Information System Innovative Framework for Online Oral Examinations

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ABSTRACT

The outbreak of the COVID-19 pandemic largely disrupted the continuity of educational delivery. Online learning was the prompt response by educators. However, this comes with a big question on the conduct of assessment. Running examinations traditionally is vulnerable to high security risks and administration costs. A precise mechanism to administer examinations from anywhere is paramount. This paper presents a novel innovative framework for an online oral examination system called OREX. The framework was tested for 31 days between July and August 2020. The system allows questions to be randomly generated, and instantly activated based on the examination timetable. The software controls pairing between examiners and candidates, balances the workload between staff, and uses a virtually enabled examination room through an audiovisual conferencing tool. The OREX framework represents an imperative and profound innovation during the COVID-19 pandemic and provides an alternative assessment system for adoption by higher learning institutions, with new insights for the sustainable digitally enabled future of education.

Keywords: *Examination; Assessment; Information System; Framework; Online Oral; OREX; COVID-19*

INTRODUCTION

In December 2019, a global outbreak of coronavirus disease (COVID-19) was detected in Wuhan, China. With fast and widespread coverage of the virus and thousands of confirmed cases globally, the pandemic has brought about a global health emergency and a severe economic slump to all sectors. As a quick response to the COVID-19 pandemic, several technological innovations were discovered to ensure continuity and availability of basic social services including educational delivery services. For instance, Dong, et al., (2020) reported development of an online interactive dashboard to provide visualization of real time global updates of the COVID-19 cases. Education as any of the other socioeconomic sectors has been mostly affected (Nicola et al, 2020) following the abrupt closure of schools in general due to social distancing, self-isolation, lock down, and travel restrictions. As one of the Higher Learning Institutions (HLIs) that operates through Open and Distance Learning (ODL) mode, the Open University of Tanzania (OUT) experienced little or no difficulties in teaching and learning services due to rich experiences in using e-learning systems. The university managed to continuously conduct online lectures through audiovisual collaboration tools for video conferencing services in both synchronous and asynchronous modes of delivery.

However, the university faced a major challenge on how to administer examinations during the COVID-19 pandemic considering that all existing examination systems required physical presence of the candidates in the examination centers to write their papers. Despite a high level of flexibility in the university's assessment modes, there was still no way of running examinations that could fit the COVID-19 public health and safety requirements in a cost-effective way. As an ODL institution, OUT normally conducts its examination sessions in over 60 regional and district

centers scattered all over the country, and in a few overseas centers. Further to the COVID-19 hurdles, the university was since then struggling with managing the high cost of running written examinations and the challenge of coordinating the centers, especially in the remote locations. Being a public institution, which operates as a not-for-profit entity, running examinations across the centers is very expensive due to high costs associated with purchase of answer booklets, security envelopes, transportation, invigilation, staff subsistence allowances, involvement of security officers, panel marking, external examiners, stationery, Internet and communications. To get rid of these financial barriers and reduce the high costs of managing examinations, while keeping the academic activity moving, the university opted for the establishment of a cost effective and efficient system for managing its examinations by putting in place online written and online oral examinations systems. One of the clearly stated targets, in the current rolling strategic objectives (RSP) of 2018/2019 to 2022/2023 (OUT, 2018), strategic objective no. 1 which reads "to strengthen open and online assessment by fully implementing by June 2020" was timely for implementation.

As a response to the COVID-19 pandemic on one side, and implementing the RSP objective on the other end, a practical solution for the online oral examination system (OREX) was introduced for the first time in the University in June 2020. The oral assessment was conducted by verbal communication through online collaboration tools between the examiners and examinees. The OREX framework played a major role for the university to become open and online in its academic delivery mode with reduced physical face to face sessions, saving time and resources, and afforded learners the advantage of continuing their higher education experience without leaving their homes or workplaces. In addition, it strengthened adherence to maintaining social distancing necessary for containing the spread of COVID-19.

In this paper, the OREX framework is presented with well-defined entities, user roles, and guiding procedures for clear understanding of the technological approach.

ORAL EXAMINATION SYSTEM (OREX)

What is an oral examination?

An oral examination is a traditional mode of assessment conducted in the form of interviews between examiners and candidates (Davis & Karunathilake, 2005) within an examination hall. The role of examiners is to pose questions for candidates to respond to, providing evidence of their learning.

The oral examination is a major way of measuring the candidate's understanding of the learning outcomes. However, the decision to adopt oral examinations should consider the validity and reliability requirements and the size of the class. This is because the fitness of oral assessment in a high-stake class is questionable due to low reliability (Colton & Peterson, 1967; Foster et al., 1969; Kelley et al., 1971) and might lead to bias resulting from poor examiner participation. The low reliability also has an adverse impact on validity (Schuwirth & Leuten, 1996). Some of the factors that might influence oral assessment include aspects of a candidate's personality (Bull, 1959), verbal style and dress code (Rowland-Morin et al., 1991; Burchard, et al., 1995); language (Roberts et al., 2000); ethnicity and gender discrimination (Esmail & May 2000). The cost effectiveness of oral examinations in terms of professional time and energy (McGuire, 1966), is a big challenge unless the effort spent is educationally 'profitable'.

On the other hand, oral examination offers vast benefits such as direct personal contact (Cox, 1978), assessment of problem-solving and reasoning (Zelenock et al., 1985; Davis & Karunathilake, 2005; Wass et al., 2003); professionalism and ethics (Wass et al., 2003); ability to probe depth of knowledge (Jolly & Grant, 1997); instant feedback (Colton & Peterson, 1967);

the candidate's capacity to formulate ideas and their communication skills (McFarlane, Goldney, & Kalucy, 1989); candidate's decision-making skills (Davis & Karunathilake, 2005; Wass et al., 2003). Other advantages of oral assessment include ensuring assessment is focused on learning outcomes, ability to probe the students' knowledge instantly, reflecting the world of practice and it improves learning. Oral assessment suits some students as the meaning of some questions can be clarified, and it largely helps to ensure academic integrity in the long run.

Oral examinations can be grouped as structured and unstructured (Fabb & Marshall, 1983). The structured oral examinations (SOE) are constructed with well-defined goals and can often give great insight into a candidate's knowledge, interpretive ability, problem solving skills and their attitudes. The traditional oral examination is physical where candidates and examiners are in the same physical room.

Apart from assessing student's performance, oral examinations are usually an opportunity for the examiner to get instant feedback from the student and release on the spot provisional examination results. Educational practitioners are increasingly appreciating that a very good measure of someone's understanding of a subject is his/her ability to verbally explain the subject to someone else.

Online oral examination

The online based oral examination is a mode of assessment where examiners meet candidates through a virtual examination room with the support of a web based audiovisual conferencing tool. The questions can be sourced from examiners or randomly generated from the system. Although it uses word of mouth, the online oral examination is conducted with the support of audio devices such as microphones and speakers and with additional videos.

The adoption of an online oral examination system by the Open University of Tanzania was in response to the COVID-19 pandemic, although it is well aligned with the University RSP, mission and vision. Unlike the OREX system developed by OUT, the online oral assessment was also adopted by a few other Universities during the COVID-19 pandemic (UoT, 2020; ISU, 2020), although their mode of operation differs significantly, as they were partially depending on uncontrolled environments which is not best practice for examination management.

The online assessment system adds value to the improved access to ICT in education which can help institutions to compete in a global economy by creating a skilled workforce (UNESCO, 2013) as well as conforming to the Millennium Development Goals (MDGs), through integrating ICT for development (UN, 2012). Considering that the education system in ODL institutions is technologically driven, the survival of online assessment should be based on high utilization of ICT to attain the expected benefits.

The OREX system developed by OUT is unique and probably, to the best of our knowledge, is a new product in innovations for university examinations; although online assessment is a long-held tradition in many disciplines (Gomersall, 2007). It is a principal mode of assessment involving use of online collaboration tools in the form of audiovisual conferencing to support examiners/candidate interaction, aided by the specially designed applied software for automatic random generation of question papers, marking sheets and immediate computation of the final score attained by the candidates.

METHOD

This study was designed using the approach of action research (Susman & Evered, 1978; Davison, Martinsons, & Kock, 2004) as it was intended to solve academic challenges, resulting from the

hurdles experienced during the pandemic, in the university assessment system. Development of the OREX framework and its guiding procedures was a clear intervention in resolving assessment issues while at the same time contributing to the existing knowledge (Wohlin & Aurum, 2015). Action research provides enough space for researchers to be part of framework development (Easterbrook, Singer, & Damian, 2008), for a solution that responds to a real-world organizational problem.

The analysis and the design of the system was conducted between May and June 2020 to systematically understand the business processes in a real-world context. It was expected that the solution would provide a highly secured environment while maintaining the confidentiality and quality of examinations, without contravening the COVID-19 safety requirements. The software development was based on the prototyping model (Budde et al., 1992; Wood & Kang, 1992; Davis, 1995), and use of available open source development tools (OSS, 2020) such as PHP programming language (PHP, 2020), MySQL database (MySQL, 2020), Apache webserver (Apache, 2020), and Linux operating system (Linux, 2020).

OREX Benchmarking

Due to the global outbreak of COVID-19 pandemic, several HLIs tried to develop solutions to maintain online learning and assessment for their students. Although the implementation mechanism and technicalities of the OREX system differ from other sources, oral assessment benchmarked from other universities (UoT, 2020; ISU, 2020) which used video conference and participation via telephone systems was preferred. Use of oral assessment is also popular in many science and psychology programmes, medical schools, postgraduate programmes, and students with special needs like those with a learning disability such as dysgraphia, or developmental coordination disorder such as dyspraxia, or a non-verbal learning disorder. Normally when the educational institution adopts an oral assessment system, those students with hearing or speech difficulties and impairments are allowed to request an alternative assessment system.

Although it is widely used for postgraduate students, the oral assessment mode is also applicable to students at all levels from non-degree, undergraduate, to postgraduate studies. Generally, oral examination has been used in undergraduate and postgraduate education for many years, however its use may have escalated due to the COVID-19 outbreak.

Software functional requirements

The design of the software was based on the well-established business processes as defined in the main OREX proposal approved by the OUT University Senate (OREX, 2020), and mapped in the existing OUT Rolling Strategic Plans (OUT, 2018). Specific features of the software as per the defined business processes include:

a) The audience of the OREX session comprises four participants, a candidate, two examiners and one independent observer.
b) The two examiners are known as chief examiner (CE) and second examiner (SE) and must be subject matter experts.
c) The independent observer, also called exam observer (EO) can be any academic staff member.
d) The CE/SE/EO pairing is randomly decided by the software.
e) The session allocation to the examiner should consider convenience and availability of examiners.
f) The maximum number of available sessions per course per instructor per day is 10.
g) The OREX session lasts for a maximum of 60 minutes.

h) Each course is divided into two parts with each part having six comprehensive oral questions.
i) The blueprint of the OREX question paper design has two questions with question one in part 1 and question two in part 2.
j) CE will ask question 1 and SE will ask question 2.
k) CE and SE will mark both questions based on the OREX marking rubric.
l) The average computation of the scores by CE and SE is automatically done by the software.
m) The question paper and mark sheet are both generated from the software as per the examination timetable, bearing student details such as name, registration number, course code, and date of exam.
n) Candidate demographic and academic details are included in the OREX Visa Card (OVC) as a printout from the software.
o) The software should capture student data, exam data bank based on the question blueprint and marking schemes based on the marking rubric.
p) Each marker to view the webpage as per the assigned role and privilege.
q) The online link for the virtual exam room should be accessed by students through the OREX system.

Online testing context

The performance testing of the OREX framework was conducted in two phases. The first phase was during the exam registration where the main actors were students. The second phase was during the examination sessions where the main actors were the examiners and the students. The registration testing was conducted over 12 days from 18th June 2020 to 30th June 2020 while the examination phase was conducted over a period of 19 days from 20th July 2020 to 14th August 2020. Both phases were conducted on the very first OREX event administered at the Open University of Tanzania (OUT). On each day, there were a maximum of 10 slots of OREX sessions. However, the total number of sessions in a single slot depended on the number of students registered.

Thus, a total of 9,380 real time OREX sessions were recorded. In each session, only one student was assessed with two examiners (CE and SE) and one exam observer (EO). In general, a total of 1,994 candidates were self-registered through the web link available at *orex.out.ac.tz* in the OREX registration module. On the other hand, information for a total of 295 examiners, all being OUT academic staff, were uploaded in the OREX examination module. The candidates and examiners are uniquely identified in the system using student registration numbers (RegNo) and staff personal file numbers (PF No) respectively. The moderated questions for 879 different courses were uploaded into the system, with 8,900 different sets of question papers (equivalent to 95%) generated during the testing period.

Despite the fear, panic and technophobia that dictated the first three days of running the live OREX sessions, a high level of acceptability was experienced with staff participation rate in testing the OREX framework recorded to reach 85%.

User training

As part of sensitizing this innovation among examiners and candidates, several online workshops were coordinated at the institutional level. For instance, five training sessions were conducted for staff where four were meant for all academic staff (examiners), and one for all directors of regional centers (DRC), faculty examination officers (FEOs), and heads of departments (HoDs). One training session was conducted for the leaders of the Open University of Tanzania Students Organizations (OUTSO) and there were several other training sessions for students which were

coordinated by HoDs in their respective departments, and by Directors of Regional Centers (DRCs) in their respective locations. Generally, the training package covered the use, functionalities, and procedures to administer the OREX sessions using the Zoom webinar facility.

Various OREX guiding tools for the user training were used. These include a quick short guide to students, guide to examiners, guide for Zoom settings, and roles of CE/SE/EO, OREX marking rubric and procedures, and observer's report.

State of computing infrastructure

The software accessibility was tested by evaluating the network availability and power reliability. The testing environment was set from both the server side and the client side. From the server side, the initial setup of Internet speed (bandwidth) was 150 Mbps. However, the bandwidth was increased to 300 Mbps after the first week of the testing exercise. The physical memory (RAM) size for the server was 8 GB during the first week and the capacity was increased to 32 GB to improve the system accessibility and for better handling of concurrent processes. During the period of framework testing, backup systems for power supply were put in place to ensure that there was no power cut in between the live OREX sessions.

From the client side, users were examiners (CE/SE), exam observer (EO), and candidates. For better access to the OREX video conferencing service, all client users were required to use electronic devices with the following minimum specifications (Zoom, 2020):

- Internet connected e-device such as laptop, iPad, smartphone, tablet, or any other mobile electronic device (iOS, Android & Blackberry devices) that can facilitate online communication.
- Microphone (built-in to the device, a USB plug-in, or wireless Bluetooth).
- Built-in headset jack (3.5mm plug) from laptop or desktop.
- Webcam (built-in to the device or USB connected).
- An Internet connection (broadband wired or wireless (3G or 4G/LTE) with minimum bandwidth of 800kbps (However, the recommendation was for 1.5 Mbps -up/down).
- Use of supported operating systems such as Mac OS X with MacOS 10.6.8 or later, MS Windows (10, 8 or 8.1, 7, Vista), and any Linux based distributions such as Ubuntu 12.04 or higher, Mint 17.1 or higher, Red Hat Enterprise Linux 6.4 or higher, CentOS 6.4 or higher, Fedora 21 or higher, OpenSUSE 13.2 or higher, etc.
- Use of supported web browsers such as MS Windows (IE7+, Firefox, Chrome, Safari5+), Mac (Safari5+, Firefox, Chrome) and Linux (Firefox, Chrome).

Most of the users managed to obtain a single package e-device with inbuilt audio and video capabilities.

DISCUSSION

User entities and roles

Generally, the software consists of four primary users: *candidate*, *second examiner*, *chief examiner*, and *exam observer*. Each user is responsible for certain activities as shown in Figure 1 below.
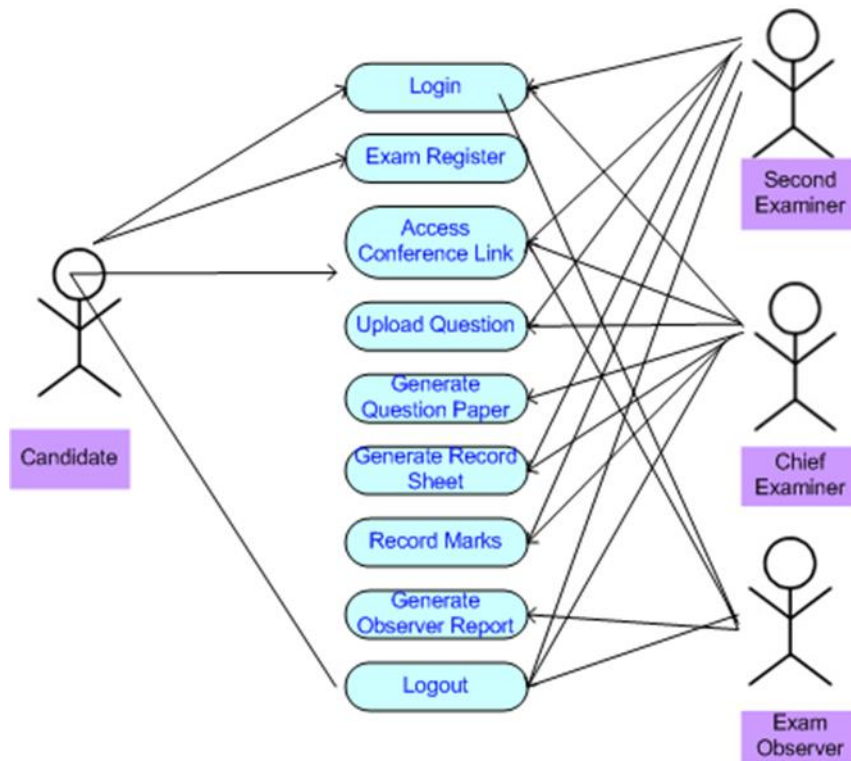
Figure 1*:* Use case diagram for the OREX System

The CE was responsible for creation of the online session link and sharing with all other participants of that specific OREX session (SE, EO, and candidate) at least two days before the exam date. The session link was shared by uploading it on the OREX software, accessible from *www.orex.out.ac.tz.* Other roles of the CE included making announcements in the virtual exam room and checking of the candidate's particulars by asking interrogative questions, verifying and confirming the student OREX Visa Card (OVC) during the first 5 minutes of the session. The OREX announcement is well structured and is intended to remind students to observe university examination guidelines and rules. The following instructions were read to candidates.

a. This is a final examination and the session will last for a maximum of 60 minutes. You will be asked two questions, each carries 50%. However, examiners are free to ask follow up questions probing more clarification on the answers.
b. You are required to speak loudly, fluently, and be elaborative in your answers as much as you can to prove your competency of the subject.
c. While responding to questions, you are advised to focus on learning outcomes, demonstrating the knowledge, creativity, understanding, and problem solving by citing examples that reflect the world of practice.
d. You are required to maintain a high level of academic integrity and observe University examination rules and guidelines.
e. You are reminded that any actions that will lead to examination malpractices may result in cancellation of the examination, AND suspension of one or two years from studies OR discontinuation from the University.
f. Apart from the examination malpractices which applies in the pen and paper examinations, any deliberate actions leading to disconnecting from the exam session without prior permission from examiners, use of supportive devices hidden

behind the camera for the purpose of assisting in giving on the spot answers, putting the 'oral' into oral assessment through reading aloud a written support such as books, unauthorized recording of audiovisual file of the exam session, taking a screenshot of the session and sharing it via social media will result in examination irregularities.

The CE is also responsible for asking question one, marking both questions as per the marking rubric, reporting alleged examination irregularities, and recording, saving, and sharing the OREX session in the MP4 file system with the course coordinator or head of department using the following naming format: *coursecode-regno-examdate* (OCP100_U19-515-1234_170620).

On the other hand, the SE assumes all roles of CE when the CE is not available. Otherwise, the SE is responsible for asking question two, and marking the OREX questions as per the marking rubric. Generally, both CE and SE are required to handle all academic matters in the session.

The EO is responsible for facilitating a smooth conduct of the online OREX session from creation of the Zoom link to the entire administration of the exam session. The EO functions in close coordination with the CE and the SE. The Observer is authorized to prepare a confidential session report using the online form accessible from the OREX software. The observer report is normally accessed by the course coordinator, head of department, and director of examinations syndicate. Generally, the EO is required to handle all administrative matters for the session including the strict monitoring of the rights, obligations, ethics, and professional codes of conduct to ensure they are observed and maintained by all session participants (CE/SE and candidate). The EO is also required to check whether the CE and SE worked independently.

Sequence of activities

Based on the defined functional requirements of the system, each user follows a specific pattern of activity sequences. The sequence shown in Table 1 is vital for the smooth conduct of online oral examinations.

Table 1*: User Sequence of Activities*

User	Sequence of Activities
CE	Create Link and Upload□Open Student Info□Activate Question Paper□Record MP4 file□Asking Oral Questions□Marking & Recording of Student Scores
SE	Get Link□Open Student Info□Activate Question Paper□Asking Oral Questions□Marking & Recording of Student Scores
EO	Get Link□Fill Observer Report
Candidate	Get Link□Respond to Oral Questions□

The online OREX registration process depends on the defined eligibility criteria. The system checks if the candidate has performed the online course registration in that academic year, paid required university fees and is computer literate. Once registration is successful, a candidate will be able to generate and print the OREX visa card bearing all important student details. These are verified by the examiners for security purposes to ascertain if the candidate is genuine and has met all the requirements before sitting an examination.
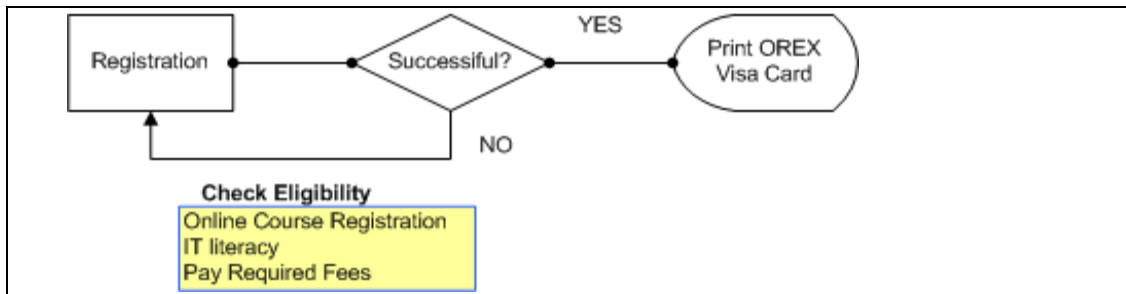
Figure 2: OREX Registration process

An example of the OREX Visa Card is shown in Figure 3 below.

Figure 3: OREX Visa Card

Observer report

The observer report is strictly confidential to capture information about the four profiles presented in Figure 4: student, session, infrastructure, and academic profiles.
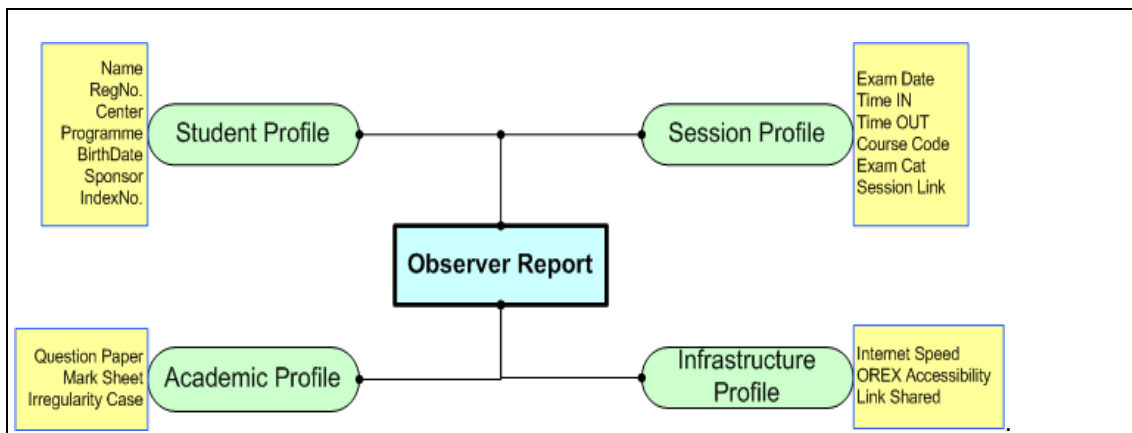
Figure 4*: Attributes in the Observer Report*

The general student profile includes student name, examination center, registration number, programme, birth date, sponsor, and form four index number. The session profile includes date of exam, time-in and time-out, course code, and the session link. The academic profile records question paper generated, mark sheet and examination irregularity matters. The infrastructure profile captures information about accessibility of the Internet and the OREX server, the Internet speed, and the session link.

The observer's report aims at capturing the attendance status of each participant (CE, SE, EO, and candidate), checking whether the candidate was verified; question paper generated, CE/SE worked independently, and if there were unfair treatments among participants. The report also captures the number of follow-up questions asked by examiners, and the adequacy of the physical arrangements in the virtual room, including participant's dress code, noise, Internet reliability, accessibility, and availability of the OREX software, number of session breaks and any disconnections.

Question paper design

The OREX question paper design consists of two types referred to as Type 1 and Type 2 templates or blueprints. In both blueprints, the questions tend to test higher order levels of Bloom Taxonomy and are prepared to carry equal weight and difficulty level. The questions are prepared from the course objectives and learning outcomes, and are focused on the concepts, theories, and procedures, applied problem solving, interpersonal competence, intrapersonal qualities and integrated practice in the respective courses.

The OREX questions are created to assess various skills and competencies, including application and problem solving, creativity, knowledge and understanding, and communication skills. The questions are not designed to assess at a level of facts and definitions, instead they are formulated in such a way that students can demonstrate that they have read, digested, and understood the material, and that they have insight and are able to apply what they have learned. The questions are also prepared to meet validity and reliability requirements. While validity evaluates the extent to which the student has achieved the learning outcomes, the reliability requirement ensures that the assessment is fair to all students.

The OREX questions are submitted through a special question submission form. The question submission form must bear basic details such as faculty, department, course code and course title for easy uploading and registering of questions into the software databank. The OREX

questions used to assess students are in two categories: the primary questions and follow up questions. The primary questions are highly structured questions that are submitted using a special submission form and are generated directly from the software on a random basis. The follow up questions are normally unstructured and are asked by examiners based on the initial response from the student. .

Based on the nature of the subject, the OREX software accepts the question blueprint and specification matrix for primary questions in the form of Type 1 and Type 2 inputs. The OREX course is divided into two parts (P1 and P2) and six knowledge areas (KA1 to KA6), regardless of the course unit and the number of lectures. Part 1 consists of the first three knowledge areas (KA1 to KA3) while part 2 covers the second part of the course in knowledge areas 4 to 6 (KA4 to KA6). In all types, the questions are comprehensive and integrated in such a way that each question is developed from the knowledge areas (KA) which represent course learning outcomes.

Before registering the question into the databank, each question must be assigned a unique question code (Q-Code) using the standard OREX nomenclature system: *CourseCode-Part-QuestionSerial Number*. For instance, the OBS100P2Q5 indicates it is question five from part 2 (covers KA4-KA6) for the course OBS 100. A sample oral question for a Type 1 blueprint from a business subject is shown in Table 2 below.

Table 2:Type 1 Blueprint

Q-Code	Q-Text (The question covers KA4 to KA6)
OBS206P2Q5	"Assume that you are a business analyst, select an economic or financial management issue in the public or private sector that has faced your country during the COVID-19 pandemic, and has a direct impact on the productivity and competitiveness of the country economy, and develop recommendations to address the problem. Your analysis should address strategic management or policy issues related to the topic, and you have to provide support for your rationale."

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Table 3:Type 2 Blueprint

Q-Code	KA	Q-Text (The question is divided into three sub-questions to cover each KA)
OCP100P1Q6	K1	Assume that you want to establish a small business and you want to buy a personal computer to help you become more organized, work more efficiently and to accomplish many tasks. Briefly tell us, how are you going to assess the computer needs for your business?
	K2	Computer is an electronic device with high speed, accuracy and storage capabilities used to process data into information with assistance of several peripheral devices working as input and output devices. Briefly describe how the computer works.
	K3	Briefly explain all basic procedures for setting up a new computer including installation of operating system, office applications, antivirus software, creating user accounts and connecting the new computer to the Internet for the first time.

In the Type 2 blueprint, the questions are prepared to test a particular aspect of the topic, that is, each question is designed with subparts which cover a specific knowledge area. For this reason, each question is further subdivided into three questions based on the specific knowledge area. For instance, the code OCP100P2Q4 comes with three sub questions K4, K5, and K6 because it assesses the second part of the course. The code OCP100P1Q6 indicates a sixth question from the first part of the course OCP 100 with three sub-questions, each representing K1, K2, and K3. A sample oral question for a type 2 blueprint is shown in Table 3 above.

The choice of whether a Type 1 or Type 2 blueprint is adopted for use, is left to the respective department and faculty to decide, and to communicate with their students. The software prototype accepts both templates. The questions printed from the system are referred to as primary questions, and they are well structured, and printed based on the institutional policy. For this specific study, two primary questions were asked by examiners in each OREX session. The CE was responsible for asking the first question while the SE asked the second question. Since both questions are printed instantly on the same webpage, the question navigation style is free mode. This flexibility provides an opportunity for a candidate to decide on which question to start with.

In addition to primary questions, the framework provides opportunity for the examiners to ask follow-up questions. The follow-up questions are regarded as unstructured questions as they are not from the system. However, the follow-up questions must have a direct relationship with the primary questions. These questions aim to seek further clarification on specific aspects of the primary question. Candidates are expected to demonstrate and express their knowledge and understanding of the subject by responding on the spot to the follow up questions.

Marking rubric and OREX malpractices

The OREX assessments were not meant to change the course grading system as outlined in the university prospectus. The marking rubric and criteria were set to guide examiners on the assessment exercise. The average score (%) taken from two examiners was considered as the final OREX score. Students from all disciplines were assessed on four items based on the following marking rubric:

- Content (25x2=50%)
- Communication Skills (5%)
- Creativity (5%)
- Knowledge and Understanding (5%)
- Problem Solving (10%)
- Understanding of Learning Outcomes (15%x2=30%)
- Confidence (Fluency & Accuracy) (10%x2=20%)

The marking is accomplished on the spot, before the close of the OREX session. If a student seeks a review of a mark, such a record is essential. An appeal in relation to any OREX exam will be accepted provided it is made within a period of three months of the examination. Other university appeal procedures remained unchanged. The general examination malpractices and irregularity regulations listed in the university prospectus apply regardless of the examination mode, - written or oral examinations. However, in addition to general well-known examination malpractices, the following actions were specifically considered as an offence for a candidate sitting the OREX examinations:

- Deliberate actions leading to candidate disconnecting from the live OREX session without prior permission from examiners.
- Use of supportive devices hidden behind the camera for the purpose of assisting in giving on the spot answers.

- Sharing of a recorded OREX session to social networks without prior permission from the university.
- Putting the 'oral' into oral assessment, that is, to read aloud a written support such as books when answering oral questions.

Student guiding procedures

For a smooth conduct of the exam session, students need to be well guided on the proper processes and personal behavior. For a student to be eligible to sit the OREX exam, they must be registered for the course in that academic year. Because OREX depends on use of audiovisual online collaboration software tools, a candidate must possess an Internet connected electronic device such as a laptop, iPad, tablet or smartphone with integrated audio and video capabilities. Students were reminded to observe the code of conduct before and after the session.

Some of the primary issues which must be observed by the student include the adequacy of physical arrangements, selection of the Internet connected smart device, dress code and behavior, observance of the workplace standards and professional business attire which are the most acceptable ideal look for the oral exam taker. To give a good first impression with the panel, students were instructed to wear office-casual as the preferred style.

Other requirements included the choice of the quietest available space to avoid audio disruption such as background noise, fragmented audio, and an echo in the virtual conference room. To achieve this, a candidate was required to test and calibrate the speaker's volume at the correct level. For online verification purposes, students were reminded to present their Student ID, OREX Visa Card, and any one of the following acceptable IDs (Voters ID, Driving License, National ID, and Passport ID). Any candidate not having an OREX Visa Card was debarred from appearing in the OREX examination.

Virtual exam room

The virtual exam room is created by the CE using the audiovisual conferencing tool. The session link is accessed from the OREX software by all participants. The accepted standards for creating a session link included setting the basic parameters for scheduling an online meeting. Some of these settings are *topic*, *date and time*, *duration*, *time zone (EAC)*, and *password*. As per the OREX standards for the virtual exam room, the video option should be set to on for both host and participants. Participants should be allowed to join before the host, and the link should be set to record the session automatically on the designated local computer.

Institutional experiences from the first OREX event

The administration of the OREX system has brought a unique experience to the university community. Development of this assessment scheme has shown that universities in the developing countries can develop state-of-the-art software solutions to global problems. While most of the education institutions in the world of academia were closed during the early months of the COVID-19 pandemic, the OREX innovation is proof of the ability to design innovative solutions when required, to address emerging issues.

Throughout implementation of the OREX scheme, staff got to know each other by active online participation as observers or examiners. Staff were conversant in administering the audiovisual software and have since attained fundamental skills in web technology for management of real-time activities, soft-skills (Zoom facility), team training due to the OREX structure of CE/SE/EO roles, and oral assessment skills.

The OREX system has helped to provide a real-time view of how staff can manage their time and be responsive to real time activities within specified time constraints. With this system, it is easy to get a quick picture of staff workload if the employee is truly engaged.

Furthermore, the online framework testing has provided an opportunity to evaluate the strength of the computing infrastructure. This was possible because both staff and students were required to login to the OREX system concurrently. The OREX administration is a participatory exercise where all academic staff got a chance to take part in invigilation and marking activities. Although there was fear, panic, and technophobia on the first day of implementation of OREX, the online Q and A sessions helped both staff and students to recover quickly and gain confidence. The fact that staff and students are the key OREX stakeholders and were extensively involved at all stages of software development, the adoption and acceptance of the technology was smooth and allowed for participation by over 300 staff and 1,990 students. Unlike traditional pen and paper examinations, the introduction of the OREX system has resulted in a more efficient examination budget with no added or extra cost to the institution.

The OREX framework

As outlined in the paper, the online oral examination (OREX) is a principal mode of assessment conducted through a spoken word or word of mouth in the form of an interview through a virtual exam room accessed via online collaboration tools such as Zoom web conferencing (Zoom, 2020).

All session participants are connected through a web link from anywhere in the world and the session is monitored by responsible units at the university. At the university, the authorities with a mandate to join the live OREX session included Heads of Departments (HoD) for all courses in their department, the Dean of Faculty for all courses in their faculty, the Director of Quality Assurance and Control, the Director of Examinations Syndicate (DES), and members of the executive management team such as the Deputy Vice Chancellors (DVC) for all courses in the university. An example of the OREX framework structure at the Open University of Tanzania (OUT) is shown in Figure 5.
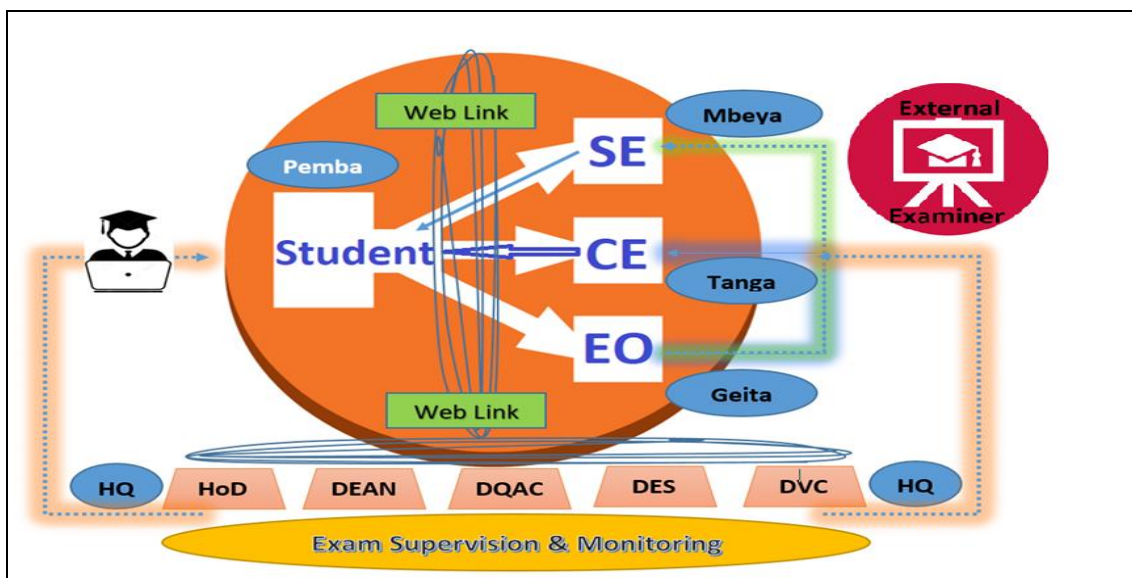

Figure 5: The OREX Framework Structure

CONCLUSION AND RECOMMENDATION

Oral examinations have been in use as one of the assessment modes for many years. Despite its vast benefits, its use is still limited to postgraduate courses especially when assessing viva voce examinations. With the outbreak of the COVID-19 pandemic, the OREX innovation developed by the Open University of Tanzania (OUT) presents an opportunity for the wider use of this mode to assess students at both the undergraduate and postgraduate levels. The structural design of the OREX framework provides a viable assessment solution that overcomes the limitations of traditional physical oral and written examinations while ensuring the continuity of education delivery during challenging times.

With the rise of digital education, it is recommended that other educational institutions, practitioners, and decision makers, both from conventional and ODL institutions adopt this framework as additional or alternative assessment to administer their examinations. The scheme of OREX assessment is ICT enabled, fully-flexible, cost-effective to the adopting organization, candidates, and examiners. Governments and higher education administrators should further scrutinize the appropriateness of this framework and consider funding the infrastructural inputs for integration into existing assessment schemes. The study reveals that by adopting the OREX framework, continuity of educational delivery is assured even during periods such as the COVID-19 pandemic.

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