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COVID-19 and Technology Enhanced Teaching in Higher Education in sub-Saharan Africa: A Case of the University of Dar es Salaam, Tanzania

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Abstract: This article aims to share an experience on the process taken by the University of Dar es Salaam to adopt and deliver technology-enhanced teaching and learning during the COVID-19 crisis. The university started by forming a team which conducted an audit to identify existing ICT infrastructure, skills gaps amongst instructors, and information systems that could be quickly adopted to deliver various courses during the COVID-19 crisis. The Moodle system, Zoom video conferencing system, and Postgraduate Information Management System were identified and recommended. After the audit, 340 instructors were trained on identified systems and 369 new courses were developed. Although face-to-face classes resumed a few months after the training and preparations, postgraduate courses continued to be offered via the blended mode with the Zoom and Moodle systems being used. The experience gathered from this study contributes towards knowledge of ICT integration in teaching and learning and can be integrated into teaching during the COVID-19 crisis in resource-constrained universities in sub-Saharan Africa and beyond.

Keywords: COVID-19, educational technology, education in emergencies, education systems, sub-Saharan Africa.

Introduction

The outbreak of Corona Virus Disease of 2019 (COVID-19) pandemic has brought unprecedented disruption to universities in Africa as many of them were closed as the mitigation step against the risk posed by the virus (Faraj, 2020; UNESCO & IESALC, 2020). Many governments directed colleges and universities to shift to technology-enhanced delivery mode to continue teaching and learning while keeping their staff and students safe (Ray & Srivastava, 2020). Several universities across Africa, including the ones in countries such as Egypt, Ghana, South Africa and Rwanda, among others, moved some of their programmes online (Adotey, 2020). Similarly, on March 19, 2020, the Tanzanian government ordered all colleges and universities to cancel all face-to-face classes, including laboratories and other teaching and learning activities, to prevent the spreading of the virus. Consequently, all students were sent home, apart from some international students who could not travel and had to stay at the main campus. Like many universities in Africa, the universities in Tanzania were caught unprepared and could not easily switch to technology-enhanced teaching and learning immediately.

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The University of Dar es Salaam (UDSM), one of Africa's oldest universities, appointed a task force to lead the process of rolling out the mandatory and university-wide technology-enhanced teaching during and after COVID-19. The task force was required to conduct a small audit on existing ICT infrastructure and information systems that could support the delivery of various courses in technology-enhanced mode. The team was also required to review and recommend policies and guidelines to be adopted to smooth technology-enhanced teaching and learning implementation.

Although the timing of this move was influenced by the coronavirus pandemic, the move by the university towards greater use of technology in its teaching and learning processes was already envisioned in the university vision 2061 and the Five Years Strategic Rolling Plan (FYSRP) 2020/2021–2024/2025. For instance, the university vision 2061 indicates the university needs to harness the full potential of ICT to transform UDSM into an e-University in terms of IT infrastructure and services. The Five Years Strategic Rolling Plan identifies technology-enhanced learning as one of the delivery strategies and incentives to be strengthened by June 2023. Therefore, the COVID-19 pandemic just accelerated already existing strategies and plans to make use of ICT in enhancing the quality of teaching and learning as well as increasing access to university programmes.

To introduce technology-enhanced teaching and learning during this pandemic, the team started by conducting an audit to identify existing ICT infrastructure, the skills gaps amongst instructors, and possible information systems that could be quickly adopted. Through this audit, three information systems: the Moodle system, Zoom video conferencing system, and Postgraduate Information Management System (PGMIS) were identified and recommended. Similarly, the skills gap analysis amongst instructors was conducted on the identified information systems.

This article aims to share an experience on the process taken by the university to adopt and deliver technology-enhanced teaching and learning during the COVID-19 crisis. Few studies have documented steps taken by universities in sub-Saharan Africa in introducing technology-enhanced learning during the COVID-19 crisis (Crawford et al, 2020; Mhlanga & Moloi, 2020). Therefore, experience from the actions taken by UDSM in embracing technology in teaching activities during the COVID-19 crisis will contribute to the body of knowledge around online learning, especially in resource-constrained universities in sub-Saharan Africa and beyond.

The Audit

Through the appointed task force, the university started by conducting a small audit to assess existing ICT infrastructure and information systems to identify additional ICT infrastructure and information systems required to introduce technology enhanced teaching for both the short term and long term. To achieve this, interviews were conducted with the ICT manager, four staff from the Center for Virtual Learning, and 24 selected ICT technicians in all colleges to assess the availability of ICT infrastructures, such as computer labs, servers, speed of Internet connectivity, and information systems that will support the delivery of online teaching and learning at the university. The non-participatory observation was also conducted to verify servers' capacity, the speed of Internet connectivity, and other relevant ICT infrastructure. Based on the collected data from non-participatory observation, the physical conditions and usage of the available ICT facilities in various colleges and schools were established. Similarly, skills gap analysis amongst instructors was conducted on the identified information systems. The task force further identified programmes and courses that could

be delivered with minimal technological and investment support. Finally, the team interviewed quality assurance staff to assess the existence of policies and guidelines that support the delivery of these programmes. The audit was conducted for four weeks starting from June 15, 2020. Some of the issues identified during a small audit are explained next.

Internet Connectivity

The availability of reliable and speedy Internet connectivity is mandatory for the introduction of technology-enhanced learning. Therefore, the assessment of the source and speed of the Internet at all campuses was investigated. It was found that the university is connected to SEACOM optic fibre cable with an Internet speed of 155Mbps. Therefore, the Internet at all campuses had a good speed and was reliable to deliver technology-enhanced teaching. At the same time, the team was working with mobile firms to find ways of offsetting the cost of Internet to students who were at home during the crisis.

Information Systems

The audit identified and recommended three information systems that could be used to deliver technology-enhanced learning. The identified information systems are the Moodle Learning Management System, Postgraduate Information Management System (PGMIS), and Zoom video conferencing system. The description of each system is explained next.

Moodle System

It was found that the university had already started using the Moodle system in 2008. The Moodle system is a web-based system with features that enable instructors to manage courses over the Internet (Islam & Azad, 2015). The system has features, such as chat rooms, whiteboards, discussion forums, polls, quizzes, and surveys, which allow instructors and students to share course content and communicate online synchronously and asynchronously (Naveh et al, 2010).

At UDSM, this system is used to complement face-to-face classrooms and to offer blended learning programmes with nearly 400 instructors. This number of instructors accounted for around 40% of the instructors at the university, and, therefore, training was needed for the remaining 60% to be able to deliver courses online under the current environment. Besides, it was found that the university developed a mobile version of the Moodle system in 2016 to enable users to access the system via mobile devices. The Moodle Mobile app has features that allow students to view course notes, announcements, and discussion threads. The mobile Moodle enables students to view their course grades and to check for their fellow students.

Postgraduate Information Management System

Another important information system identified that could support the delivery of technology-enhanced teaching at the university during the COVID-19 crisis was the Postgraduate Management Information System (PGMIS). The PGMIS enables the university to manage students' supervision from supervisor allocation to dissertation/thesis examination processes. At the time of the audit, only two out of 15 colleges were using the systems. These colleges were the College of Information and Communication Technologies (CoICT) and College of Natural and Applied Science (CoNAS), with 261 instructors and 1,283 postgraduate students. The rollout of the system to the remaining colleges was needed.

Zoom Video Conferencing System

The team surveyed various video conferencing applications to identify the system that would be relevant to UDSM during the pandemic period. The team reviewed Zoom, Skype, Hangout, GoToMeeting, Adobe Connect and Big Blue Button. The task force also recommended Zoom as the video conferencing system as it was the most popular system at the time of assessment, and many instructors had been using it. Zoom offers video and audio conferencing, chat, and webinars across mobile, and desktop and was suitable for the proposed delivery.

Identification of Priority Courses

During the COVID-19 crisis, the university further identified courses that could be quickly delivered with minimum effort and investment. First, the university decided those courses offered in blended mode before COVID-19 should be given priority. These courses include a Postgraduate Diploma in Education (PGDE), a Postgraduate Diploma in Engineering Management (PGDEM), and a Master's degree in Engineering Management (MEM). The second priority was given to postgraduate courses. The decision was based on the fact that many postgraduate students had access to equipment such as computers, laptops, and the Internet compared to undergraduate students. Therefore, prioritising postgraduate courses would require minimum investment from the university in terms of providing access to devices and Internet access to learners. It would also give time for instructors to practice the new mode of delivery and gain experience with a small group of learners before rolling out undergraduate students.

With the exception of existing blended courses, most of the courses were designed for face-to-face instruction, which meant that instructors needed to adapt them to make them suitable for technology-enhanced delivery. This meant that training was required to equip instructors with relevant skills to redesign their courses for the technology-enhanced mode. Before redesigning those courses, the customised blended mode was proposed to ensure uniformity among courses across the university. The customised blended learning model is explained next.

Customised Blended Learning Model

A customised blended delivery model for the university was proposed to guide instructors in preparing and delivering technology-enhanced teaching courses. Having the blended teaching model ensured that the developed courses across the university are consistent, especially when instructors transition into a technology-enhanced environment without having enough time to work critically on the courses. However, some flexibility was allowed to ensure different learning outcomes could be achieved in different courses. Figure 1 shows the blended model design that was adopted to deliver technology-enhanced learning at the university.

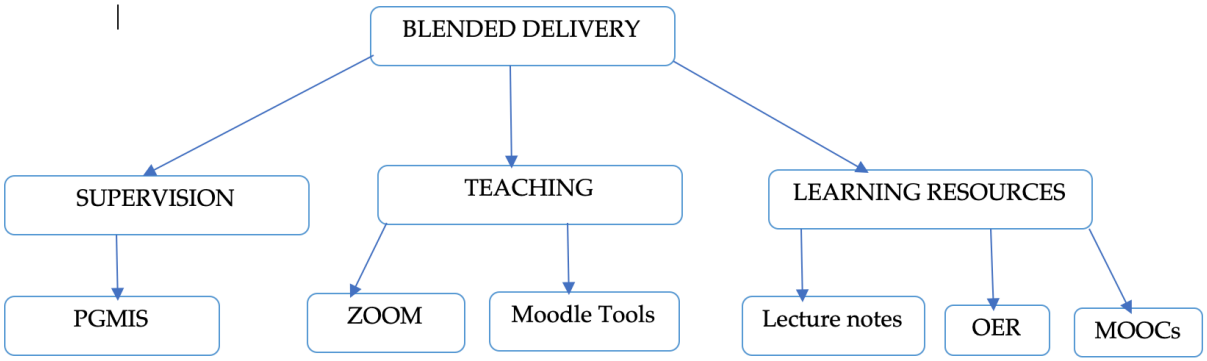


Figure 1: The study blended learning model

Learning Resources

The first component of the proposed blended model was the development of learning resources. Students rely on learning resources as their major source of information during the learning process (Keats, 2003). Therefore, it was essential to ensure that instructors develop and upload into the Moodle system quality learning resources to foster students' learning. However, during the audit, it was found that the majority of instructors had not prepared their learning resources for technology-enhanced learning, except for instructors that were teaching in blended learning. Generally, preparing such learning resources could take time. Therefore, it was decided that instructors should start by uploading the teaching notes they have been using to teach in the face-to-face environment. Consequently, they should improve existing learning resources by using existing open educational resources (OER) and Massive Open Online Courses (MOOCs) to enhance the quality of learning resources. Instructors adopted and used MOOCs as additional learning resources to enhance students' learning experience. In this case, MOOCs were treated as a piece of content, much like any other OER. MOOC resources were selected from various platforms that match various topics within a single course. This approach enabled instructors to select the best topics from various MOOCs to enhance the quality of their courses.

Teaching

The second component of the proposed blended model involved adopting Zoom video conferencing systems for conducting synchronous online teaching. It was suggested that instructors use this system to facilitate online teaching, replacing face-to-face delivery. Simultaneously, the Moodle system would be used for conducting asynchronous instruction where instructors were going to use discussion forums and quizzes to facilitate students' learning. The use of discussion forums is beneficial and useful to eLearning students in terms of improving their learning skills and quality (Hadullo et al, 2018).

Supervision

The PGMIS was recommended for managing students' supervision process. The system allows the university to address students' supervision from supervisor allocation to dissertation/thesis examination processes. It also allows students to present their work without having to come physically to the university campus.

The development of the blended model enabled the university to develop relevant training for instructors and ICT staff to deliver technology-enhanced teaching and learning at the university. Therefore, university-wide training was conducted for ICT technicians and instructors on aspects of various elements of the proposed blended model. The details of each type of training are explained next.

ICT Technicians' Training

It was clear that the number of instructors who were going to use technologies to facilitate teaching and learning during and after COVID-19 was going to be more than double, with most of them using these technologies for the first time. Staff at the Center for Virtual Learning (CVL) were not going to offer the same level of support to all instructors in such a narrow preparation window. CVL was established in 2005 to facilitate the development and delivery of blended learning programmes by providing pedagogical support to instructors for effective facilitation of the courses (Mtebe & Raphael, 2013). It was identified, therefore, that CVL should take the lead in establishing technology enhanced learning at UDSM. As pointed out by Hodges et al (2020), support personnel are usually available to help instructors learn about and implement online learning, these staff have been supporting a small pool of instructors interested in using ICT in complementing face-to-face delivery. In the situation at the time of writing, these staff were not able to offer the same level of support to all instructors and learners in such a narrow preparation window.

To ensure that instructors receive reliable, timely, and effective support services, CVL organised training for 30 ICT technicians (two technicians from each college), equipping them with skills and competencies for administering and managing the Moodle system, Zoom video conferencing system, and the PGMIS. Other topics included in the training were creating and managing users and courses, adjusting permissions, and setting up assignments and quizzes. The idea was to equip ICT staff at each college so that they could help CVL in providing reliable technical and pedagogical support to instructors and learners in each college.

Instructor Training

A total of 340 instructors received training in 15 colleges and directorates across the university. The CoICT had the highest number of instructors who participated in the training, with 43 participants, followed by CoSS with 38 participants, while CoAF had the least number of participants. Table 1 shows the number of instructors who attended the training.

Table 1: The distribution of instructors who attended the training

No.	College/Directorate	No. of Instructors
1	College of Information and Communication Technologies (CoICT)	43
2	College of Engineering and Technology (CoET)	22
3	College of Natural and Applied Sciences (CoNAS)	28
4	College of Humanities (CoHU)	29
5	College of Social Sciences (CoSS)	38
6	Mkwawa University College of Education (MUCE)	34
7	University of Dar es Salaam Business School (UDBS)	12
8	School of Education (SoED)	32
9	School of Journalism and Mass Communication (SJMC)	8
10	Library	18
11	Institute of Resource Assessment (IRA)	13
12	Institute of Kiswahili Studies (IKS)	15
13	Institute of Development Studies (IDS)	10
14	Dar es Salaam University College of Education (DUCE)	34
15	College of Agricultural Sciences and Fisheries Technology (CoAF)	4
	Total	**340**

The training was organised for three days for each college, focusing on teaching postgraduate courses. The training covered three topics—the first topic aimed at equipping instructors with the necessary skills to develop quality learning resources. To ensure that instructors develop these resources with minimum effort, a course template was designed and shared with instructors. Instructors were required to follow the template while organizing their learning resources in MS Word before uploading it into the Moodle system. The template consisted of course information, learning objectives, lesson topic and format, and activities and assessment. Simultaneously, instructors were introduced to Open Educational Resources (OER), Massive Open Online Courses (MOOCs), and other available digital resources so that they can use them to enhance the quality of learning resources. A list of possible OER and MOOC repositories were prepared and shared with instructors during the training.

The second topic focused on training on skills and competencies related to using various features of the Moodle system. Each instructor was required to upload at least three modules/topics of the course during the three days of training. Moreover, instructors were equipped with skills to use discussion forums, emails, wiki, and portfolios to facilitate students' learning. For instance, instructors prepared reflection questions which learners were able to discuss asynchronously via discussion forums. An example of learning resources uploaded into the Moodle system is shown in Figure 2.

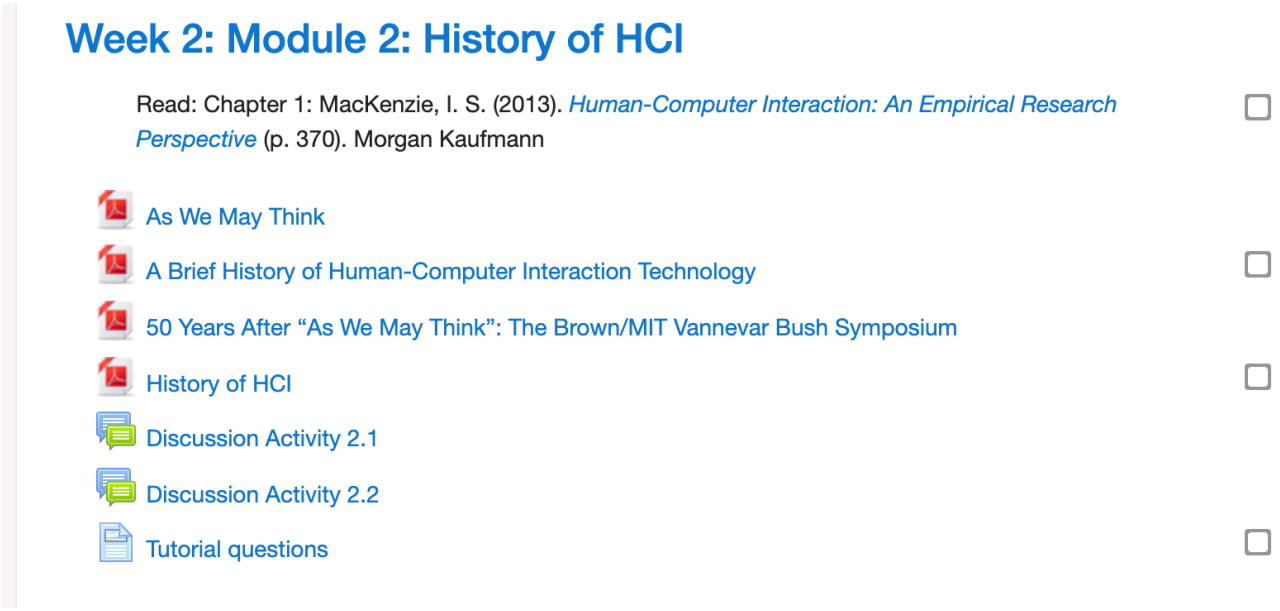


Figure 2: Example of learning resources uploaded into Moodle system

During the training, a total of 369 new courses were developed and uploaded into the system for eight weeks. CoSS had the highest number of courses uploaded into the system with 610 courses, followed by CoNAS with 55 courses and CoHU with 53 courses. CoAF has the least number of developed courses with three courses followed by IDS with seven courses. The distribution of courses per college is shown in Table 2.

Table 2: The distribution of new courses developed during the training

No.	College/Directorate	Number of Courses
1	College of Information and Communication Technologies (CoICT)	29
2	College of Engineering and Technology (CoET)	10
3	College of Natural and Applied Sciences (CoNAS)	55
4	College of Humanities (CoHU)	53
5	College of Social Sciences (CoSS)	61
6	Mkwawa University College of Education (MUCE)	28
7	University of Dar es Salaam Business School (UDBS)	14
8	School of Education (SoED)	29
9	School of Journalism and Mass Communication (SJMC)	13
10	Library	13
11	Institute of Resource Assessment (IRA)	13
12	Institute of Kiswahili Studies (IKS)	15
13	Institute of Development Studies (IDS)	7
14	Dar es Salaam University College of Education (DUCE)	26
15	College of Agricultural Sciences and Fisheries Technology (CoAF)	3
	Total	**369**

Finally, instructors were equipped with the necessary skills to use the PGMIS and Zoom conferencing system. Instructors used the training session to upload documents for students' presentations, schedule presentations, and upload students' verdicts. Figure 3 shows a screenshot of PGMIS showing a schedule of students' presentations.

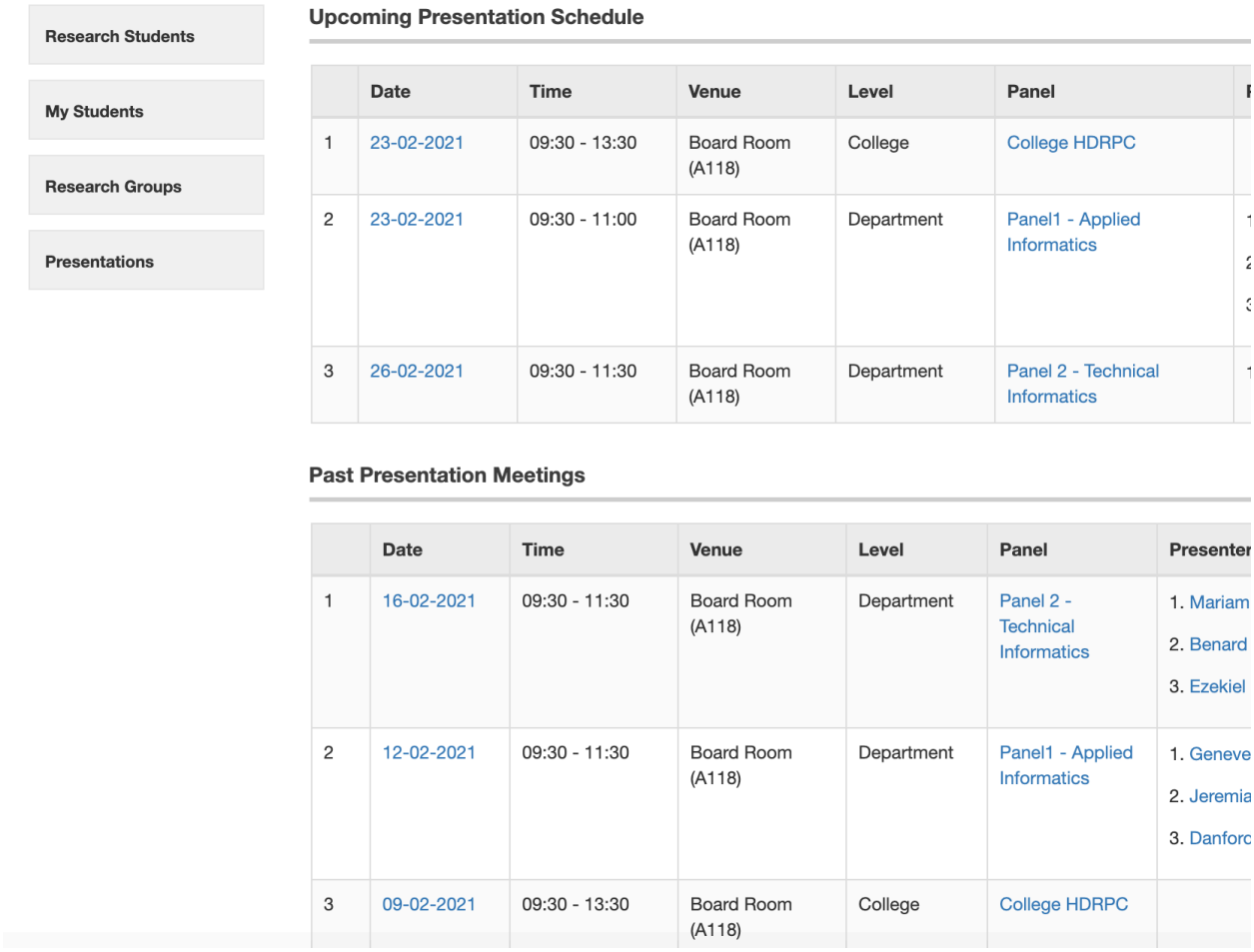


Figure 3: A screenshot of a schedule for students' presentation in the PGMIS

A total of 551 instructors and 845 postgraduate students were uploaded into the system. Table 3 shows the distribution of new students and instructors who were uploaded into the system per unit.

Table 3: The distribution of new students and instructors uploaded into the system

No.	College/Directorate	Students	Staff
1	College of Engineering and Technology (CoET)	54	45
2	School of Education (SoED)	32	37
3	College of Information and Communication Technologies (COICT)	6	9
4	Dar es Salaam University College of Education (DUCE)	30	40
5	College of Natural and Applied Sciences (CONAS)	33	24
6	University of Dar es Salaam Business School (UDBS)	2	16
7	Library	4	7
8	Institute of Resource Assessment (IRA)	14	24
9	College of Social Sciences (CoSS)	426	56
10	College of Agricultural Sciences and Fisheries Technology (CoAF)	2	2
11	Institute of Development Studies (IDS)	104	35
12	School of Journalism and Mass Communication (SJMC)	36	8
13	College of Humanities (CoHU)	28	32
14	Mkwawa University College of Education (MUCE)	15	178
15	Institute of Kiswahili Studies (IKS)	59	38
	Total	**845**	**551**

On the other hand, the university purchased 60 Zoom accounts, which were distributed to all academic units. The course coordinators for each college were responsible for managing Zoom accounts. They were required to assign zoom account to instructors during the delivery of the courses. Each instructor was required to record the Zoom lecture delivered so that learners who could not attend live Zoom class would have an opportunity to do so.

Challenges

Internet Connectivity

The availability of reliable Internet to learners and instructors remained a challenge to implementing technology-enhanced teaching at the university. At the main campus, Internet connectivity was found to be reliable and had a good speed. However, during the COVID-19, the majority of instructors were working from home and, therefore, they had to use their Internet bundles to facilitate students' learning. The practice was not the same for students, as many did not have access to reliable Internet access and/or technology outside the main campus. According to UNESCO, 89% of students in sub-Saharan Africa do not have access to household computers, and 82% lack Internet access (UNESCO, 2020). This means that ensuring students have access to reliable Internet and devices is critical for technology-enhanced teaching success (Adotey, 2020). The university decided to negotiate with three mobile firms to overcome the challenge of Internet connectivity. Out of three mobile firms, Vodacom Tanzania agreed to provide zero-rated access to the three systems identified for the blended mode. Therefore, the university provided IP addresses of all websites related to teaching and learning to Vodacom so that they could be zero-rated. In this case, users using Vodacom would not be charged when accessing these websites. Yet, some courses redirected to OER and MOOC platforms, which were not zero-rated by Vodacom Tanzania, posing another challenge to learners.

Development of Multimedia-Enhanced Courses

It was found that not all courses could be quickly redesigned and be offered via technology-enhanced teaching. Some courses required laboratory experiments or practical exercises and, therefore, required integration of multimedia elements. The development and integration of multimedia elements into courses takes time and, therefore, could not be done during the COVID-19 crisis. Typical planning and preparation for a quality online course with multimedia elements for university courses takes six to nine months before the course is delivered (Hodges et al, 2020). Therefore, most of the courses that required laboratory experiments or practical exercises were not fully developed. The team advised instructors to look for possible animations and simulations in the OER depositories that could be used to enhance areas that need experiments or practical exercises.

Pedagogical Content Knowledge

The inadequate skills for facilitating courses that are offered in a technology-enhanced environment were found to be a significant challenge. In addition to technical skills to use identified information systems to facilitate teaching and learning, instructors' skills on how using identified information systems may change the way they teach various courses is essential. They need to understand how ICT and pedagogy interact to facilitate the development of 21st-century competencies in their students (Voogt et al, 2013). Due to time constraints, the pedagogical content knowledge was not covered in the designed training during the COVID-19 crisis.

What is Next?

In June 2020, the government announced reopening universities and other higher learning institutions as there was a decline in COVID-19 cases in the country. The face-to-face classes resumed at the University of Dar es Salaam from June 1, with most classes offered in traditional face-to-face. However, postgraduate courses continued to be offered via the blended mode of delivery with the Zoom and Moodle systems being used. However, the university recognises that life after COVID-19 will not be the same again. Plans were underway for preparing the university for a long-term strategy to ensure that educational technologies are widely used for both undergraduate and postgraduate courses.

Discussion

The COVID-19 pandemic has exposed the unpreparedness of many higher education institutions in Africa in making use of ICT to widen access to education and improve the quality of on-campus delivery. The University of Dar es Salaam, for instance, started using technology-enhanced teaching and learning since 1999 when the Blackboard system was introduced (Mtebe & Raphael, 2017) before switching to Moodle in 2008 due to an increased annual license fee (Mtebe, Dachi & Raphael, 2011). Since then, many developments have occurred, including improving ICT infrastructure by equipping colleges with computer labs with reliable Internet connectivity and installing various information systems for supporting teaching and learning. Similarly, the university developed a long-term vision for 2061 to use the full potential of ICT to transform the university to an e-University.

Despite these developments the university could not continue offering its programmes during the COVID-19 pandemic period. The number of instructors who were using the Moodle system before the COVID-19 pandemic was small. Specifically, only one-third of instructors (nearly 500 out of 2,000)

were active users of the Moodle system. The majority of them used the system to share learning resources with learners while teaching in face-to-face mode. Similarly, only two out of 15 colleges were using PGMIS, while relatively few instructors used video conferencing facilities to facilitate teaching and learning.

Therefore, COVID-19 has forced the university to make greater use of technologies in teaching and learning activities long overdue by existing magnifying challenges. The number of instructors using technologies has increased from 500 to nearly 900, while more than 500 instructors are now using the PGMIS. Besides, almost 350 new courses were developed and uploaded into the system. The majority of the courses were partially developed given the time constraints, and it was expected that instructors would continue developing the remaining modules after the training.

Now the university has been reopened since June 2020, and regular face-to-face classes have resumed. During the first semester, it was observed that there is increased usage of the Moodle system compared to the situation before. Although students attend classes, many instructors have uploaded learning resources into the Moodle system and allow students to submit assignments online. Moreover, most courses were taught via Zoom instead of face-to-face delivery, with most learning resources being shared through the Moodle platform. A detailed evaluation is required at the end of the academic year to compare the adoption and use of various technologies before and after the COVID-19 pandemic. Evaluation should be more focused on the context, input, and process elements than the product (learning), as suggested by (Hodges et al, 2020).

Hopefully, the COVID-19 threat will soon be a memory, but the university activities will not be the same again after the COVID-19 pandemic. It is time for university management to take advantage of the current situation to reform academic activities towards greater use of ICT to enhance the quality of on-campus delivery and widen access to education. One crucial aspect is to review existing policies that limit the integration of ICT in teaching and learning. For instance, the UDSM Intellectual Property Policy of 2008 identifies learning content created for technology-enhanced courses as protected under IPR (UDSM, 2008). Therefore, instructors are not allowed to share learning resources in the public domain. In this case, this policy is against the current trend of openness, which emphasises sharing content in the various repositories as OER. Other policies that could be reviewed include ICT policy, staff development policy, eLearning policy and OER policy.

One of the significant impediments to student engagement is the lack of high-quality learning resources for learners, even though students rely on learning resources as their primary source of information during the learning process in a technology-enhanced environment. Most of the courses were designed for face-to-face delivery, and instructors were adapting, making them suitable for a technology-enhanced environment. Instructors need to be equipped with the necessary skills to redesign courses to be relevant in technology-enhanced teaching rather than adapting existing courses. The university can also consider the adoption and use of virtual labs that provide a simulated replica of real-life laboratories that can provide learners' practical skills for science and engineering courses (Ray & Srivastava, 2020).

Conclusion

The COVID-19 crisis has exposed many universities' unpreparedness in sub-Saharan Africa in delivering teaching and learning during the crisis. The University of Dar es Salaam, for instance, was

unable to resume studies immediately after the pandemic despite investing in ICT infrastructure since 1999. With the COVID-19 outbreak, the University of Dar es Salaam conducted an audit of the infrastructure and information systems and analysed instructors' skills gap needed for appropriate use of ICT. The audit recommended Moodle, PGMIS, and Zoom conferencing information systems, with these forming the basis for offering training to instructors. With the training of 340 instructors on these systems, a percentage increase was observed in the number of courses developed and uploaded in Moodle and the number of instructors and students using the PGMIS and Zoom conferencing for teaching and learning purposes. The study further highlights that university units are lagging, making it possible to develop a tailored mechanism to ensure that they align the needs of the university to realise online teaching and learning as stipulated in its vision and mission statements. Challenges such as unreliable Internet connectivity and appropriate integration of practical courses into online mode have continued to demand further improvement. Instructors need as well to learn about online facilitation and develop related pedagogical competencies. Therefore, the COVID-19 crisis has presented a good opportunity for the university to appropriately assess the application of ICT in enhancing teaching and learning.

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