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Adopting a Sustainable Framework for Online Oral Examination Practices from a Student's Perspective: The Case of the Open University of Tanzania

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Abstract

Information and communication technology (ICT) provides numerous global opportunities and benefits for teaching and learning. The Open University of Tanzania (OUT) manages these teaching and learning activities by combining online and face-to-face delivery modes. The unimaginable COVID-19 pandemic emerged in 2020. In addition to its adverse effects on human health, it slowed socio-economic development, including education, in various countries. Due to the necessary isolation and social distancing to minimise the pandemic's impact in Tanzania, this pandemic led to the closure of all educational institutions in March 2020. The online delivery part of our blended learning strategy was limited to formative assessments, leaving summative assessments to the face-to-face delivery mode. Due to the pandemic, OUT investigated "online summative assessment approaches" and developed an online oral exam (OREX). During the annual examination sessions in July and August of 2020, this OREX was utilised by OUT to meet pandemic requirements and fulfil the University's vision of being a leading open and online university for knowledge creation and application. Its inputs included coming out with questions, examiners, an observer and a link for each candidate exam session. Zoom, a web conferencing technology and venue for each exam, complimented them. This study aimed to investigate student perceptions of this OREX intervention to develop a framework for a sustainable online oral examination ecosystem. The methodology employed consisted primarily of a survey of students and a desk review that included collecting and reviewing pertinent documents from relevant offices. The results revealed the approach's advantages for students and the country's socio-economic development and suggestions for enhancing a sustainable and effective online oral examination. Based on these findings and discussion, a framework for the online oral examination ecosystem and student-centric recommendations is proposed. Researchers, decision-makers, and practitioners areas well-informed of the implications of the study's results.

country, has implemented a blended learning delivery model

1. Introduction

Whether on campus or at a distance, Information and Communication Technology (ICT) offers numerous opportunities and benefits for teaching and learning [1]. Sustainable Development Goals 2030 (SDGs) make clear this ICT potential as several studies have demonstrated the significance of ICT in achieving them, including SDG4 on Quality Education for All. One of the studies conducted by Huawei revealed that the contribution of ICT to achieve SDGs ranked SDG4 relatively higher [2]. E-learning, also known as online learning, is an intervention of education via digital means primarily powered by the Internet, adopted variably by higher education institutions worldwide for over a decade. Digital access to educational materials, interaction, and assessment benefits educators and students. According to a study conducted at the Massachusetts Institute of Technology (MIT), e-learning is more effective than traditional lecture-based courses. It reduces student costs and offers greater flexibility regarding what, where and how they learn and get assessed [3,4], and the developed competence and confidence in its pedagogical application positively affect the delivery of digital-based education [5].These online or electronic learning practices and associated pedagogical use are also witnessed in Sub-Saharan Africa's higher education institutions, which are increasingly adopting them to intensify access to education and enhance the quality of learning [6]. Tanzania is an example where its national ICT policy 2016 [7] has emphasised the effective use of ICT in teaching and learning in higher education. The Open University of Tanzania (OUT), an Open and distance learning (ODL) based University with centres in all regions of the that combines online and face-to-face modes [8]. With a vision to be a leading open and online University for knowledge creation and application, this University's significant resources were spent developing and implementing ICT-related policies, structures, systems, tools, advocacy, capacity building, learning materials, and pedagogical interventions to advance teaching and learning [9

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In 2020, an unimaginable COVID-19 pandemic that shiftedthe world's reliance on ICT to survive came to light. Apart from its human health effects, it also distracted all socio- economic development activities, including education in different countries. In Tanzania, this pandemic led to the closure of all learning institutions. This closure was due to the required isolation and social distancing to minimise the effect of the pandemic. However, with its blended learning approach, OUT continued online teaching with formative assessments already being provided online, such as quizzes, discussion forums, and assignments [10,39,40,41]. Summative assessments such as Annual Exams were still done in physicalface-to-face settings where our students come to our centres country-wide. Thus, online summative assessment was pursued considering online oral exams given the pandemic requirements and the fact that it is commonly practised in some universities in which students speak to provide their competencies evidence, i.e., knowledge, skills, and attitudes [11,12,13,14] with Bloom's taxonomy six levels based assessment, i.e. from remember to create allowing study progress in learner-centric learning outcomes [15,16,17].

With technological progress and COVID-19 pandemic social distancing requirements, Online Oral Assessment has

elevated summative oral examinations to a new level. However, online oral examination existed before COVID-19 [18], albeit infrequently, as a form of summative assessment for students. Examples include a study on persuasive web video conferencing for proctoring online oral exams and a comprehensive case study at a Brazilian university [19].

This method of oral assessment in the online environment was also contextualised, developed, and implemented as an OUT Online ORal EXamination (OREX). The design of thisUniversity Senate-approved system was unique [22]. It consists of an automated online registration of exams and session allocation using efficient random algorithms to maintain the anonymity of both examiners and students. Other features include the auto-generation of unique questions, a marking scheme and space to record exam results during an oral examination for a particular student [23,24,28] and a follow-up question, thereby assessing further creativity and application of learning outcomes [5].

Students were required to use exam visa cards or any recognised official identification as entry and to adhere to all exam regulations. Also adopted is the use of a web conferencing tool, in this case, Zoom, to bring together in a virtual examination room the chief invigilator, the second examiner, a student being examined, and an observer to ensure fairness.

The University LMS complemented OReX by providing students access to review questions aligned with learning outcomes that enable expected knowledge, skills, and attitudes [25, 26]. Also, it was complemented by social media, in this case, WhatsApp, to support the necessary communication and awareness through various student groups. Such a system aligned with university quality assurance measures and implemented for the first time in July 2020 exams ensured the social distance caused by the COVID-19 pandemic [24]. It produced a new and innovativeuniversity exams system, later shown by a study that identified OREX as the most influential ICT innovation in the country [23].

OREX was also implemented and used to fulfil the vision of OUT, that is, to be a leading Open and online University in knowledge creation and application, of which an Online assessment was required for a complete online education delivery [27]. In this way, people from various backgrounds can access scalable self-paced higher education, learn, interact, collaborate, and be examined at any time and place,whether on the move, at home, at work, or in a business. Consequently, saving time and money and gaining flexibility and efficiency [5, 24]. Additionally, the OREX approach improves students' ICT skills using intelligent devices and online collaboration tools and fosters confidence, communication skills, and subject command. Moreover, OREX is not only an evaluation of the student's performance but also an opportunity for examiners to receive immediate feedback on the performance of the department and University [24].

This exam approach was novel for the University and the students involved; thus, there was uncertainty regarding the University's infrastructure, personnel, and readiness. After

its initial implementation, it was necessary to re-evaluate its utility, difficulties, and potential for improvement, including from the student's perspective in all phases, i.e., before, during, and after online oral exams. University of Twente (UT), which developed a framework for Remote Assessment [20], and Iowa State University on a step-by-step guide for the oral online exam just before and after the exam [21] are examples of universities that have implemented related approaches during COVID prior OUT. This development,however, does not demonstrate the associated uncertainties surrounding systems, infrastructure, and people and how to handle them more consistently from a student's standpoint. Therefore, this study investigated students' experiences with OREX intervention at OUT to develop a sustainable framework and student-centred recommendations for improvement. This paper consists of the methodology, findings, and conclusions.

2. Methodology
The methodology applied [22] is based on the aim of this study, which was to investigate students' experience with the new intervention of OREX before, while, and afterwards. Its ultimate purpose was to develop a sustainable framework and provide recommendations for an online oral examination ecosystem from a student's perspective.

It was essential to get both quantitative and qualitative data from students because of the nature of the study, complemented by a desk review and other supporting literature on what was done as the students' preparation for OREX. This meant looking into what seemed to be success stories, challenges, lessons learned, and what to improve from the application of and experience with OREX before, during and after exams.

Quantitatively, it involved a population sample of allstudents who did OREX in July and August 2020, more than 1000 [23]. The survey, a data collection research method used to collect data from a predefined group of respondents to gain information and insights into various topics of interest [24], was used. This survey was created based on Google Forms, validated by two experts, and different means, such as emails and WhatsApp groups, were used to reach these studentsscattered across the country and beyond. Together with the student survey and as part of the case study research method, which is in-depth investigations of a single person, group, event, or community and data gathering from a variety of sources [25], several relevant documents, presentations, and reports were collected through a desk review. These OREX- related documents included approved Senate documents, a Poster for the TCU exhibition, and a student guide mainly from the offices of Deputy VC- academics, Directorate of Examinations, and Teaching and Learning section. These documents were reviewed for assembling relevant information on what transpired during OREX preparation and undertaking from the student's perspective. It also contributed to the framework and recommendations that can lead to a better, well-founded, and sustainable online oral examination ecosystem. The survey and desk review data were analysed using quantitative and qualitative tools. These tools included descriptive analysis using Excel and narrative analysismethods to study content from various sources, such as documents and observations from the field or surveys to answer the research questions [26, 25].

3. Findings

The results are based on the aim of this study, which was to investigate students' experience with the new intervention of online oral examination with the ultimate purpose of analysing and learning what transpired and proposing a sustainable framework for online oral examination practices from the student's perspective. As indicated earlier, these OUT OREX sessions were done via Zoom in July and August 2020 with a maximum of 10 daily sessions, an hour per each. In contrast, all inputs such as exam questions, examiners, observers, links, and student information for a particular session were accessed via the developed OREX. The results were achieved by a survey of students who undertook exams through this new approach, complemented by a desk review and presented from a student perspective.

4. Results and Discussion

4.1 Students Profile

The survey was conducted with 88 students from various faculties of the Open University of Tanzania (OUT), among over 1000 students participating in July/August 2020 online Oral Examinations (OREX) that generated 7,479 exam sessions. All 88 participants were valid as they filled in what was required, so all responses were evaluated. Gender-wise, 26% of the participants were female, and 74% were male, while in terms of nationality, the majority were local students (Tanzanian) with 98% and international students with 2%. Looking at their faculties, more students were from the Faculty of Education - FED (31%) with more student populations than any other faculty in the University. The rest were from the Faculty of Arts and Social Science - FASS (25%), Faculty of Business Management - FBM (23%), Faculty of Science, Technology and Environmental Studies - FSTES (18%), and Faculty of Law - FLW (3%). Most of these students were taking bachelor's at 85%, which aligns with students' distribution in university-wide programs. The rest were masters (9%), Diplomas (5%), and certificates (1%). Generally, more students were in the first year (38%) and the rest in the second (25%), third (26%), and beyond the third year (11%),

of which most of them in this OREX did an average of about six (6) exams.

4.2 Why do students opt for OREX instead of written exams

As shown in Figure 1 below, many students indicated that cost-effectiveness and affordability were the main reasons they used OREX (17%). This pattern is also supported by the collected documents that OREX saved students time and money, about 500 dollars per exam session. Students also indicated the strength of oral assessment over written exams (14%). Its corresponding documents also showed that testing higher-order skills bloomy taxonomy-based questions were used, formulated, and demonstrated thus students to have digested the materials by applying, analysing, evaluating, and creating what they learned. In this way, as an example, students were asked to use the concept or theory from the syllabus for an unfamiliar situation not discussed in class. This strength was also brought by the fact that students in all disciplines were told and assessed on three main items, i.e., understanding of learning outcomes, Confidence (fluency & accuracy), and Content considering communication skills, creativity, and problem-solving. Students noted that these communication skills and competency-based assessments in this approach might lead to a confident and more practical graduate.

Comfortability of OREX (13%) was another aspect that its corresponding collected documents also indicated OREX to be highly flexible to a student as these exams were takenfrom anywhere in and outside the country, in or away from the student's working place or home, which is also the case for theassociated session examiners and observer. This comfortability was also due to the Availability of OREX review questions (12%). Its corresponding

collected documents indicated that most OREX questions would beuploaded as review questions in Moodle (LMS in use), thus giving students insights and rubrics to practice.
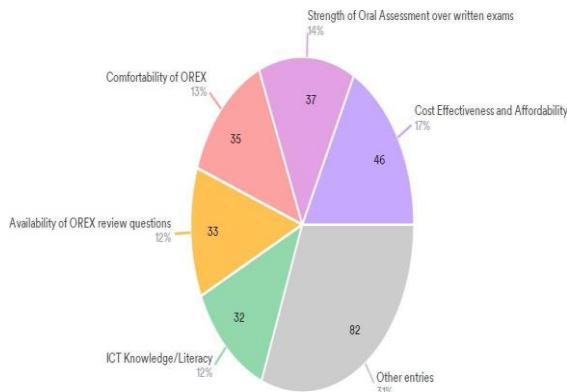

Fig. 1 Reason to opt for OREX exams instead of written exams

ICT knowledge/literacy (12%) is another aspect that the interviews and collected documents showed students to have gained through a short guide and online orientation on how to access cost-effectively exam sessions using Zoom andOREX. Other entries (31%) included responses to the COVID-19 pandemic, instant feedback, support, and fairness.

Concerning OREX support, necessary administrative, technical, and psychological support was provided. Students and collected documents indicated University teaching and learningcoordinators, instructional designers/experts, Heads of departments, Program coordinators, Directors ofRegional Centres, and session examiners provided such support. Regarding the COVID-19 pandemic, the interviewsindicated its strength due to online examination, an activity allowing online accomplishing exams, thus continuity of thestudies even during the COVID pandemic. Concerning instant feedback, the interviews and collected documents indicated OREX to have been handled in real-time to generate exam questions, host exam links, and run audiovisual responses and post-observation reports and results. Fairness of the OREX system is yet an entry that interviews indicated the system to generate randomly selected questions and three interviewers comprising two examiners and an observer for fair student assessment. Before this, OREX fairness was also aquestion design made from six (6) knowledge areas (KAs) representing and aligned to the learning outcomes, of which a student isrequired to answer only two (2) questions and follow-up questions built on the primary OREX questions.

4.3 Reasons for some students not registeringfor

OREXFrom the survey, significant reasons for some students notregistering for OREX were primarily oral exam fear (29%)and Technology/Zoom fear (20%) (Figure 2). Thedocuments also echoed such fear, which showed that theapproach and technology were new and unfamiliar, creatinguncertainties and, thus,

undecidedness. Another primaryreason was connectivity problems (21%) of which collected documents also showed that though the networkaccessibility and power backup were generally OK withincreased Internet speed from150 to 300Mbps in this period,the server that hosted OREX misbehaved for a while in oneof the exam dates due to many logins at the same time.Moreover, ICT literacy (16%) showed the presence ofilliteracy.

Furthermore, there are no clear guides on how OREX works (11%), which shows that despite efforts to disseminate guidelines and raise awareness, some students did not attend, thus creating this bottleneck. On 'Other entries' (4%), students also pointed out several reasons: lack of confidence, phobia of expressing themselves, unstable power, and the presence of follow-up questions. These results on significant reasons for some students not registering for OREX also align with other studies that indicated students' fear and phobia of expressing themselves due to anxiety, especially when starting with this approach [11]. These studies also showed concerns about the technicalities of setting up and using online collaboration tools such as Zoom and the need for adequate technical support [19, 29].
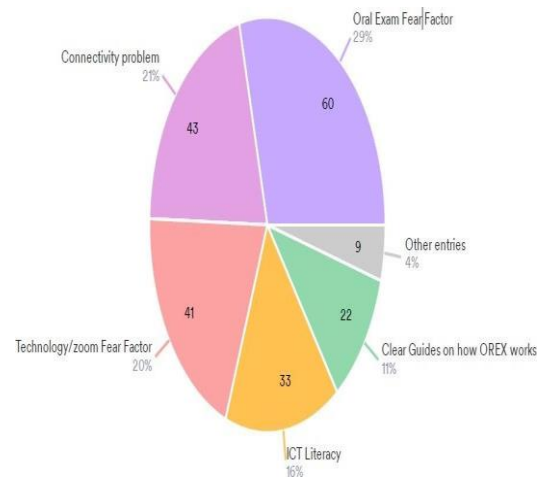

Fig. 2. Significant reasons for some students not registering for OREX

4.4 Kind of examination location/venue
The survey indicates that students used various locations todo their OREX exam sessions. It was led by at-home

(64%), followed by Office (23%), OUT Regional Centers (7%), Others (6%) and OUT-HQ (1%) as shown in Figure 3.
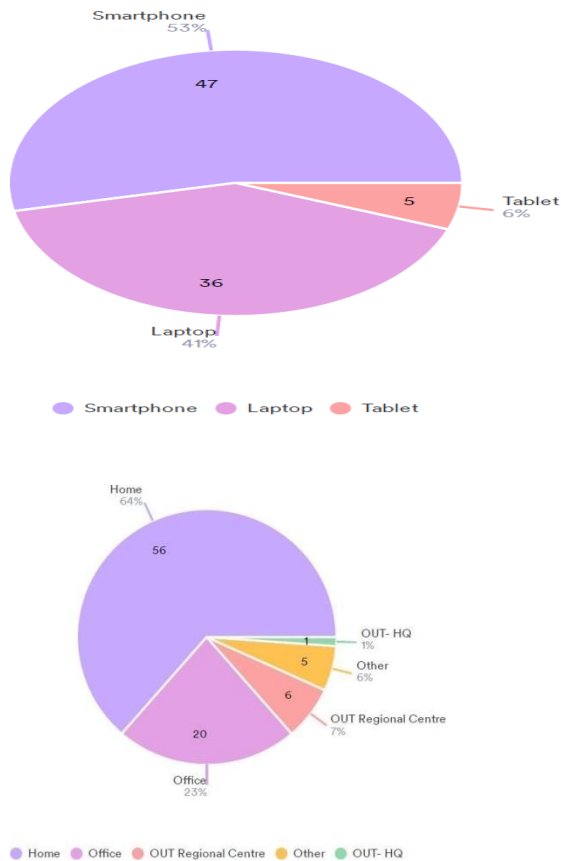
Fig. 3 Kind of examination location/venue

4.5 Types of devices used by students during OREX

From the survey, the data indicated that the types of devices used by students during OREX sessions were mostly Smartphones (53%), followed by laptops (41%), and tablets (6%) (Figure 4). These devices flexibly facilitate audiovisual online communication and interaction, and the mobile devices' specific usage by April 2021 indicated the presence of 53,063,085 SIM cards, about 90% of the population [30].

Fig. 4 Types of devices used by students during OREX sessions

4.6 Internet connectivity access and quality

The survey results in terms of Internet connectivity access indicated to be mainly through mobile (56%), and the rest were Wireless Hotspot (23%), Mobile tethering to laptop (20%), and LAN cable - 1% (Figure 5). The complimentary documents echoed these results, indicating that students' access is mainly through mobile devices. The Tanzania Communication Regulatory Authority (TCRA) statistics supported this access via mobile devices, putting Internet users at 29,071,817, about 50% of the population, by March 2021 [30]. Regarding internet quality, the survey results indicated mainly a range of Excellent to Good (87%), and the rest were Poor and Very poor (13%).

Also, it was indicated that no power cut-off during the whole period of OREX sessions happened, though the server hosting OREX misbehaved on one of the exam dates, and a new server witha higher RAM capacity of 32 GB was deployed to handle smoothly increased concurrent users. Also, mobile devices' internet connectivity quality tests made through Internet bandwidth testing software available on the Internet, such as Speedtest.net, at least in some urban places and providers indicated to have more than the required minimum capacityof Internet connection broadband wired or wireless, which is 800kbps thus the possibility of having quality onlineconnection and services.
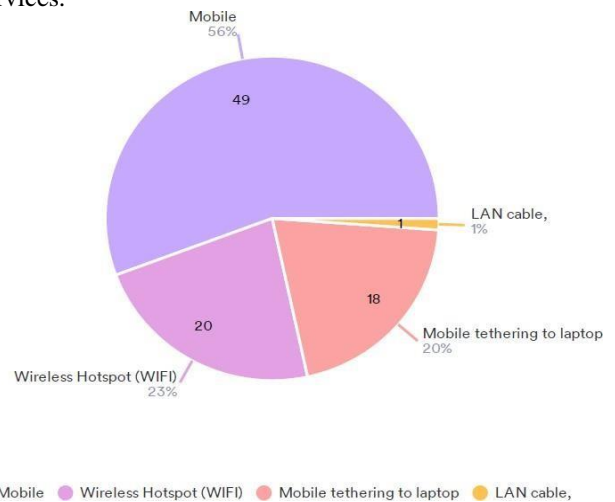
Fig. 5 Internet connectivity access

The extent of OREX is easy to use, cost-effective and resources saving

When students were asked to what extent oral online exams via Zoom were easy to use, most agreed with 84%. A few were uncertain (7%), and 9% disagreed. They were also asked to what extent this OREX was more cost-effective than written exams. The majority (58%) agreed the remainder were uncertain (5%), and 33% disagreed. This was complemented with relevant resource types that OREX does savecompared to written exams (Figure 6), in which many indicated time is saved (28%) followed by travel costs (25%), requestsfor travel permission logistics (23%), accommodationcosts (21%), and others (3%). Also, the students showed that budgets can be minimised during exams since they use the daily home/workplace budget and can handle both exams and job schedules.

Fig. 6 Resources that OREX does save compared to written exams.

The collected documents echoed these cost and time savings, which showed that OREX reduced the time and costs for both the University and students. OREX approach also allows a student to be examined at home, work, and when travelling, provided it has reliable internet connectivity. Furthermore, each student had a printed OREX Visa Card (OVC) bearing essential student information like the traditional Exams Hall Ticket (EHT) that facilitated the identification and attendance control like paper-based exams. The literature also supports it, such as

[19] indicating how an online oral exam was easy to handle, brought flexibility, and reduced student costs. The support is also provided by [32], which showed several conveniences, including transparency and instant results, and offered new possibilities in a constantly changing world, including mobile technologies and students' mobility.

4.7 OREX learning outcome demonstration, innovation, and awareness.

When students were asked whether they could express and demonstrate their learning outcome understanding before examiners through their responses to the primary and follow-up questions, most indicated that they agreed, 80%. The rest, fewer, were Uncertain (10%) and disagreeing (10%). The complimentary documents revealed that the higher-order skills bloomy taxonomy-based review questions were prepared, moderated, and accessible via Moodle, with students as the primary beneficiaries. After that, in the exams, each student was assessed with just two main random questions and the related follow-up questions where necessary. This approach allowed students to cite examples reflecting the world of practice and applying what they have learned in six (6) knowledge areas aligned to each course learning outcome.

Furthermore, the format of the questions, marking rubric, and criteria were provided in advance. Two examiners assessed students in each course on three items using their average: Content (50%) comprised of Communication Skills, Creativity, Knowledge and Understanding, and Problem-Solving. The other items measured were Learning Outcomes (30%) and Confidence – Fluency and Accuracy (20%).

Additionally, when students were asked whether this OREX

innovation is helpful and supports distance learning, the kind of education delivery via blended or online mode, most agreed 80%; the rest, fewer, were Uncertain (10%) and generally disagreeing - 10%. The complimentary documents also echoed it, indicating that the Virtual exam venue (OREX system and Zoom tool) was indeed an innovation that comprised a student, a chief examiner (CE), the second examiner (SE), and an exam observer (EO) that ensured fairness in student assessment.

Furthermore, the quality of examination was handled digitally in an innovative way where apart from student results being moderated using a similar approval process at departmental and faculty levels, External examiners (EE) were engaged in some OREX sessions virtually on a random basis and were also given summarised students record sheets and if need be, an observer report and an audiovisual record from the OREX session. Moreover, the OREX system was able to generate question papers with randomly selected questions (for a student and CE/SE/EO) and a marking scheme (only for examiners/observers) on the date and time of the exam while taking care to pair CE/SE/EO and a respective student.

Still, in the same perspective, when students were asked whether their OREX awareness was OK, they agreed with 61%. The rest, fewer, were Uncertain (10%) and disagreeing (10%). The complimentary documents also echoed it, indicating that, indeed, students were oriented and trained on the use, functionalities, and procedures to access and participate effectively in OREX sessions using Zoom facility by HoDs in their respective departments, DRCs in their regional centres, and coordinators in their various programs. The OREX awareness and training also involved student government leaders (OUTSO) throughout the country by the office of Deputy VC Academics, specifically through the Director of Examination Syndicate (DES) and University Teaching and Learning Services (UTLS) unit.

Additionally, all information on the use of OREX was communicated to students two months in advance, including an OREX short student's guide that explained the operations and technical requirements of the new OREX approach and dynamic systems, as well as exam malpractices and irregularities that lead to cancellations of exams, suspension, and discontinuation of studies. This guidance for students was provided briefly in each live OREX session before the main and follow-up questions.

4.8 Challenges/issues deterring good performance and sustainability of the OREX

Students were asked what they thought to be the challenges/major issues deterring good performance and sustainability of the OREX from these exam experiences. Some indicated not experiencing any; several indicated facing some, as shown in Figure 7. Internet availability was the primary one (23%), supported by complementary documents that indicated some students reporting University Internet instability during OREX exams and people with low incomes or unavailability of connectivity

at times from the side of some students. Also, there was the underperformance of the OREX server at the beginning of these exams, where the system was found not accessible to examiners and associated students. Others were the lack of online oral experiences (15%), Fear/Phobia (12%) that played a part in OREX acceptability difficulties, Software usability (8%), and training (7%). Other entries (36%) collectively, each in a small percentage, included Power problems/interruptions, Price/costs, Uncertainty of educational policies, Unclear OREX guides, Security concerns, and limitations on used digital platform free time and knowledge by staff and students. The collected documents also showed threats of inaccessibility due to power outages and the use of 40 40- minute free Zoom accounts that disrupted sessions and concentration.

Other significant challenges from the survey were English speaking fluency and a display on the students' side to complement the examiners' questions reading. Some more issues were shown by collected documents, including non-centralised management of the recorded sessions in MP4 that, if not organised well, could be problematic to access. Others are some courses not having OREX review questions in the Moodle platform, some examiners asking follow-up questions unrelated to the main questions, and the availability of a few missing and incorrect Zoom links.

Furthermore, there are some questions about nonconformities to the OREX template, instructors' unpunctuality, harshness, unfriendly students, poor language barrier, non-alignment of the prospectus, and difficulties in dealing with science- related practical/experimental exams. The study by [19] also supports it on issues influencing an exam, such as punctuality, minimum equipment (computer, webcam, and audio), good web connection, software, and means to connect them. It also supports addressing questions objectively and being prepared to demonstrate competencies.

4.9 Benefits of OREX from students' point of view

Students were asked what they saw as benefits from their one- month experience with this OREX approach. Generally, benefits include ICT skills building, flexibility as one can do exams anywhere, and saving time and costs for travelling and accommodation. It also provided them with competency and confidence for better performance.

Furthermore, it indicated that it allows them to clarify answers with follow-up questions, and most examiners are cooperative. And such an approach makes them competent, and results are released quickly. The exam is recorded if a student wishes to appeal against the results. The complementary interviews and collected documents also indicated that the Audiovisual of the examination sessions were made and stored in case of a student seeking an appeal, an invigilator indicating malpractices, or any other future reference. Such a record is essential to the student and the University.

Additionally, the availability of a neutral observer beyond

the two examiners ensured that both examiners and a student were treated during OREX, and its random allocation of those examiners maintained a high level of anonymity, thus contributing to corruption avoidance that may have otherwise affected students. Furthermore, the approach ensures assessment focused on learning outcomes, the ability to probe the student's knowledge, and reflects the world of practice while providing the means of clarifying questions, thus, better learning. Moreover, it had a cost-effective virtual assessment software, well-defined processes, and learner support.

Other benefits include being more focused when studying for exams because of learning outcomes and associated review questions. Generally, OREX fits and contributes to OUT's vision of "to be an open and online university in knowledge creation and application" due to these online oral examinations. Generally, most students were satisfied with how OREX sessions were conducted regarding readiness to attempt examinations online and oral examination questions asked during OREX sessions. These led to the acceptability level of the OREX system being higher among students and many requests on the DES table asking for OREX exams. [18] also support it with their case study of oral examination as an online assessment tool and [19] in their study of compelling web video conferencing for proctoring online oral exams: a case study at scale in Brazil that despite years difference, both indicated the increased access, flexibility, validity/high-quality assurance, clarification of questions and reduced cost brought by such online oral examinations.

4.10 OREX Improvement Suggestions - Students' View

Students were asked in the survey what they saw as an improvement that could be made from their one-month experience using OREX. The students indicated that the system was generally good. However, several improvements can be considered, such as entering results on time after the last examination, assessing the students to be fair and not laughing at them, and conducting OREX every quarter to finish their studies on time. Also, the system should proceed,

giving students second chances if they fail to do it at an arranged time for some reason, such as a network problem on either side. Moreover, the system should be used even for other universities as it is efficient and enables students with economic and time issues to do their exams at home, at the office, or anywhere else. The improvement suggestions from collected documents further brought to light the following:

4.10.1. Institution backend infrastructure

The University should have reliable internet and power supply during OREX exams. It should also increase bandwidth, processing, and storage capacities to accommodate concurrent users during OREX sessions.

4.10.2. User devices and access to the Internet

The University should put up an awareness campaign in partnership with mobile and other tech companies for

students on the availability of affordable laptops, tablets, smartphones, and internet bundles. This way can reduce the cost while increasing access to learning resources. Students should consider having a sufficient internet bundle and being inan area with reliable Internet during OREX exams.

4.10.3. Change management/awareness and training
The University should ensure that changes in OREX are reflected in the prospectus for easy referencing and unambiguous dissemination to students. Students should also visit the OUT website, emails, the OREX system, and relevant social media groups to know their scheduled exam dates and updated exam guides. Additionally, students shouldpractice the use of group video calls in use at the time, in this case, Zoom. Moreover, students should acquire the digital literacy necessary to undertake OREX exams, including group video, call tools, learning management systems, social media, mobile gadgets, and audiovisual and connectivity skills. Examiners should be provided with continuous training on OREX issues like setting the right questions and fair assessment and treatment of candidates during the sessions. Generally, a single-page student brochure for easy dissemination and awareness about OREX with all the necessary information may be value-added.

4.10.4. Content and assessment preparation
The University should ensure writing material and incorporate activities for the students to practice Bloom's Taxonomy six levels, from remembering to creating while studying, thus filling the required student learning outcome and competencies. Students should also practice all provided OREX template-based review questions in a Moodle course, demonstrating that they have read, digested, and understood the course materials, showing that they have insight and can explain, contrast, compare and apply what they have learned to a familiar or unfamiliar situation. Furthermore, students should be aware of assessment criteria, i.e., OREX rubric & marking criteria in three areas, i.e., content comprising of CS-Communication Skills, CR-Creativity, KU-Knowledge and Understanding PS-Problem Solving, learning outcome comprising LO-Understanding of Learning Outcomes, and confidence comprising fluency and accuracy.

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the form of individually assessed skills, as well as observers, report. Moreover, the University should learn more about the means for practically oriented courses such as STEM to be tested theoretically and practically from an OREXperspective. The suggestion for improvement also enhances timely exam creation, moderation, and subsequent uploading of results into SARIS.

4.10.5. Student support
For its smooth undertaking, guaranteed student support pedagogically and technically should be embraced before andduring OREX exams.

4.10.6. Used assessment platforms related to improvement (OREX & Zoom)
Ensuring timely student access to OREX and associated Zoom links and having a mandatory field for a student's telephone number to directly facilitate examiners calling if a student does not appear for exams. Also, some of the questions proved to be a bit longer, so having a standardised and documented way to read. At the same time, students see them and may add value (e.g., copy and paste in the chat, copy and paste in a Word document or a PowerPoint slidethat you can then share). Additionally, the system should be able to remind instructors via their emails (copiedto therespective heads of the departments) of the courses that have no OREX questions just before the submission deadlines. Furthermore, more systematic, centralised, and automatedmanagement of MP4 files of the recorded sessions is required to increase reliability, thus enabling HoDs and others to see recordings the same way they can see /their department results. Moreover, it is to negotiate, leverage, and deploy an effective education package of Zoom or any other cost-effective collaboration tool, thus avoiding short interruption brought by its 40-minute session limit in a free account.

5. Proposed Framework
Based on the literature and desk review done, an observation made, practices experienced, study results obtained, and discussion made, an online oral examination ecosystem framework is proposed from a student perspective. This framework ensures a systematic and sustainable ecosystem approach to online oral examinations at the OUT. The framework includes four (4) main phases, 16 components, and several elements to be considered for a smooth Online Oral Examination (OREX) from a student perspective. The four phases are studying (Phase 1), Preparing for exams (Phase 2), Doing exams (Phase 3), and Post exams (Phase 4),as depicted in Figure 7. These four phases (Figure 9) are essential and interlinked. Together with the proposed recommendations in the next section, they can contribute to a systematic and sustainable ecosystem of student approach to online oral examination at OUT and beyond. This proposed framework is also in line with the learner-centred approach that allows the students to master their learning environment [32,41], thus a need for students'

development in information-handling skills, which thisframework contributesto concerning the optimal use

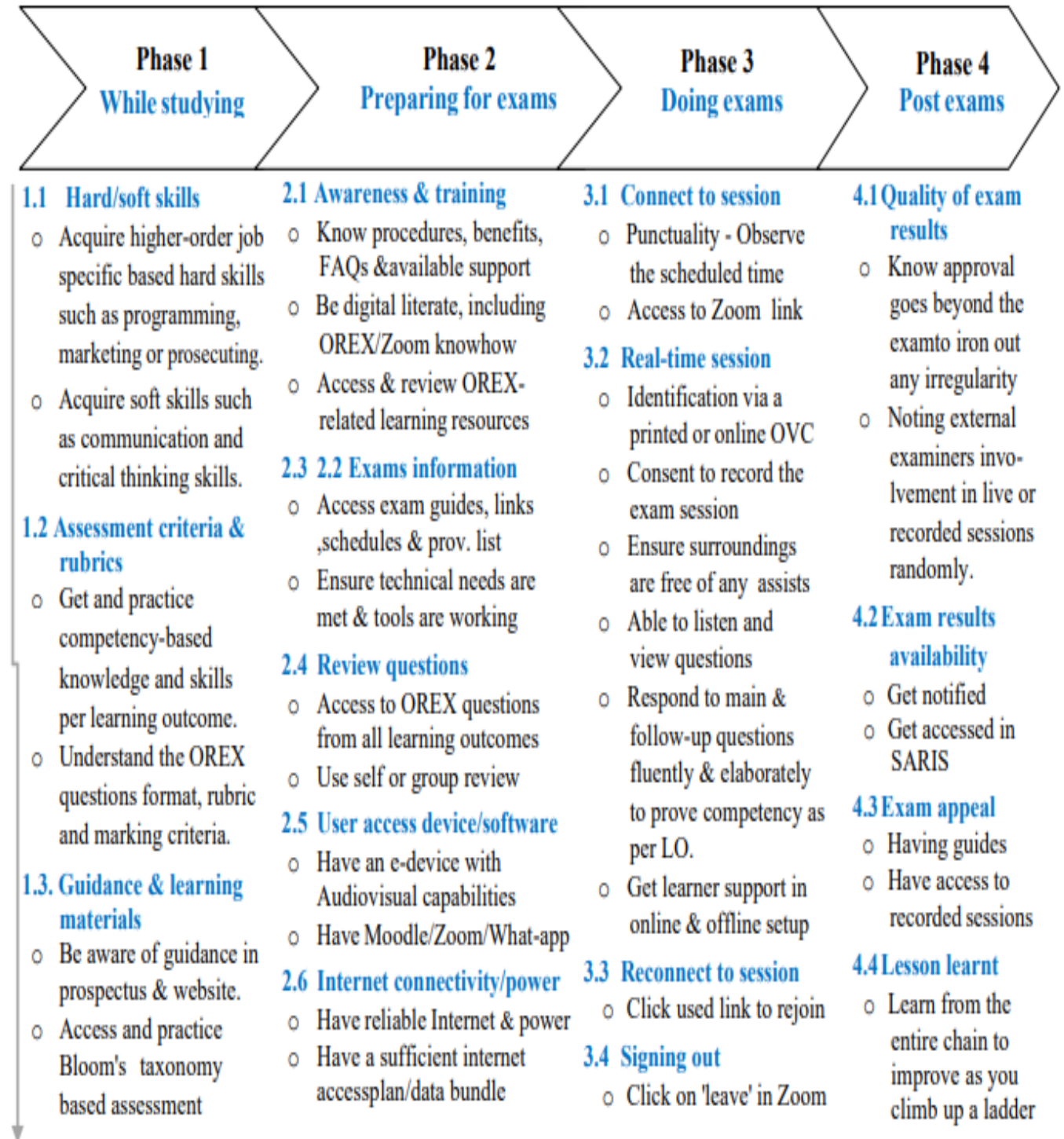of online oral examination(OREX). The four involved phases are further described below.

Phase 1
While studying

1.1 Hard/soft skills
o Acquire higher-order job specific based hard skills such as programming, marketing or prosecuting.
o Acquire soft skills such as communication and critical thinking skills.

1.2 Assessment criteria & rubrics
o Get and practice competency-based knowledge and skills per learning outcome.
o Understand the OREX questions format, rubric and marking criteria.

1.3. Guidance & learning materials
o Be aware of guidance in prospectus & website.
o Access and practice Bloom's taxonomy based assessment

Phase 2
Preparing for exams

2.1 Awareness & training
o Know procedures, benefits, FAQs &available support
o Be digital literate, including OREX/Zoom knowhow
o Access & review OREX-related learning resources

2.3 2.2 Exams information
o Access exam guides, links ,schedules & prov. list
o Ensure technical needs are met & tools are working

2.4 Review questions
o Access to OREX questions from all learning outcomes
o Use self or group review

2.5 User access device/software
o Have an e-device with Audiovisual capabilities
o Have Moodle/Zoom/What-app

2.6 Internet connectivity/power
o Have reliable Internet & power
o Have a sufficient internet accessplan/data bundle

Phase 3
Doing exams

3.1 Connect to session
o Punctuality - Observe the scheduled time
o Access to Zoom link

3.2 Real-time session
o Identification via a printed or online OVC
o Consent to record the exam session
o Ensure surroundings are free of any assists
o Able to listen and view questions
o Respond to main & follow-up questions fluently & elaborately to prove competency as per LO.
o Get learner support in online & offline setup

3.3 Reconnect to session
o Click used link to rejoin

3.4 Signing out
o Click on 'leave' in Zoom

Phase 4
Post exams

4.1 Quality of exam results
o Know approval goes beyond the examto iron out any irregularity
o Noting external examiners invo-lvement in live or recorded sessions randomly.

4.2 Exam results availability
o Get notified
o Get accessed in SARIS

4.3 Exam appeal
o Having guides
o Have access to recorded sessions

4.4 Lesson learnt
o Learn from the entire chain to improve as you climb up a ladder

Fig. 7 Proposed framework for online oral examination ecosystem from a student perspective

5.1. Phase 1: While Studying

5.1.1. Hard and soft skills

Acquire hard skills to demonstrate insights on digesting, arguing, comparing, relating, contrasting, and providing practical examples or cases of learned materials, including concepts, theories, procedures, and practical solutions to apply them to a related or unfamiliar situation in real life. These skills include marketing, programming, or prosecuting by learning and working on given activities, assignments, and practices in the enrolled program to acquire competencies. This handover is done via approaches such as Bloom's Taxonomy, six cognitive levels covering three lower & three higher-order skills from remembering, the lower- order skill, to creating, the highest-order skill [35-36]. Acquire soft skillsin capacity-building Initiatives using available opportunities during 1st year and subsequent yearly orientations provided by the University in today's digital era [42], such as digital literacy [34,43]. These opportunities include the web

conferencing tools, a learning management system, social media, and own university-developed OREX for successfully undertaking ICT-enabled, hybrid, blended, and online learning and assessment. Moreover, it is acquiring soft skills required for employability, such as the 4Cs of 21st-century learning: communication skills, collaboration, critical thinking, and creativity [37].

5.1.2. Assessment criteria and rubrics

Acquire and practice required knowledge, skills, and competencies per course learning outcome, as the quality of assessment directly correlates to the quality of learning [38] in this case, guided by three assessment criteria, which are 1) Content comprising Communication Skills (CS), Creativity (CR), Problem-Solving (PS); 2) Learning outcome comprisingunderstanding of learning outcomes, and understanding of learning outcomes, and 3) Confidence which is Fluency and Accuracy.Understand the OREX question format, rubric, and marking criteria that will eventually be used for scoring based on three assessment criteria, i.e., 1st on content (50%) comprising of CS (10%), CR (10%), and KU. (10%). Furthermore, PS (20%); 2nd on Learning outcomes that comprise understanding them (30%); and 3rd on confidence forming ofFluency and Accuracy (20%).

5.1.3. OREX-based guidance and learning materials

The prospectus and website reflect access to OREX-based high-level guidance information for easy referencing and decisions.

Having access to and practice the learning materials incorporated with activities and other engaging assessments based on Bloom's Taxonomy six levels from remembering to create.

5.2. Phase 2: Preparing for Exams

5.2.1. Awareness & training

- Acquire digital literacy necessary to prepare and undertake OREX exams, including basic web conferencing such as Zoom, learning management systems such as Moodle and the associated Moodle Mobile, social media such as Whatsapp, and Online Oral Examination System (OREX) itself, and used devices audiovisual and connectivity skills. Acquiring such digital literacy, among others, includes attending all necessary orientations where a student learnsbenefits and how to access and use all indicated OREX- related platforms effectively & supporting infrastructure to avoid technophobia and become efficient.
- Access and review online oral exam format, questions, and associated materials.
- Know and get used to all available learner support mechanisms and channels for smoothly handling dynamic student-related systems and tools.
- Access relevant updates and frequently disseminate Asked Questions (FAQ) to increase efficiency and avoid unnecessary communication.

5.2.2. Exams information

- Access the OUT website and other channels such as email and social media regularly to know the scheduled dates of OREX examinations and any updated guides/instructions such as requirements to ensure and malpractices to avoid on OREX examinations for planning and other necessary preparations.
- Access a provisional list of OREX candidates (OREX list) published in advance by the DES office, showing students and OREX registration details.
- Access to and ensure video conference (e.g., Zoom) technical requirements are met for an OREX Session.

- Knowing in advance that Examiners will ask a student two main OREX and follow-up questions, provided they are built on the main questions.
- Knowing that the system generates OREX questions& pairs with relevant CE/SE/EO.
- Able to access individual online oral examination timetables and respective Zoom links in OREX.
- Access to a brochure with all the necessary information oneneeds to know about OREX, which is on one page for easy access and awareness about OREX.

5.2.3. Review Questions
- Access to lower and higher-order skills Bloom's taxonomy-based review OREX questions from all 6 KAs are moderated and uploaded in Moodle to evaluate the extent to which one has achieved the learning outcomes. An example is when students apply a concept from the syllabus to an unfamiliar situation not discussed in class.
- Focus on the self/group approach to review questions.

5.2.4. User Access Device and Software
- They have a cost-effective digital device such as a desktop computer, laptop, tablet, iPad, or Smartphone with Audiovisual capabilities that enable OREX sessions & other necessary digital access/interaction.
- They have installed and practised required software and tools such as Zoom, Moodle, WhatsApp, and others to enable OREX sessions & other interactions.
- They have installed supported Web browsers such as MS Windows (MS Edge, Firefox, Chrome, Safari),Mac (Safari, Firefox), and Linux (Firefox, Chrome).

5.2.5. Internet Connectivity and Power
- They have availability and reliability of the Internet and power in an area where the student intends to do OREX exams.
- They have sufficient user internet broadband wired or wireless access via corporate internet connectivity or individual mobile data with 800kbps as a minimum, preferably from 1.5 Gbps tested via speedtest.net.

5.3. Phase 3: Doing Exams
5.3.1. Punctuality
- Observing scheduled time and coming in a timely

5.3.2. Main OREX Access
- Access to respective VC software (Zoom) links activated during the relevant exam.

5.3.3. Exam invigilators
- Respond to randomly allocated interviewers (2)

inthepresence of an observer for a fair assessment.

5.3.4. Session recording
- Provide consent to recording Audiovisual of the examination session for using it as evidence in the event of seeking an appeal and other related purposes.

5.3.5. Virtual Exam venue (Zoom)
- Live identification in a virtual room (Zoom) via a printed or online OREX Visa Card (OVC) that bears essential student data like a traditional Exam Hall Ticket.
- Ensuring a virtual venue (Zoom) surroundings are free from any possible assistance during the exam.
- Having access to VC software (Zoom) for live exam sessions at home or the workplace provided reliable internet connectivity and could talk and be seen.

5.3.6. Guidance on critical matters in a live OREX session
- Speaking loudly, fluently, confidently, and elaborately toprove the competency of the subject.
- They are maintaining & adhering to the high level of academic integrity, exam rules & guidelines, including actions leading to irregularities resulting in exam cancellation, suspension of studies, or discontinuation.

5.3.7. Access to OREX questions
- Able to listen and, where necessary, view questions

5.3.8. Response to questions
- Respond to main and follow-up questions that probeto clarify and provide elaborative answers to reflecton learning outcomes, competencies & world of practice.

5.3.9. External examiners
- The possibility of external examiners engaging in some OREX sessions randomly.

5.3.10. Learner support
- Access to online and, where possible, physical support during the examination.

5.3.11. Reconnect to real-time session.
- In case of unintended disconnection, click again on the used VC software (Zoom) link to rejoin.

5.3.12. Signing out/leaving the virtual room (Zoom)
- Click on 'leave' in VC software (Zoom)

5.4. Phase 4: Post Exams
5.4.1. Quality of examination results
- Students should know that their exam results are going through the approval process at departmental& faculty levels to ensure any irregular issue is ironed out.
- Students should know that their exam results go through an external process via live or recorded OREX sessions and summarised record sheets.

5.4.2. Exam results availability
- Timely notified when exam results are ready
- Able to access exam results relatively fast in SARIS

5.4.3. Exam results appeal
- Having a guide on how to apply OREX-related appeal.
- Access to recorded evidence from the session when required to support OREX-related appeal.

5.4.4. Lesson learned.
- Learning from weakness during prep & live sessions, especially on responses to main & follow-up questions&improving performance as climbing a studyingladder.

6. Conclusion and Recommendations

6.1. Conclusion

This study aimed to investigate experience from the newly used Online Oral Examination (OREX) intervention and approach at OUT from a student's perspective to develop a framework to lead us to a sustainable OREX ecosystem. The results show diversified experience and how beneficial the approach to the summative assessment is despite limited access to technologies and connectivity in the country. It was interesting to see how learners could access OREX-related digital platforms during this online oral examination. Most applauding is the use of smartphones, which is a good sign for this OREX approach due to the country's widespread use of such devices.

Based on the literature, results, and discussion, an online oral examination ecosystem framework was developed from a student perspective. This kind of intervention, if used well, might assist students in being conversant with the best way tooptimise OREX use, stand out to do well in associated exams, and motivate the development of competencies required in the job market. Also, on the same basis, several recommendations are made on what could be improved for a sustainable online oral examination from a student viewpoint.

The study's outcome has implications for policymakers and practitioners in the Universities and supporting parties in aligning existing policies, strategies, and practices to allow maximum appropriation of the proposed framework and recommendations. The implication is also to researchers using these findings to test the proposed framework while considering the recommendations. Also, it implies investing further in how each shown phase, component, and element can be practised to benefit students in achieving better resultsin their courses and overall program learning outcomes.

6.2. Recommendations
This study presents recommendations from the viewpoint of analysed quantitative and qualitative collected data

and aframework proposed for further improvement to a sustainable online oral examination practice from a student perspective.

- Students should be aware and act on the overall OREX requirements provided by an institution and other factors that influence the exam, such as punctuality and meeting minimum equipment (desktop, laptop, tablet, or Smartphone with visual Audio). Other factors are good internet connectivity & aspects described in a framework.

- Students should address questions with objective answers, solve problems creatively, and be prepared to interact professionally to portray and demonstrate required competencies along with the six bloomy taxonomy levels, especially the higher level on which the OREX questions are based. i.e., apply, using the information in new situations; analyse, drawing connections among ideas; Evaluate, which justifies a decision; and produce original work [6].

- The first two levels should also be considered by students as the foundation, i.e., Remember, which deals with recalling facts and basic concepts, and Understand, which explains ideas or concepts. When used appropriately to write learning materials and their delivery, it produces a sound, market-ready & employable graduate.

- Students should acquire and leverage devices they have toincrease efficiency in preparing for and doing OREX exams that involve access to Moodle for OREX review questions and course materials. Also, the OREX system for access to exam schedules and session links, the Zoom platform as a virtual exam room, and WhatsApp as a social media for efficient communication.

- Students should note that technology, in and of itself, does not necessarily result in a fundamental improvement in educational practice. In this case, concerning preparing and doing the online oral examination, the focus shouldbe on learning outcomes that ensure they are ready for online oral exams and the competency-oriented knowledge, skills, and attitude required in the market.

- Students need to be oriented and acquire digital literacy on how to participate effectively in online oral exams where online training and orientation are used efficiently & cut down costs.

Funding Statement

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