the undergraduate students. He opined that, some of the cognitive skills include but not limited to critical thinking, problem solving, interpersonal understanding, communication skills, creativity, intellectual curiosity and imagination. Considering recency of empirical result, Abubakar and Adebayo (2014) noted that technology-based assessment provide opportunities to measure complex form of knowledge and reasoning that is not possible to engage and assess through traditional methods. Since, the present research result also admitted that the undergraduate students appreciated and appropriated the use of CBT in UTME.

Hypothesis three found that there is no significant impact of CBT in UTME on critical and creative thinking of undergraduate students. In contrary to the present research finding, Jonassen (2000) in Lin & Dwyer (2006) submitted that through the use of Microsoft Excel to do simple calculations with spreadsheet tool, the effect of computer-based assessment is seen in terms of students' reflective thinking (i.e. an expression of critical and creative thinking) and helping a struggling student's learning.

Findings from hypothesis four revealed that there is no significant difference between male and female on their higher order thinking skills. Contrary to this present empirical result, Hong et al (2013) submitted that among the 234 male and 244 female students on which they conducted an empirical study in a bid to measure specific variables (fluency, flexibility and elaboration) in a critical thinking test, it was discovered that females have mostly higher creative thinking skills compared to males in different age groups. Although Stoltzfus, Nibbelink and Thyrun (2011)'s result [from investigating the issue of gender and creative thinking

skills among 136 undergraduate students, (57 males, 79 females)] indicated that males had higher scores than female in verbal creative tasks, it is noteworthy to state clearly that they did not observe any statistically significant difference in the creative thinking skills of both males and females. Ayyidiz-Potur and Barkul (2009) also concluded that there were no differences among male and female undergraduate students in their use of creative thinking abilities.

Conclusions

The introduction of Computer Based Test (CBT) was well appreciated by many students; this brought about a significant impact on students' display of higher order thinking skills as well as on students' display of cognitive skills during the conduct of CBT in UTME, although significant impact was not observed on students' display of critical and creative thinking; besides, the male students displayed more higher order thinking skills than their female counterparts, even though this gender difference was not statistically significant.

Recommendations

Based on the findings and conclusion in this study, the study recommends the following:

Any form of ICT development is capital intensive. The initial expenses of CBT adoption include; central hardware (internet), local telecommunications hardware, machines in schools and test authoring and delivering software, among others.

1. Nigerian universities should involve private organizations as partners in progress to finance CBT in education so as to effectively enhance the cognitive skills of students in the teaching and learning process.
2. School Teachers should construct more multiple choice items in their classroom tests given to students in such a way to stimulate displays of students' higher order thinking skills and critical skills. This is necessary because it will prepare them well ahead of the Computer Based Test (CBT) in UTME.
3. School Teachers should make concerted effort to raise the standard of their classroom teaching in terms of contents that are relevant to present-day realities. They should make a paradigm shift from "teaching the students what to think" to "teaching the students how to think". This will aid students' reasoning on how they can use what they taught to solve present-day problems of life.
4. Students should not only cultivate the habit of reading/studying their textbooks on their own, but should also ensure they practice multiple- choice past questions on what they read in textbooks are related into real life situations
5. Curriculum Planners should ensure all textbooks used in our schools are revised and updated (in terms of adopted examples and scenarios) to meet up with the present-day life situation. This will in no doubt enhance students' critical and creative thinking (which our world needs today)

References

Abubakar, A. S. and Adebayo, F. O. (2014). Using Computer Based Test Method for the Conduct of Examination in Nigeria: Prospects, Challenges and Strategies. *Mediterranean Journal of Social Sciences*, 5(2), 47-56

Aizikovinsh,-Udi,S and Amit,T.A (2011). *Developing critical thinking in probability lesson*. Proceedings of the conference of the international group for the psychology of mathematics education, 2(1), 51-59

Anderson, Lorin W., Krathwol, David R ., (2001).A taxonomy of learning, teaching and Assessing: A revision of Bloom's taxonomy of educational objectives, New York: Addison Wesley Longman.

Anderson, T. (2004).*Theory and practice of online learning. Athabasca University* (Accessed 11th May, 2018). Http://cde.athabascau.ca/online.book

Ayyildiz-Potur, A. and Barkul, O. (2009). Gender and creative thinking in education: Atheoretical and experimental overview. *ITU Journal of Faculty of Architecture 6(2), 44-57.*

Barak , M. and Dori, Y.J. (2009). Enhancing Higher Order Thinking Skills among in-servicescience education teachers via embedded assessment. *Journal of Science Teachers Education, 20(50), 459-474.*

Costa, A.L. (2002). C*omponents of a dell developed thinking skills program*. New Horizon forLearning.

Dangut,A.J. &Sakiyo,J. (2016).Assessment of computer literacy skills and computer based testing anxiety of secondary school students in Adamawa and Taraba States, Nigeria.

Hakami, Y.A.A., Hussei, R.C.B. &Adenuga, K.I. (2016). Preliminary model for computer based assessment acceptance in developing countries. *Journal of Theoretical and Applied Information Technology, 85(2), 44-78*

Halpern, D.F. (2000). *Sex differences in cognitive abilities.* Lawrence Eribaum Associates USA..

Hong, E., Green, M., and Hartzell, S. (2013). Cognitive and motivational characteristics of elementary teachers in general education classrooms and in gifted programs. *Gifted child quarterly, 55*(4), 250-264

Hong, E., Peng, O'Neil, H.F. and Wu, J. (2013). Domain-general and domain specific creative thinking tests: Effects of gender and item content on test performance. *The Journal of creative behaviour, 47(20), 89-105*

Jonassen, D.H (2000). *Computer as mind tools in schools: Engaging critical thinking*: Saddle River N.J: Prentice Education.

Kerka,P.O (2002) *Higher order thinking skills in vocational education* Hall, Pearson

:ERIC Clearing house.

Kin-yuen, L. &Yiu-chi,L. (2017). Facilitating higher-order thinking with the flipped classroom model: A Student Teacher's Experience in a Hong Kong Secondary School. Journal of *Research and Practice in Technology Enhanced Learning*, 12(8), 1-14.

Lin, C. and Dwyer, F. (2006*). Educational research: Fundamentals for the consumer* (4thedition) Boston: Pearson education.

Nkwocha,P.C., Akanwa,U.N. &Nkwocha,N.C. (2015). Challenges Encountered Using CBT by 2015 UTME Candidates in Owerri Zone One, Nigeria: Test Validity Implications. *IOSR Journal of Research & Method in Education (IOSR-JRME),5(5),28-35.*

Obioma,C., Junaidu,I &Ajagun,G.(2013). *The automation of educational assessment in Nigeria Challenges and implication for service teaching education.* Paper presented at the AnnualConference of the International Association for Educational Assessment (IAEA) held atthe Dan Panorama Hotel, Tel-Aviv, Israel.

Ogbazi,K.A and Okpala,P.O (1994). *Writing research report: Guide for researchers in education the social sciences and the humanities.* Enugu: Press Time Ltd.

Rajendran and Idris (2008). *Teaching and Acquiring Higher Order Thinking Skills. Theory and Practice*: Pernerbit University Pendidikan Sultan Idris.

Rania, A. (2015). Developing and Measuring Higher Order Thinking Skills: Models forState Performance Assessment Systems. *Evaluation Review, 31*(5), 415–439

Sanni,R.A and Mohammad,A.S(2015). Enhancing students' Higher Order Thinking Skills (HOTS) through the Socratic method. *Approach with technology Journal.2(1),28-42.*

Stoltzfus, G., Nibbelink, B.L., Vredenburg, D., and Thyrum E. (2011).Gender, gender role and creativity.*Social behaviour and personality,* 39(3), 425-432.

Usoof,H.(2012).Technology assessment for learning in a distance education degree programme in Sri Lanka.The international *Journal on advances in ICTfor emerging regions 5(1) 105-122.*

Yee,M.H, Widad,O, Jailani, M.Y, Tee, T. K,, Razali, H,, Mimi, PanMohaffyza, M(2011):The level of marzano higher order thinking skills among technology education students*International Journal of Social Science and Humanities,*1(20),121-133.

Yousef, K.O(2016) *Assessment Techniques and Students' Higher Order Thinking Skills.* Department of Mathematics and Science. Preparatory program, Khalifa University, Abu Dhabi,UAE.