# EXAMINERS' ICT PROFICIENCY LEVEL AND ATTITUDE TOWARDS ON-SCREEN ASSESSMENT OF PUBLIC EXAMINATIONS IN NIGERIA.

**BY**

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**Abstract**

*In Nigeria, the West African Examinations Council (WAEC) in August 2012 launched the e-marking portfolio on a trial scale preparatory to the full-embrace of the paradigm shift towards examiners' marking digitally scanned copies of examination scripts on-screen rather than the original paper document. This study therefore, investigated the examiners' ICT proficiency level and attitude towards on-screen assessment of public examinations. The study adopted survey design. A multi stage sampling technique was employed to obtain a sample of 56 Chief Examiners', 388 Team Leaders' and 530 Assistant Examiners' across 36 marking venues in Nigeria. Two instruments were used namely, Examiner ICT Proficiency Scale (EICTPS) and Examiner Attitude towards On-screen Assessment Questionnaire (EAOAQ). The data collected were subjected to descriptive statistics and multiple regression analysis. The study found that examiners' ICT proficiency level was generally low. It was observed that the examiners' had good perception about on-screen marking accuracy and demonstrated positive attitude towards on-screen assessment of public examinations. Examiners' factors considered in this study explained 22.3% of the total variance observed in ICT proficiency level. Examiners' age was positively related to ICT proficiency level. Moreover, examiners' factors explained 3.3% of the total variance observed in the examiners' attitude towards on-screen assessment of public examinations. The gender of the examiners was the most potent predictor of examiners' attitude towards on-screen assessment of public examinations. The findings of this study have implications for technology-driven human capital development in line with global best practices. This study recommends that periodic basic computer appreciation and innovative ICT- based assessment training should be provided for examiners'. This will help to further engender objectivity, accountability, public trust and confidence in the assessment of public examinations in Nigeria.*

***Key Words:*** *ICT Proficiency, On-screen Assessment, Attitude towards On-screen Assessment, Public Examinations.*

## Introduction

Information and Communication Technology arguably are strategic tools for economic growth and development the world over. The radical revolution impacted on human endeavours by ICT in the last decade is pervasive and monumental. In a modern world that is ever changing and highly competitive, we need technology and competence to be able to compete. According to Uwadiae and Adelakun (2011), the global reform in education particularly in response to the effects of globalization demands that any public examination board desirous of being a key player must be in the fore front of applying ICTs to all its educational assessment plans and processes.

Regrettably, the assessment of public examinations in Nigeria is yet to feel the full impact of technological developments as being experienced in advanced countries such as UK, USA, and Singapore. While the advanced economies are in full-embrace of the paradigm shift towards examiners marking digitally scanned copies of examination scripts on-screen rather than the original paper document, public examination authorities in Nigeria are yet to key in to this. It was in realization of the potentials of ICT in solving the challenges inherent in the manual mode of scoring essay scripts that prompted the West African Examinations Council (WAEC) in August 2012 to launch the e-marking portfolio on a trial scale.

According to Haggie (2010) one of the most significant and marked changes that took place in the United Kingdom assessment environment in the past five years had been the adoption of on-screen marking technology. He posits that all major UK suppliers of general qualifications have either implemented or are working towards implementing software and processes to allow paper examination scripts to be scanned and distributed to markers on-screen. It was estimated that since 2010, in the UK more than 10 million examination scripts are marked each year using an e-marking system.

Boston (2005) argues that benefits offered by e-marking include: better quality marks, early detection and remediation of aberrant marking, random distribution of scripts and items to marker, specialization of markers in a limited number of items, reduction of clerical errors, because the computer sums the marks and greater scripts security among other benefits. Haggie (2010) corroborating the views of Boston (2005) reports that quality improvement offered by the e-marking technology relates to: marking quality (standardization, seeding, double marking, improved support); item authority quality (access to item performance data); and service quality (the provision of enhanced reports and analysis for candidates and centres, exploiting item level data).

Johnson and Nadas (2009) showed that marking GCSE English Literature essays on-screen had no significant effect on marker accuracy when compared with how they were marked on paper, although the examiners exhibited different marking behaviours when marking in each mode. According to Haggie (2010) on-screen marking of short answer scripts was reliable and comparable to marking of the paper originals. Powers, Farnum, Grant and Kubota (1997) report that there were no differences between the average scores awarded in both medium and inter-marker agreement was comparable for paper and online scoring. Johnson and Nadas (2009) report that reading long texts on-screen can be more demanding and that this extra demand can have a detrimental effect on how readers comprehend longer texts. Power *et al* (1997) observe that examiners experienced significantly heightened cognitive workload levels while they marked on-screen.

According to Masole (2008) teachers in Botswana indicated that their knowledge in computer was moderate and that they were versed in the use of computer application such as power-point, excel, internet, word and use of email. However, they indicated that they were not so good in webpage design, desktop publishing, file structure, IPSO and Access. Ajmal, Rahman, Ullah, Hina and Ghayyur (2011) in a study conducted in Pakistan report that graduates had low proficiency in the use of computer hardware,

spreadsheets, presentation software and internet, E-learning, blogs, computer programs and faced obstacles in the use of ICT.

In a study conducted by the Global Information Technology (2010), the report used the Networked Readiness Index (NRI), covering a total of 115 economies in 2010-2011, to measure the degree of preparation of a nation or community to participate in and benefit from ICT developments. Nigeria ranked 90th out of the 115 countries surveyed. Further to this, Nigeria ranked 86th out of 104 countries surveyed in 2009 (Global Information Technology, 2009). This indicates a downward trend in Nigeria's preparedness to participate in and benefit from ICT development globally. Ololube (2006) opines that slow access to basic ICT equipment, low internet connectivity and computers, and inadequate training opportunities are barriers to the effective and professional development of teachers, majority of whom are examiners engaged in the assessment of public examinations in Nigeria.

Balancskat, Blamire and Kefala (2006) identified teacher level barriers as one of the factors that may prevent the full use of ICT in school. Such factors related to teachers' attitudes and approach to ICT such as lack of ICT skills, lack of motivation and confidence on ICT, and inappropriate teacher training. According to Yusuf (2005) and Anao (2003) most school teachers lack the skills and literacy to fully utilize the ICT and other common software. Ololube (2006) identify technology related training as a key factor for progress, suggesting that it "plays a crucial role in developing teachers' competency with computer applications as well as influencing teachers' attitudes towards computers". Newhouse (2002) opines that most teachers irrespective of the level of education have minimal ICT literacy. Teachers with internet access at home and those who had computer training demonstrated more attitudes to computers (Tsitouridou and Vryzas, 2003). Notwithstanding these barriers, teachers exhibited great enthusiasm and positive attitude towards the use of ICT in teaching and learning (Yusuf,2005) and, are favourably disposed to using ICT in classroom instructions (Newhouse,2003).

**Statement of Problem**

Assessment of the WASSC Examination is quite a crucial exercise to the West African sub-region and requires that examiners mark accurately and build positive attitude towards the assessment procedures. However, the expanding candidature and high capital outlay involved in the traditional system of assessing candidates' scripts are instructive that technology should be incorporated into the assessment system to further engender objectivity, accountability, public trust and confidence in the assessment system. According to Adelakun ( 2009) cases of examiners' varied behaviours such as inconsistency in assessment, poor handling of scripts and score sheets, superimposition of candidates scores, late submission of assessed scripts, failure to pass scripts for vetting and checking, farming out of scripts, nonchalant attitude, misappropriation of scripts, reactive attitude, etc. abounds. It is crucial that high stake examinations are assessed as accurately as possible thus ensuring fair results for all. This presupposes that those that would be saddled with the marking of the digitally scanned copies of examination scripts on-screen display high level of ICT proficiency to be able to mark accurately with positive attitude. Although, many studies have addressed the challenges of assessment of public examinations from varying perspectives, there is dearth of research on the articulation of a framework for the paradigm shift towards examiners marking digitally scanned copies of examination scripts on-screen rather than the original document. It is therefore, in an attempt to seek a framework for the paradigm shift from the traditional paper-based to on-screen marking that this study sought to determine examiners' ICT proficiency level and their attitude towards on-screen assessment of public examinations; it in addition, sought to determine the relationship between the examiners factors, ICT proficiency and attitude towards on-screen assessment of public examinations.

**Research Questions**

The following research questions were formulated to guide the study.

(1) What is the examiners' ICT proficiency level?
(2) What is the examiners' attitude towards on-screen assessment of public examinations?
(3) To what extent would examiners' factors predict ICT proficiency level?
(4) To what extent would examiners' factors predict attitude towards on-screen assessment of public examinations?

**Methodology**

**Population, Sampling and Sample**

This study adopted survey design. The target population consisted of all examiners who participated in the May/June 2012 WASSCE Coordination and Marking exercise in Nigeria. The study adopted a multistage stratified random sampling technique. The sampling was at four levels: the geo-political level, the state level, subject and marking venue levels. Stratified random sampling technique was extensively used in selecting samples for the study. This sampling technique was used because stratification increases the reliability of survey estimates; improves efficiency of the sampling technique; allows the use of different sampling techniques for a single study; and ensures adequate representation of specific groups in a target population.

As at the time of this study, there were 36 States and the Federal Capital Territory (FCT) in Nigeria, stratified into six geo-political zones. From each geo-political zone, three states were randomly selected. In all, a total of eighteen states participated in the study. Sampling at marking venue level was done by collecting a list of all marking venues from the Examiners' Records Section in WAEC. Thereafter, one marking venue was randomly selected in each State. Sampling at participant level was done using simple random sampling technique. This technique was used to select examiners on subject basis from 36 Marking Venues. In all, 530 Assistant Examiners, 388 Team Leaders and 56 Chief Examiners participated in the study.

**Instrumentation**

The instruments used in this study are: Examiner ICT Proficiency Scale (EICTPS) and Examiner Attitude towards On-screen Assessment Questionnaire (EAOAQ).These instruments were subjected to content and face validation by two educational evaluators from the International Center for Educational Evaluation, University of Ibadan (ICEE), two computer educators from Department of Science and Technology Education, University of Lagos and a network administrator from a private IT firm.

**Examiner ICT Proficiency Scale**

EICTPS was designed to determine the examiners' ICT proficiency level. The EICTPS has two sections, A and B. Section A was designed to elicit responses in relation to examiners' status, marking experience, educational qualification, place of employment, age and gender. Section B consists of fourteen (14) items based on four point scale ranging from 1 = Low, 2 = Moderate, 3 = High and 4 = Very High. A measure of internal consistency and construct validity (Cronbach alpha) was used to establish a reliability coefficient of 0.96. The value was high enough to warrant the use of the instrument in the study.

### Examiner Attitude towards On-screen Assessment Questionnaire

This instrument measured examiners attitude towards on-screen assessment. It consists of twenty-two (22) items. A four point scale was used: Strongly Agree = 4, Agree = 3, Disagree = 2 and Strongly Disagree =1. For positively stated items the scoring was in the order SA = 4; A = 3; D = 2; SD = 1, while it was reversed for negatively worded items. The reliability coefficient using Cronbach alpha was 0.92.

### Results and Discussion

### Research Question 1

What is the examiners' ICT proficiency level?

**Table 1**: **Mean and Standard Deviation on Examiners' ICT Proficiency Level**

| S/N | STATEMENT | RESPONSE | | | | $\bar{x}$ | SD |
|---|---|---|---|---|---|---|---|
| | | VH | H | M | L | | |
| 1. | The use of computer-based packages (e.g. Microsoft: Power Point, Excel, Word, Corel Draw etc.). | 39 (4.0%) | 150 (15.2%) | 502 (51.0%) | 293 (29.8%) | 1.93 | 0.78 |
| 2. | Performance of basic computer tasks (e.g. saving documents, using mouse/pad to navigate, opening documents, changing font and font sizes). | 121 (12.3%) | 216 (22.0%) | 411 (41.8%) | 236 (24.0%) | 2.23 | 0.95 |
| 3. | The use of computer packages like Auto-CAD in making sketches, drawing and illustrations. | 10 (1.0%) | 84 (8.5%) | 351 (35.7%) | 539 (54.8%) | 1.56 | 0.69 |
| 4. | The use of social media networking tools (Facebook, Twitter etc.) to communicate. | 80 (8.1%) | 199 (20.2%) | 373 (37.9%) | 332 (33.7%) | 2.03 | 0.93 |
| 5. | Performance of basic internet tasks (searching/surfing, composing e-mail, attaching files, sending e-mail/opening e-mail, scanning e-mail documents for virus). | 89 (9.0%) | 177 (18.0%) | 387 (39.3%) | 331 (33.6%) | 2.02 | 0.94 |
| 6. | The use of virtual library and search engines (e.g. Goggle, Yahoo Messenger, Mozilla Firefox, Internet explorer). | 93 (9.5%) | 213 (21.6%) | 360 (36.6%) | 318 (32.3%) | 2.08 | 0.96 |
| 7. | Knowledge of Computer Based Testing (CBT) and E-marking. | 26 (2.6%) | 154 (15.7%) | 417 (42.4%) | 387 (39.3%) | 1.82 | 0.79 |
| 8. | Mastery of computer-based packages (e.g. Adobe, Web Page Design, File Structure, IPSO and Access). | 06 (0.6%) | 85 (8.6%) | 334 (33.9%) | 559 (56.8%) | 1.53 | 0.68 |
| 9. | Competence in the use of computer-based desktop publishing. | 21 (2.1%) | 149 (15.1%) | 426 (43.3%) | 388 (39.4%) | 1.80 | 0.77 |
| 10. | The quality of training qualifications acquired in computer operations/ applications. | 27 (2.7%) | 209 (21.2%) | 486 (49.4%) | 262 (26.6%) | 2.00 | 0.77 |
| 11. | Competence in the use of computer tools (e.g. Skype and Web cam) for audio-visual recording. | 28 (2.8%) | 92 (9.3%) | 366 (37.2%) | 498 (50.6%) | 1.64 | 0.77 |
| 12. | Knowledge of Computer Adaptive Testing (CAT). | 10 (1.0%) | 92 (9.3%) | 350 (35.6%) | 532 (54.1%) | 1.57 | 0.70 |
| 13. | Navigation skills to move from one field to another. | 48 (4.9%) | 158 (16.1%) | 407 (41.4%) | 371 (37.7%) | 1.88 | 0.85 |

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| **14.** | **Proficiency in the use of computer assisted learning materials like CD ROM.** | **50 (5.1%)** | **206 (20.9%)** | **394 (40.0%)** | **334 (33.9%)** | **1.97** | **0.87** |

From Table 1, examiners' mean rating scores in ICT proficiency level in all the 14 items, ranged between 1.53 and 2.23. The mean rating in each of the items was lower than 2.50 the mid of the scale. The results show that examiners ICT proficiency level was generally low. For instance, use of computer-based packages (Microsoft: PowerPoint, Excel, Word, Corel Draw etc.) had mean of 1.93; use of computer packages like Auto-CAD in making sketches, drawing and illustrations (mean = 1.56); knowledge of computer-based-testing and e-marking (mean = 1.82); mastery of computer-based packages such as Adobe, Web Page Designs, File structure, IPSO and Access (mean = 1.53); competence in the use of computer tools (e.g. Skype and Web cam) for audio-visual recording (mean = 1.64).

## Research Question 2

What is the examiners' attitude towards on-screen assessment of public examinations?

**Table 2: Mean and Standard Deviation on Examiners' Attitude towards On-screen Assessment of Public Examinations.**

| S/N. | ATTITUDE TOWARDS ON-SCREEN ASSESSMENT | RESPONSE | | | | $\bar{x}$ | SD |
|---|---|---|---|---|---|---|---|
| | | *SA* | *A* | *D* | *SD* | | |
| **1.** | **E-marking technology will improve marking accuracy.** | **272 (27.6%)** | **500 (50.8%)** | **147 (14.9%)** | **65 (6.6%)** | **2.99** | **0.83** |
| **2.** | **Slow servers will discourage examiners to mark on-screen.** | **41 (4.2%)** | **116 (11.8%)** | **482 (49.0%)** | **345 (35.1%)** | **1.85** | **0.78** |
| **3.** | **E-marking technology will motivate examiners to greater productivity.** | **244 (24.8%)** | **540 (54.9%)** | **156 (15.9%)** | **44 (4.5%)** | **3.00** | **0.77** |
| **4.** | **Marking scripts on-screen will strain one's eyes.** | **62 (6.3%)** | **199 (20.2%)** | **399 (40.5%)** | **324 (32.9%)** | **2.00** | **0.89** |
| **5.** | **E-marking will be susceptible to cybercrime.** | **50 (5.1%)** | **176 (17.9%)** | **402 (40.9%)** | **356 (36.2%)** | **1.92** | **0.86** |
| **6.** | **E-marking is more objective than the paper-based marking.** | **171 (17.4%)** | **432 (43.9%)** | **279 (28.4%)** | **102 (10.4%)** | **2.68** | **0.88** |
| **7.** | **Candidates will be disadvantaged because the E-marking system would not allow the checking of their scripts by checkers.** | **64 (6.5%)** | **212 (21.5%)** | **419 (42.6%)** | **289 (29.4%)** | **2.05** | **0.88** |
| **8.** | **Power outage will affect the implementation of E-marking.** | **43 (4.4%)** | **92 (9.3%)** | **397 (40.3%)** | **452 (45.9%)** | **1.72** | **0.81** |
| **9.** | **Examiners will have more freedom with the e-marking portfolio.** | **235 (23.9%)** | **531 (54.0%)** | **161 (16.4%)** | **57 (5.8%)** | **2.96** | **0.80** |
| **10.** | **E-marking will eradicate the superimposition of candidates' scores.** | **339 (34.5%)** | **506 (51.4%)** | **104 (10.6%)** | **35 (3.6%)** | **3.17** | **0.75** |
| **11.** | **E-marking will eliminate the physical movement of scripts by examiners.** | **475 (48.3%)** | **438 (44.5%)** | **48 (4.9%)** | **23 (2.3%)** | **3.39** | **0.69** |
| **12.** | **Examiners ICT proficiency will be improved by the E-marking system.** | **329 (33.4%)** | **542 (55.1%)** | **92 (9.3%)** | **20 (2.0%)** | **3.23** | **1.17** |
| **13.** | **E-marking will facilitate the progressive vetting of scripts by the Team Leaders.** | **213 (21.6%)** | **515 (52.3%)** | **189 (19.2%)** | **67 (6.8%)** | **2.89** | **0.82** |
| **14.** | **E-marking is more transparent than the paper-based marking.** | **255 (25.9%)** | **434 (44.1 %)** | **226 (23.0%)** | **69 (7.0%)** | **2.89** | **0.87** |
| **15.** | **E-marking will eliminate the loss of candidates' scripts by examiners.** | **411 (41.8%)** | **443 (45.0%)** | **91 (9.2%)** | **39 (4.0%)** | **3.25** | **0.78** |
| **16.** | **E-marking will reduce the workload on the examiners.** | **264 (26.8%)** | **471 (47.9%)** | **200 (20.3%)** | **49 (5.0%)** | **2.97** | **0.82** |
| **17.** | **E-marking will quicken the marking of scripts.** | **304 (30.9 %)** | **473 (48.1%)** | **151 (15.3%)** | **56 (5.7%)** | **3.04** | **0.83** |
| **18.** | **E-marking will ensure improved feedback to students.** | **268 (27.2 %)** | **548 (55.7 %)** | **121 (12.3 %)** | **47 (4.8%)** | **3.05** | **0.76** |
| **19.** | **Training of examiners on the E-marking platform will improve marking accuracy.** | **431 (43.8 %)** | **468 (47.6%)** | **65 (6.6%)** | **20 (2.0%)** | **3.33** | **0.69** |
| **20.** | **E-marking will reduce the poor handling of candidates' scripts by examiners.** | **382 (38.8%)** | **494 (50.2%)** | **81 (8.2%)** | **27 (2.7%)** | **3.25** | **0.72** |
| **21.** | **Examiners performance can be automatically** | **329** | **547** | **79** | **29** | **3.20** | **0.70** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **monitored with the E-marking system.** | **(33.4%)** | **(55.6%)** | **(8.0%)** | **(2.9%)** | | |
| **22.** | **The current Website bandwidth of public examination boards should be expanded for the E-marking to be successful.** | **23 (2.3 %)** | **61 (6.2%)** | **495 (50.3%)** | **405 (41.2%)** | **1.70** | **0.69** |

Results in table 2 indicate that the examiners had mean rating scores of between 2.68 and 3.39 for 16 out of the 22 items on the scale, which are higher than 2.50 the mid-point of the scale. This implies that the examiners have positive attitude towards these statements. Further observed was that the remaining six items had mean rating scores of between 1.70 and 2.05 which are lower than 2.50 the mid of the scale. The implication of this is that the examiners had negative attitude towards these six items and these have consequences for the e-marking portfolio. These are; slow servers may discourage examiners to mark on-screen (mean=1.85); marking scripts online will strain one's eyes (mean=2.00); e-marking would be susceptible to cyber-crime (mean=1.92); candidates would be disadvantaged because the e-marking system will not allow the checking of their scripts by checkers(mean=2.05); power outage will affect the implementation of e-marking (mean=1.72) and the current website bandwidth of public examination boards should be expanded for the e-marking to be successful ( mean =1.70).

**Research Question 3**

To what extent would examiners' factors predict ICT proficiency level?

**TABLE 3**: **Standard multiple regression of the six predictor factors on examiners' ICT proficiency level**

| VARIABLE | B | SEB | Beta | T value | Sig |
|---|---|---|---|---|---|
| Status | -0.707 | 0.495 | -0.047 | -1.429 | 0.153 |
| Marking Experience | 0.104 | 0.144 | 0.025 | -0.720 | 0.471 |
| Educational Qualification | 1.484 | 0.448 | -0.094* | 3.309 | 0.001 |
| Place of Employment | 0.676 | 0.312 | 0.062* | 2.167 | 0.030 |
| Age | -4.130 | 0.315 | -0.467* | -13.131 | 0.000 |
| Gender | -1.523 | 0.541 | -0.080* | -2.805 | 0.005 |
| Constant | 38.443 | 1.441 | | 26.676 | 0.000 |

* Significant at $P < 0.05$

| | | |
|---|---|---|
| Multiple R | = | 0.477 |
| R Square | = | 0.227 |
| Adjusted R Square | = | 0.223 |
| F – Ratio | = | 47.791 |
| Significant F. | = | 0.000 |

Regression result reveals that the overall model of the six predictor variables significantly predicts examiners ICT proficiency level, $R^2 = 0.227$, $R^2_{adj} = 0.223$, $F_{(6,977)} = 47.791$, $P < 0.05$. This model accounts for 22.3% of the variance observed in the examiners' ICT proficiency level. A summary of the regression coefficients is presented in Table 3 and it reveals that only four variables significantly contributed to the model. These are age $\beta = -0.467$, $t(977) = -13.131$, $P < 0.05$; educational qualification $\beta = -0.094$, $t(977) = 3.309$, $P < 0.05$; gender $\beta = -0.080$, $t(977) = -2.805$, $P < 0.05$ and place of employment $\beta = 0.062$, $t(977) = 2.167$, $P < 0.05$.

**Research Question 4**

To what extent would examiners' factors predict attitude towards on-screen assessment of public examinations?

**TABLE 4**: **Standard multiple regression of the six predictor factors on examiners' attitude towards on-screen assessment of public examinations**

| VARIABLE | B | SEB | Beta | T value | Sig |
|---|---|---|---|---|---|
| Status | 0.147 | 0.554 | 0.010 | 0.265 | 0.791 |
| Marking Experience | -0.283 | 0.161 | -0.067 | -7.755 | 0.080 |
| Educational Qualification | -0.640 | 0.502 | -0.041 | -1.274 | 0.203 |
| Place of Employment | 0.241 | 0.350 | 0.022 | 0.689 | 0.491 |
| Age | -0.096 | 0.353 | -0. 124* | -1. 103 | 0.002 |
| Gender | -0.096 | 0.353 | -0.128* | -4.005 | 0.000 |
| Constant | 75.673 | 1.609 | | 46.752 | 0.000 |

* Significant at $P < 0.05$

| | | |
|---|---|---|
| Multiple R | = | 0.198 |
| R Square | = | 0.039 |
| Adjusted R Square | = | 0.033 |
| F – Ratio | = | 6.603 |
| Significant F. | = | 0.000 |

Regression results depict that the overall model of the six predictor variables significantly predicts examiners attitude towards on-screen assessment of public examinations, $R^2 = 0.039$, $R^2_{adj} = 0.033$, $F_{(6,977)} = 6.603$, $P < 0.05$. This model accounts for 3.3% of the variance observed in the examiners' attitude towards on-screen assessment of public examinations. A summary of the regression coefficients is presented in Table 4 and it depicts that only two variables significantly contributed to the model. These are gender $\beta = -0.128$, $t (977) = -4.005$, $P< 0.05$ and age $\beta =- 0.124$, $t (977) = -1.103$, $P<0.05$.

**Discussion**

This study generate interesting findings pertaining to examiners ICT proficiency level and attitude towards on-screen assessment of public examinations. While the study is obviously limited in scope, its outcomes may prove most informative when interpreted together with those from previous studies. The findings that examiners ICT proficiency level was generally low corroborate previous studies (Masole, 2008 and Ajmal *et al*, 2011). In separate studies, Masole (2008) reported that teachers in Bostwana indicated that their knowledge in computer was moderate; while, Ajmal *et al* (2011) submitted that in Pakistan graduates had low proficiency in the use of computer hardware and faced obstacles in the use of ICT. The low level of ICT proficiency observed among the examiners in this study may not be unconnected with the non-inclusion of ICT in teacher training programmes in school curriculum at all levels of education in Nigeria. The outcome of this study also supports the work of Yusuf (2005) and Anao (2003) that most school teachers lack the skills and literacy to fully utilize the ICT and other common software. The finding is also in line with the view of Newhouse (2002) that most teachers irrespective of the level of education have minimal ICT literacy. Most of the institutions responsible for teachers' education in Nigeria lack computer literate teachers and ICT experts that would support and manage the internet connectivity. This is a pointer to the low level of ICT application in the teaching and assessment processes in schools. According to Okebukola (2010) computer is not part of classroom technology in over 90% of public schools in Nigeria thus the chalk board and textbooks continue to dominate classroom activities. The implication of this is that the examiners who are predominantly classroom teachers are still fond of the old method of paper-marking, the practice which makes them lag behind in the world of ICT. However, improvement can be achieved through deliberate periodic training and re-training of examiners' on basic computer appreciation and innovative ICT-based assessment system.

It was further observed that majority of the examiners had positive attitude towards on-screen assessment of public examinations. The positive disposition of the examiners towards on-screen assessment of public examinations may not be unconnected with the fact that ICT has the potentials to accelerate, enrich, and deepen skill; to motivate and engage its users in critical thinking, and contribute to radical changes in

assessment. It was also revealed that the examiners' had good perception about on-screen marking accuracy. The examiners believed that on-screen marking would among other things reduce farming-out of candidates' scripts, improve marking quality, afford examiners the opportunity to review their marking, ensure anonymity of candidates and reduce marking bias. These findings might not be unconnected with the fact that the examiners know the importance inherent in the use of ICT in the assessment system. This buttresses the views of Boston (2005) who reported that the e-marker portfolio offer better quality marks through early detection and remediation of aberrant marking and reduces clerical errors because the computer sums the marks and ensures greater script security. Similarly, Johnson and Nadas (2009) showed that marking GCSE English Literature essays on-screen had no significant effect on marker accuracy when compared with how they were marked on paper, although the examiners exhibited different marking behaviuors when marking in each mode. The finding supports the work of Yusuf (2005) that teachers exhibited great enthusiasm and positive attitude towards the use of ICT in teaching and learning. This outcome also lends credence to the findings of Newhouse (2003) that teachers are favourably disposed to using ICT in classroom instructions. It should be noted however, that majority of the teachers are engaged in the assessment of public examinations in Nigeria.

Nevertheless, a good number of the examiners were of the opinion that slow servers may discourage examiners to mark on-screen; marking scripts online will strain their eyes; e-marking would be susceptible to cyber-crime; power outage would affect the implementation of e-marking and the limited website bandwidth of public examination boards may affect the implementation of e-marking. The findings of Johnson and Nadas (2009) that reading long texts on-screen can be more demanding and that this extra demand can have a detrimental effect on how readers comprehend longer texts seems to corroborate the finding that marking scripts online will strain the eyes of the examiners. The study also revealed that power outage may affect the implementation of the e-marking. The epileptic power supply is a national phenomenon that has a detrimental effect on all sectors of the economy. This finding supports Yusuf (2005) and Ofodu (2007) who submitted that irregular power supply in the country is a major obstacle to the usage of ICT in all spheres of the economy.

Examiners' age had the highest predictive value for ICT proficiency level. The study shows that the younger the examiner, the higher their ICT proficiency level. On the contrary, the older the examiner the lower their ICT proficiency level. This is logical because the ICT phenomenon is just gaining ground in the teaching curriculum of most institutions in recent years with increasing access to emerging technologies and software. Examiners' gender was the second factor that significantly predicted ICT proficiency level. Teachers' gender has been found to be important in ICT research. Some studies have indicated that females show greater degree of anxiety towards the use of computers (Clement, 1981; Gribbin, 1987). Other findings have however indicated that no significant difference existed between male and female teachers' interest and anxiety towards the use of ICT (Offir, 2006; Orr and Hall, 2007). However, male teachers have better positive attitude towards computer than female teachers (Yusuf, 2005). Examiners qualification was the third factor that significantly predicted level of ICT proficiency. The results showed that continuous self-improvement by examiners with acquisition of additional proficiency- based knowledge can improve their ICT proficiency level. The place of employment of an examiner was the fourth factor that significantly predicted ICT proficiency level. In Nigeria, the private schools are better equipped with ICT facility and software than the public schools, hence it is expected that examiners teaching in the private schools will be more proficient in the use of computers and ICT than their counterparts in public schools.

Further observed was that examiners gender and age were significant predictors of attitude towards on-screen assessment of public examinations. The findings of this study corroborate those of Adelakun and Adewale (2011) who indicated significant group difference between male and female examiners' on sociological factors. Male examiners exhibited proactive disposition to the assessment of public examinations than the female examiners. Further to this, examiners within the age cohorts 20-29 years

were significantly more likely to approach the assessment exercise with feeling of hesitation resulting from fear of not being able to cope with the workload (Adelakun and Adewale, 2010).

## Conclusion

Generally, the examiners' had low level of ICT proficiency. However, it was observed that they had good perception about on-screen marking accuracy and demonstrated positive attitude towards on-screen assessment of public examinations

## Recommendations

From the results of the study, it was therefore recommended as follows:

(1) Public examination boards should train and retrain their examiners' periodically on basic computer appreciation and innovative ICT-based assessment system.
(2) Public examination boards should upgrade their current website bandwidth to ensure uninterrupted network for the successful implementation of the e-marking portfolio.
(3) Public examination boards should protect their e-marking portfolio against cyber-crime and un-authorized access to their data base.
(4) Public examination boards should put in place a reliable alternative source of power in the face of erratic power supply from government corporations.
(5) The framework to be used for the selection of examiners should take into consideration examiners factors such as age, gender, educational qualification and place of employment to further engender objectivity, fairness, continuous quality improvement, public trust and confidence in the on-screen assessment system.
(6) Examiners' that would be engaged in the e-making process need to demonstrate more commitment, responsiveness and professionalism in view of the strategic roles they would play in the efficient and effective implementation of the e-marking portfolio.

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