
FACIAL CAPTURE AS A MEASURE TO SOLVING CBT EXAMINATION MALPRACTICES

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ABSTRACT

The adoption of Computer Based Testing (CBT) by Nigerian Tertiary Education Institutions has helped to address some of the challenges relating to the conduct of examinations and results processing. The most prominent of these challenges is the impersonation and to tackle these eventualities, multi-layered security architecture is implemented to ensure the authenticity of the student participating in the CBT. The architecture will assist Nigerian University administrators to effectively plan the conduct of CBT and develop in-house solution that will engender the reduction in the examination malpractices in CBT. The introduction of the facial capture reduced the intents of the students in engaging in the act of impersonation. The first security layer is the profiling of the registered students that are eligible to partake in the test, the second layer is the biometric capture to identify and authenticate that the student is the original person to partake in the test. The third layer is the facial capture on the system before the commencement of the test. The proposed system will be designed and implemented using algorithmic approach and a web-based application which will be deployed on the LAN of the institution. Therefore, this research presents the implementation of the multi-tiered layered security in mitigating the incidences of impersonation during CBT.

Keywords: Computer Based Test, Exam Malpractices, Facial Capture

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INTRODUCTION

Measuring the capability of students in teaching and learning through continuous assessment (CA) has been rated high in various levels of educational system. CA is seen as a classroom strategy implemented by teachers to ascertain the knowledge, understanding, and skills attained by pupils. Teachers administer assessments in a variety of ways over time to allow them to observe multiple tasks and to collect information about what pupils know, understand, and can do (Onuka & Durowoju, 2011). For lecturers, when students' performances are high, it is obvious that they have transferred knowledge appropriately to the students. On the other side, i.e. for the learners/students, high (CA) performance means good grades, and this implies better opportunities to further/continue education and good chance for job placement. Assessment systems provide the ways to measure individual and institutional success, and so can have a profound driving influence on systems they were designed to serve

(Resnick & Resnick, 1992). As part of the assessment, it is a normal process in educational system to conduct series of examinations before a session can be completed. The common or predominant form of conducting examinations in Nigeria is the traditional method. In this method, students are assessed by pen and paper method on cognitive abilities. The pen and paper method is characterized by various setbacks and threats like high cost of papers and/or printing, examination malpractices, questions leakage, missing scripts, delayed in release of results, impersonations, extortion of money by lecturer or head of class, sexual harassment from the opposite sex with the gain of earning marks, bringing of written materials or phones into the exam halls and many more. Examination malpractice is any illegal act committed by a student single handedly or in collaboration with others like fellow students, parents, teachers, supervisors, invigilators, printers and anybody or group of people before, during or after examinations in order to obtain undeserved marks or grades (Olatoye, 2013). The use of



computers in form of Computer Based Testing (CBT) for assessment can provide several benefits for educators and test-takers. which spurs development in education as well as other sectors of the economy (Festus Oladimeji, 2017; Ogunlade & Oladimeji, 2014). CBT usually assists to ensure that candidate's identity in the examination hall is efficiently cross-checked. It is also an efficient way for test sponsors to provide a secure, consistent environment for certification and licensure as it also enhances students' experience (Abubakar & Adebayo, 2014; Mardapi & Rahmi, 2015). The successes of transition from one test method depends on the extent and ability of testing professionals to communicate the benefits and limitations of that test method to stakeholders (Jones, 2000; Leeson, 2006)

Computer Based Testing is the use of computer in assessing a student (Peat & Franklin, 2002). The advantages of CBT are enormous over pen and paper testing, for instance, the problems faced (like space, missing script etc.) when general or compulsory courses that are taken by large classes have been solved. Problems encountered by students during and after tests and examinations are curbed with the new technological method. The lecturers are also relieved from the burden of marking large answer scripts and probably scripts lost in the process of moving the script from one place to another. The cost of production of printing papers is brought to minimum level; this is indirectly an economic gain to the institution as it reduces the administration costs. Examination leakages are eliminated and there is an end-to-end electronic audit trail to know who assessed what and when. There is availability of randomness in the loading of questions for each student, and this removes the probability of helping one another in the course of doing the examination within the examination hall (Funke, 1998; Kleinmann & Strauß, 1998; Tella & Bashorun, 2012).

However, there is no system that does not have its peculiar challenges. CBT has proved to be a solution to the students' authenticity and eligibility for test/examination. Students' details like Surname, Student Number/Matric. No. can be used to gain access to examination. With these details the case of impersonation is made possible. Hence friends/colleagues can sit for others conveniently to conduct examination for others. This is the exact impersonation problem that existed and being

faced in the conduct of examination through the pen and paper approach. Having this experience, it is therefore important to build another layer of security in order to combat the impersonation cases which arise as a result of the use of the Matriculation number and default surname as a form of access to the tests. The aim of this research is to add another security layer to the CBT application system. The layer is expected to activate the candidate facial images that have been captured before and during the test assessments. The scope of this study is focused on the students that participated in the General courses of Tai Solarin University of Education (TASUED), via the use of the CBT application. TASUED is a university of education in Nigeria. It was established in 2005 and located in Ijagun, Ijebu-Ode, Ogun State. The university was named after the Nigerian educational administrator and human rights activist Tai Solarin.

SYSTEM DESIGN AND RESEARCH METHODOLOGY

This section describes the system design for the project and research methodology

SYSTEM DESIGN

The facial capture module is introduced to enhance the security of the CBT system. It was made optional in a situation where the CBT application system does not have a web camera attached to it by either activating or deactivating the module from the *Admin* end. Once activated, the CBT application system will not proceed to the test page for the student until an image is captured via the web camera. Supposing the application system does not have an in-built camera or detachable camera, the Administrator can decide to de-activate the image capture module. It was designed as a module and integrated using an Application Programming Interface (API). The CBT architecture is designed to be of 3-tier architecture which is *presentation tier*, *logic tier* and *database tier*. The presentation tier serves as an interface to the users, the logic tier serves as the middleware that processes user's requests and the database tier serves as the repository of all the data required to take the assessments. The initial architecture supports the username and password login module, and takes you to the test page where every student's

passports are displayed. Fig. 1 shows the University assessment page

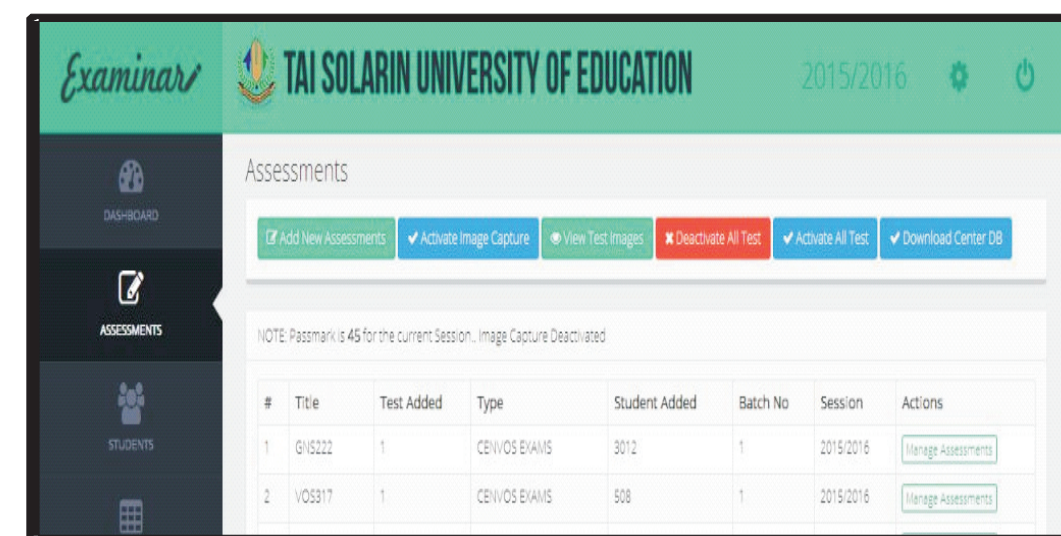


Fig. 1: University Assessment page

RESEARCH METHODOLOGY

The process flow is such that the student will *log in* with the usual login details which is *Matriculation Number* as the User name and *Surname* as the Password. There is a user table that contains all students that have paid for the session. The *login* authentication page searches for the student eligibility and if the name is not found there, the system displays "incorrect username and password" message. If found, it goes on to generate questions and randomize it to remove the chances of the students teaching themselves during the assessment. No two students can have same questions occurring in the same sequence. Once the student answers all the questions, the student ends exams or when the time elapsed, the system automatically logs you out and end exams. Fig. 2 shows flowchart of the CBT system. Candidates' eligibility and authenticity were confirmed before randomized questions can be presented. The

examination period for the particular course (GNS 111) is 10 minutes for a maximum of 30 questions. GNS 111 is a compulsory course for all fresh students in the College of Science and Information Technology. This gives the great opportunity for testing the proposed biometric system. Like any other higher institution, registration of the fresh students is done per session in TASUED. Students' personal bio-data like names, Matric. Number, age, gender, home address, parent-address, educational background are captured. The webcam is used to take the picture of the student and it is converted into *.jpg* format. The picture is then placed in the *25mm by 25mm* photo-box created in the CBT application system. The picture that was taken is labeled accordingly against the students' registration number.

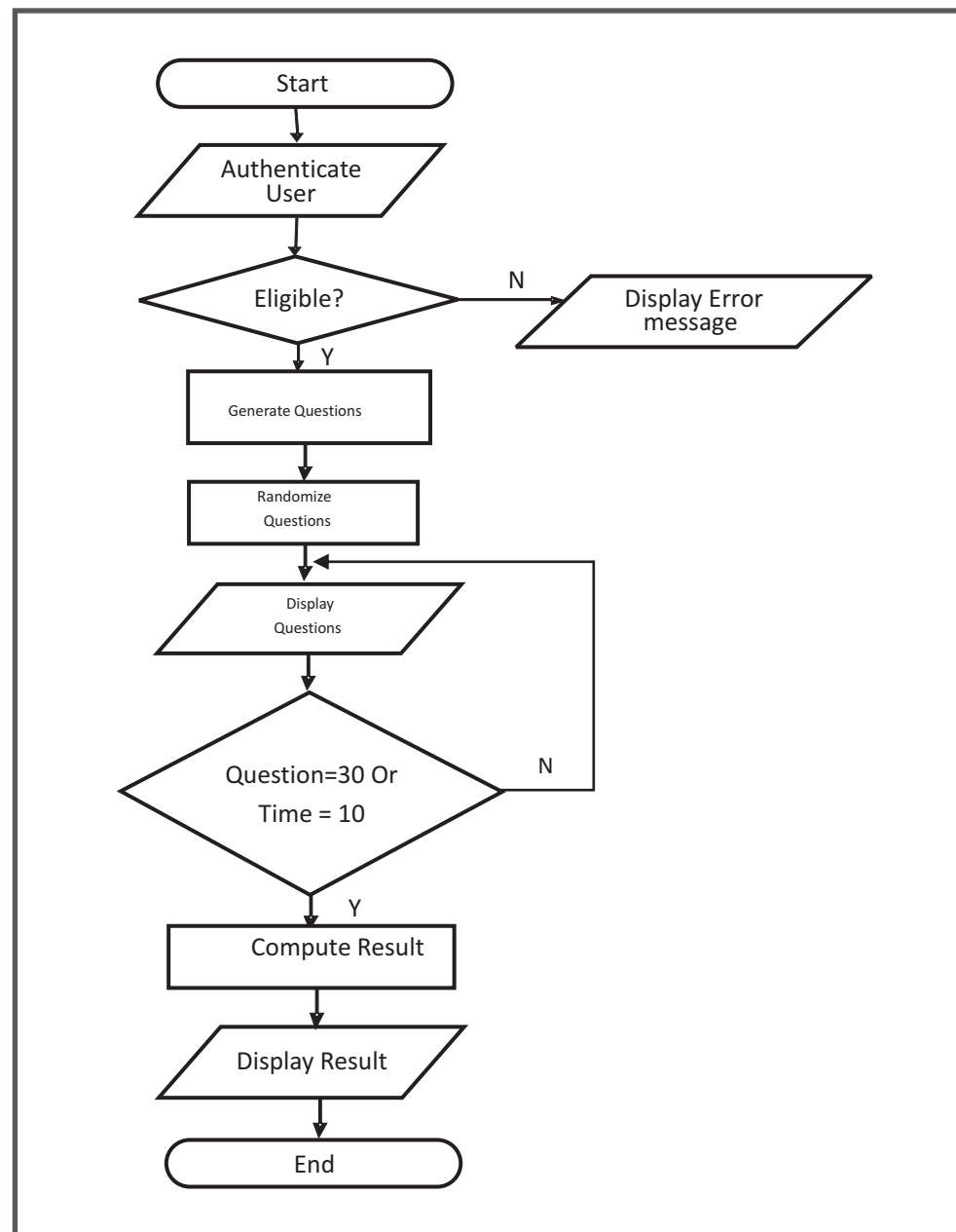


Fig. 2: CBT system flowchart

Within the time frame allocated for the GNS 111 examination; 3 snapshots of candidates are taken at random with different orientation. This set of images is taken in different angles as part of the presentation layer. The image is then compared with the pictures that had been saved in the folder (database layer). Any dissimilarity in the pictures will give room for suspicion (See Fig. 3). When the pictures are similar the candidate will be able to continue with the examination. There is a possibility that the student may attempt to cover the

face of the web camera to take a black picture, the *admin* side is equipped with a page called Image capture that displays all the pictures taken in real time and once any of such is discovered, the admin logs the person out by clicking the reset button. The user immediately receives a message on the screen that “you have been logged out from the system because the passport taken is bad” The New Architecture of the proposed CBT system with facial capture module is displayed in Fig. 3

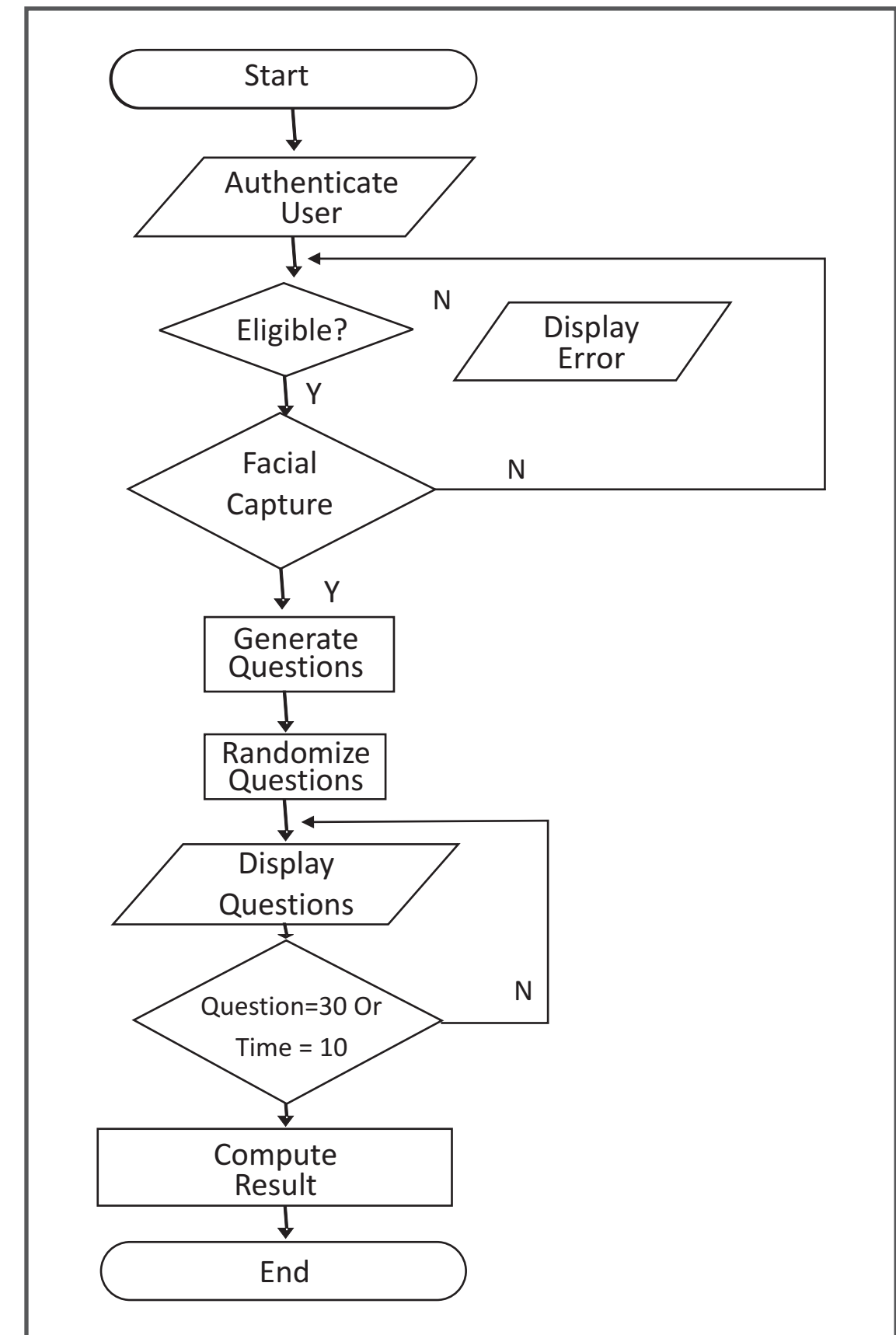


Fig. 3: Data validation for the facial images captured

In the new CBT Architecture with facial capture integration as a security layer, at the point of generating questions, it prompts for a picture to be taken before generation of questions. Once the picture is taken, it is displayed alongside with the passport of the student on the test page. With this in place, the user can be questioned if there is a disparity between the picture taken and the passport in the database.

RESULTS

Before the introduction of the new CBT system with facial capture integration, the students engage in impersonation to either assist a student who is not

around to partake in the test or to help a weak student in conducting the tests. The login credential is just the matriculation number and the passwords, a student can log in on behalf of the other person. Below is a table showing the result achieved with the integration of the facial capture. This experiment was conducted over a series of four academic sessions (2013/2014, 2014/2015, 2015/2016 and 2016/2017). There has been a remarkable achievement from the use of Paper and Pen, CBT, CBT and CCTV, CBT, CCTV and Facial capture integration in the corresponding manners of 5.27%, 4.41%, 4.5% and 0.08%.

Table 1: Results of performance for the proposed method

Session	Number of candidate for GNS 111 examination	Number of Impersonator
2013/2014	2560	135 (Paper and pen exam)
2014/2015	2520	111 (First use of CBT)
2015/2016	2000	90 (Second use of CBT with CCTV)
2016/2017	2525	2 (Facial capture integration)

The awareness and implications of impersonation is getting high within the University system. Any student caught in the act is rusticated from the University. It is obvious that since the students know the possibility of been caught is high, they abstained totally from the act of impersonation.

CONCLUSION

When fully implemented it is expected that the design and architecture will assist not only TASUED but also any other higher institution to cope with the menace of examination malpractices through impersonations. Another area that can strengthen the purpose of achieving impersonation-free University examination is for the school authority to work the students' attitude so that they are aware of the consequence of their

actions. Proper implementation of the biometric technology will also assist the school administrators to effectively plan the CBT examination for all other courses as well as result processing.

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