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# Mainstreaming Blended Learning in a Low-Income University

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## Abstract

Due to the COVID-19 pandemic, Maseno University (MU) began to consider institutional shift from traditional face-to-face (F2F) instructions to online and blended modes of teaching and learning. The university was able to draw from its experience with adapted flexible and blended learning (FBL) approaches for high enrollment common courses already offered to students on the Learning Management System (LMS). Several questions have been raised: How to preserve what most lecturers consider as most essential — the regular student interaction, the freewheeling give-and-take discussion sessions — if the class cannot be together in the same physical space at the same time? How to make a synchronous activity dependent course and make it work in a completely asynchronous environment? How to handle the practical based subjects on the online platform? And even if the university is able to find acceptable answers to these questions, where would it begin? However, MU did not try to reinvent the wheel. There were already examples of good practice in a number of common courses had been running on the LMS. The available courses already had a blend of both theory and practical base. The university sought assistance from schools and departments that already had parts of their programmes running on the LMS. They were able to tap into their expertise and get introduced to a valuable collection of resources about online distance teaching and learning (ODTL). That, in turn, assisted the university to develop online or blended versions of its regular F2F courses that far surpassed expectations, judging from how well their courses performed, and get ready for any other unexpected circumstance equal or similar to which the world has had to live through the COVID-19 pandemic.

**Keywords:** blended learning, common courses, face to face learning, high enrollment courses, low-income university, online learning, online distance teaching and learning

## 1. Introduction

Lecturers especially in Africa's Higher Education Institutions (HEIs) are facing unprecedented change, with often larger classes, more diverse students, demands from government and employers who want more accountability and the development of graduates who are workforce ready, and above all, needing to cope with an ever-changing technological landscape [1, 2]. To handle changes of this nature, lecturers and instructors need a theoretical base and knowledge that provide a solid foundation for their teaching, no matter what changes or pressures they face. There is need, therefore, to study and understand the underlying principles that guide effective teaching in an age when everyone, and in particular the students, are using

and understanding technology better than their teachers especially in the developing world. A framework and a set of guidelines need to be developed by a university with vast knowledge and practice in online learning to build an appropriate model, theoretically sound, which allows making decisions coherently about pedagogical foundations of teaching, low cost but versatile technologies that can be deployed for classroom use and hybrid ad online delivery based on their vast experience in handling classes in technology rich ecologies. This can be done while keeping in mind that every subject discipline is different, and every lecturer has something unique and special to bring to their teaching which needs exploiting and nurturing to its full potential.

The need for this kind of mentorship from Universities already practicing blended learning is dire with the developments witnessed in the recent past where the COVID-19 pandemic has rendered all institutions non-operational from basic to higher education institutions (HEIs) in a country like Kenya [3, 4]. The basic education institutions would have been seeking mentorship from the HEIs but as it is, the HEIs were all shut down and looking to institutions in the west for support and mentorship. This kind of scenario spelled the urgency for this book project so that in future, HEIs in developing countries, more specifically Kenya, could have Maseno University (MU) as a mentor within its borders that the government can turn to for guidance and leadership in a major shift from face to face (F2F) to online classroom delivery mode. Recently, the COVID-19 pandemic forced a major global experimentation with remote teaching. But most of the experts agree that remote teaching as applied was an emergency measure from which lessons learned must not be lost but documented for future. There are many indicators that this crisis has transformed the education sector and good practice when document, will provide useful lessons in the post-COVID-19 period. As this crisis-driven experiment was launched at MU, it is expected that the process must not be lost as it proves useful guidelines for other universities hoping to be part of this shift.

As MU eCampus team began to consider institutional shift from F2F to online and blended modes on behalf of the University Management, despair almost overwhelms the team. Several questions were raised: How to preserve what most lecturers consider as most essential — the regular student interaction, the free-wheeling give-and-take as discussion on a particular source or topic take place — if the class cannot be together in the same physical space at the same time? How to take a course that seemed to depend on synchronous activity and make it work in a completely asynchronous environment? And even if acceptable answers to these questions are found, where would the university begin? Fortunately, the university did not try to reinvent the wheel. The university received assistance from colleagues from Open University of Catalonia (OUC), Association of Commonwealth Universities among others who were more familiar with the online world than the colleagues from MU. Faculties from MU were able to tap into their expertise and get introduced to a valuable collection of resources about online teaching and learning. That, in turn, helped MU to develop online or blended versions of its regular F2F courses that far surpass expectations, judging from how well their courses have performed, and get ready for any other unexpected circumstance equal or similar to which we have lived facing the pandemic.

Today, the outburst in developments in educational technology and the fact that the ed-tech arena is a crowded field may overwhelm. At any given time, there is at least one app or platform screaming about how it is the newest, best, easiest tool for online courses [5]. And that app or platform is just as likely to be gone within a year as it is to become and remain a valuable teaching tool. How does one make a decision on good digital tools that (a) afford students the means of interacting substantively with lecturer and with one another, (b) enable a deep engagement with course materials

or applications, and (c) affordable in low-income institution like MU? Yet still, in the shift in learning modes, several variables need to be considered: The planning process, learner characteristics, design and delivery methods, learning contexts, workplace environment and the already existing barriers to this shift. A successful shift, however, needs to move beyond asking which method is most effective to the important role of pedagogy that actually takes into account a social element in online delivery which is important to student engagement and knowledge acquisition [6]. One important pedagogical theory that addresses this is constructivism. It offers a model that addresses the social needs of students as well as providing an opportunity for critical inquiry and subsequent knowledge acquisition. However, for attitudes to change and trust to be built there is need to co-develop online systems where university management teams are involved in decision making based on existing university delivery systems. However, knowing about pedagogy and practicing the pedagogy are two different things. In this project, it is hoped that mentorship by Open University of Catalonia (OUC) or any other informed user would inculcate correct attitudes and a shift in institutional culture at MU that would allow for development of the expected institutional culture that blends with constructivism as a classroom would take root. This would open the door for setting the correct environmental climate needed to introduce online and blended learning as modes of practice at MU.

Maseno University already had a robust and very interactive learning management system running on Moodle (Modular Object-Oriented Dynamic Learning Environment). However, the institution has not been able to adopt online and blended learning because of shortcomings that need to be addressed in this project. The chief of these being lack of policy to guide the uptake of fully online and blended learning for faculty and students; insufficient knowledge of pedagogical orientations needed to implement these new modes of instructional delivery; and a model for carrying out mass capacity building for lecturers to allow them to develop and teach online and blended courses.

The goal of this chapter is to document the processes the university had to go through in making the shift from a traditional face to face institution to a modern university having F2F, blended and online learning. The processes it had to consider were: carry out capacity building for lecturers in online pedagogy, content development and facilitation in a bid to build a new university community culture that is positive towards affordances of online and blended learning; and expand its technology infrastructure to support the twenty thousand plus students at the university.

The specific objectives of this chapter are to document how to:

- a. Mainstream quality conceptual pedagogy for online and blended learning that would create a change process with a genuine paradigm shift in instructional strategies within the institutional;
- b. Create a model for online and blended content development that allows seamless shift in learning modes within a traditional face to face university, especially set up for MU;
- c. Prepare a set of mechanisms, and resources for training of staff to learn to teach online;
- d. Design a policy to guide online and blended learning activities with the university; and
- e. Choose low cost but effective technologies for classroom instruction in the light of existing economic constraints within the University.

## **2. Maseno University eCampus**

The eCampus was established in the year 2007 to spearhead the development of institutional policies and strategies for promoting the innovative use of information and communications technologies (ICTs) to benefit learning, teaching and research activities in Maseno University. Located in Kisumu City, the eCampus boasts of an open office work environment that models good office practice to the university community. As currently constituted, the eCampus operates on a different time, different place (home study, computer conferencing, tutorial support by e-mail and fax communication), recognized as Scenario 4 in the Commission of University Education (CUE) Open Distance and eLearning (ODEL) standards and guidelines as stated in the Universities Standards, 2014.

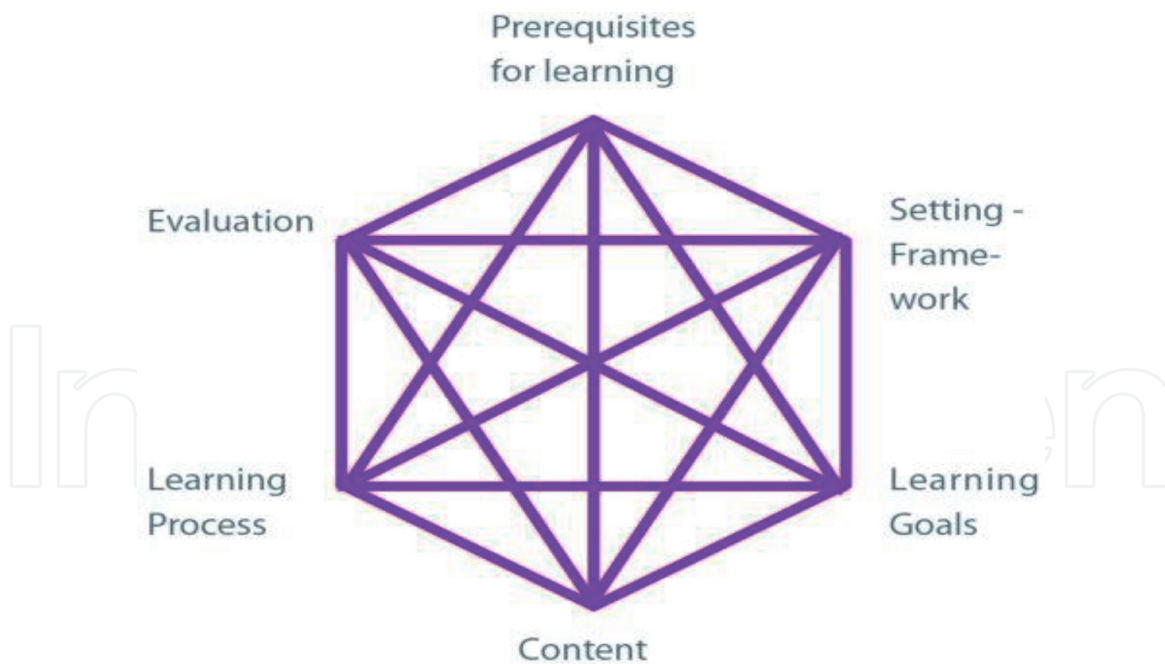
The eCampus of Maseno University is a pioneer workstation using modern technologies to offer quality higher education for learners within the region and globally. This involves use of the internet to support teaching and learning activities. Developed around a web-based learning management system (LMS), this approach has attracted a large number of undergraduate and postgraduate students who registered for different certificate, diploma and degree programmes spanning seven schools within the university. In addition, eCampus provides an ambient platform that mounts university common courses offered to all students registered for various undergraduate programmes in all the campuses of MU, irrespective of their mode of study i.e. full-time, part-time, weekend, sandwich or eLearning. These courses are mandatory and are currently offered online at the eCampus of Maseno University through the LMS, also known as the Maseno University eLearning Portal. To achieve quality eLearning standards on programmes offered at the eCampus, there is a robust quality and effective monitoring and evaluation mechanism in place.

The eCampus operations are domiciled in 4 key support areas: Content Development; Learner Support Services; Capacity Building; and Research, monitoring and Evaluation. The functions of each of these key areas are discussed in the sections that follow.

### **2.1 Content development**

The content development follows internationally acceptable norms [7–9] and all content offered at the eCampus is developed by the content expert nominated by the department offering a specific programme at the eCampus. The programmes offered at eCampus are provided on a modular basis to give maximum flexibility to the participants as well as on a blended basis as part of regular full time face-to-face programmes. The programmes specify core materials to be covered and guidelines detailing total content required for completion. The eCampus technical team (Instructional designers, systems support specialists and graphic designers) and the host Departments are jointly responsible for capacity building for module development, evaluation and related quality assurance procedures.

Module development, delivery and assessment are undertaken by a course development team (course developer, editor and reviewer) in the host departments as appointed by the Dean, in line with the University Statutes. This team is assisted by a support team (instructional designer, graphic designer, multi-media specialist, eLearning System support specialist, eLibrary assistant and copyright officer) from eCampus so as to ensure that guidelines for content development, review, uploading, packaging and branding are adhered to. Each module provides clear learning outcomes, course content, instructional mode and assessment methods. The content development flow is represented in **Figure 1** [10].



**Figure 1.**  
*Didactical relationship model by Charlotte Lærke Weitze [10].*

The eCampus uses an improved model of the didactic relationship in its content development by considering the target group for which content is intended; The content itself in terms level in the curriculum; The targeted learning outcomes; The pedagogical approach the content is hinged on; Organization of the content which in most cases is from simple to complex; The learning activities that enable the learner to achieve the outcomes in the shortest time possible; The assessment of student learning. To help further clarify issues in content development, the eCampus furnishes its content development experts with a content review rubric adapted from the Commonwealth of Learning. The rubric is used to focus the content development by considering the following key aspects: Navigation/Orientation (e.g., the course site is well organized and easy to navigate from the course home page to the course units, links, forums, etc.); Content (learners can engage with content together with peers as expectations are clear); Instructional Design (the content is pedagogically sound); Good flow in course structure; Student support structures are considered in the development; Technology or Media used is clear and available to learners; Assessment is ingrained in the developed material; and lastly quality assurance measures are considered in every part of the content development. It follows therefore that the eCampus endeavors to provide high quality online programmes that are supported by renown researchers [2] who believe that quality online programmes should be Open: learning resources are accessible and available, including after the course; Navigable: well-planned interfaces allow students to find what they need; Learning: sites are designed to develop knowledge, skills, attributes and identity; Interactive: dialog is supported among and between teachers and learners; Networked: curriculum and activities foster broad-reaching connections; and Engaging: teachers invite, model and sustain enthusiastic presence for learning. These sentiments are summarized in the **Table 1** below.

## 2.2 Learner support services

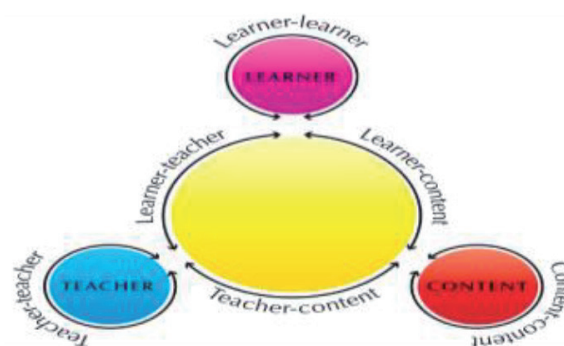
The eCampus has invested significantly in an online based learning management system (LMS). The learning content is uploaded to the learning management system. The LMS supports upload of multimedia and well as text-based resources.

Open	Navigable	Learning	Interactive	Networked	Engaging
Create links from and to key industry research & websites.	Develop, share & follow a consistent Program glossary of educational terms.	Identify the key digital tools that graduates are likely to use and include them in the course.	Create a marked Discussion Forum and post a clear marking guide. Model strong interaction.	Dedicate marks to students posting completed assessment on a digital portfolio	Create & post an auto-biographical video about you and what attracted you to the taught discipline.

**Table 1.**  
Description of quality online programmes [11].

Student and course lecturers communicate using both synchronous and asynchronous instructional tools. Learner support assistants headed by a coordinator ensure the learning processes are efficient and effective. This is achieved by promoting effective Learner-Learner and Learner-Lecturer interactions employed through online learner support services.

As confirmed by research [12, 13] some of the most important online teacher competencies drawn from the experience at the eCampus include: communication skills; technological competence; provision of informative feedback; administrative skills; responsiveness; monitoring learning; and providing student support. The problems of the distance learners are unique and require to be handled differently. The efficiency of the delivery system will greatly depend not only on efficient modes of providing services but also on the staff of the university. The Online Support Service System should be developed for the learner community, along with other electronic media services [14]. In fact, a well-designed learner support system for the distance learning is a system for fostering creative, critical and independent thinking skills which inculcates deep learning [15]. The practice at eCampus was designed to avoid obvious pitfalls in online learning such as high attrition and repetition rates normally associated with unfacilitated online instructional practices [16]. The eCampus further believes as affirmed by research that good learner support services provide online learners with coaching and mentorship programmes to help them discover their interests; develop self-motivation, innovativeness and excellence in performance. This prepares them with essential skills for life and the workplace such as leadership, communication, self-awareness into their own strengths and weaknesses, initiative, problem-solving, innovation and critical thinking [17]. The learner support practice at eCampus can best be summarized in **Figure 2** that follows as described specialists [18, 19].



**Figure 2.**  
Interaction and learner support [19].

## 2.3 Capacity building

The eCampus continues to organize online training for course lecturers, editors, reviewers, supervisors and facilitators to enable them to develop modules, edit content, review online modules, teach and supervise learners and offer online support to eLearning students. A mandatory foundation course is offered to course lecturers, editors, reviewers, supervisors and facilitators before embarking on specialized blended training. These training sessions are developed to ensure adherence to MU good practice guidelines for online interaction which is in line with international best practice especially during the pandemic [20–22].

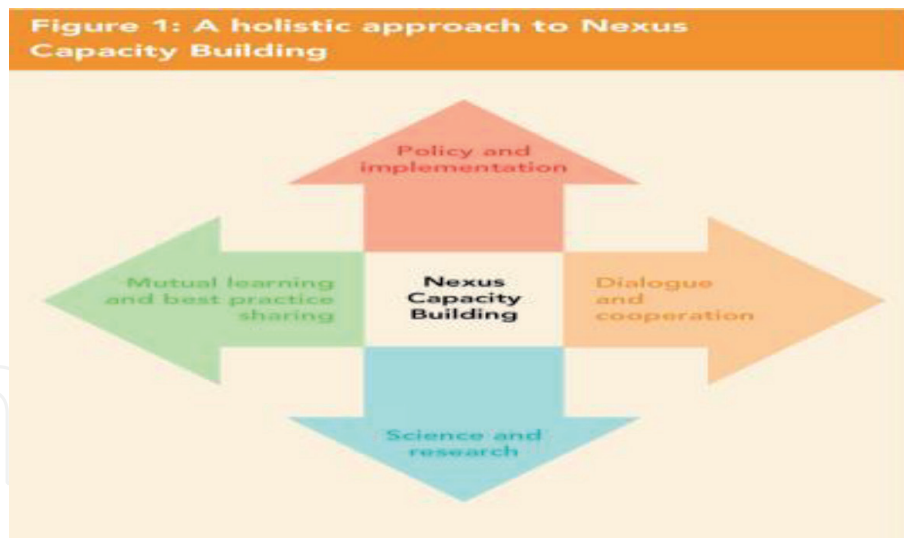
HEIs in Africa like Maseno eCampus face the challenge of responding to the expanding demand for tertiary education while maintaining or enhancing the quality of their course offerings. This demand has led to some HEIs introducing the use of interactive web technologies to support their distance teaching and learning practices [23]. However, academic staff at these institutions may struggle to provide sufficient support to online learners in part due to inadequate staff capacity in terms of familiarity with and use of online communication tools and virtual learning environments. It is therefore necessary to develop capacity building strategies that are self-sustaining in such an institution.

Two key considerations from research [24] drive capacity building initiatives at the Maseno University eCampus. These are that in designing effective distance education programmes, engagement with and feedback from the learner is critical, and open-source solutions may be effective in meeting teaching objectives. Second is that in training initiatives for staff capacity building in HEIs that are just starting out in online learning initiatives: it is imperative for trainees to understand the relevance of the technology for the existing ecosystem and build for sustainability through the development of demand-driven country-specific and institution affordable applications. Capacity building at the eCampus relies mainly on the blended mode because the staff come from geographically dispersed locations; have limited flexibility because of work schedules and would face challenges attending fully in-person training; have limited daily time to devote to capacity building and would benefit from courses being split into short modules; have reliable access to the necessary technology and basic computer and internet skills; and appreciates learning at their own pace.

The paper hypothesizes a four-part framework to define the e-learning capacity gaps that these circumstances appear to represent: the “instructional design capacity gap”, the “production capacity gap”, the “tutorial capacity gap” and the “community building gap” [25]. Capacity building must be at the heart of moving from theory to practice. Increasingly, individuals need to understand different perspectives in their endeavor to manage the complexities of real-world problems [26]. This is particularly true in the case of the Nexus Approach which has been extensively borrowed and applied by the eCampus, which examines the challenges related to interconnected resources and in this case, the needs of staff at the university. It is clear that for capacity building measures to be successful, innovative approaches are required. The Nexus approach advocates for an inclusive approach to capacity building by anchoring all capacity building approaches on institutional policy; allowing dialog among participants while using the free flow of information to share best practice from participants. The outcome can only be scientific if informed by research during the capacity building session, and this builds into institutional practice (**Figure 3**) [26].

The other model used in all capacity sessions at the eCampus is mentorship. Mentoring can help staff overcome difficulties in mastering several subjects in higher education while reducing failure rates and lowering dropout rates. Mentees





**Figure 3.**  
*The nexus approach to capacity building [26].*

receive personalized direction to improve attitudes, values, and skills needed to master the new issues in the curriculum and develop self-confidence in teaching with technology [26]. Mentoring programmes as used at the eCampus provide the necessary guidance and support in content and/or pedagogy, to aid technology novice lecturers in their ongoing professional development. Mentors in this case are colleagues in more advanced specific technology knowledge within the university or other educational consultants providing outside, research-based perspectives on the subject [27]. The eCampus uses mentorship at two levels in its capacity building session: The school champions are academic staff that have grasped the concepts and as a result provides mentorship at school level; they also use learner support assistants who are mainly administrative staff but with good technology skills and are then mentored by the eCampus technical staff to provide the needed technical support at school level. The two groups of staff are core to all capacity building activities at the eCampus. In developing countries like Kenya, access to and quality of education are being addressed by e-learning strategies and especially mentorship of academic staff serving as a useful tool of capacity building [28] in eLearning methodologies and practices.

#### **2.4 Research monitoring and evaluation**

Monitoring and Evaluation (M&E) are two distinct but complementary processes that mutually reinforce each other. In general, M&E is designed to monitor the impact of a policy, or progress of programme activities, against the overall goals, objectives and targets. M&E also assesses the outcome relevance of an activity, and the impact of a programme, or effectiveness of a policy, as well as its efficiency and sustainability [29]. OECD-DAC [30] defines monitoring as “the ongoing, systematic collection of information to assess progress towards the achievement of objectives, outcomes and impacts,” and it defines evaluation as “the systematic and objective assessment of an ongoing or completed project, programme or policy, its design, implementation and results, with the aim to determine the relevance and fulfillment of objectives, development efficiency, effectiveness, impact and sustainability. This unit at the eCampus of Maseno university does both monitoring and evaluation of the systems, programmes, learning outcomes and learning processes. It is this unit at the eCampus that ensures that quality procedures and processes are followed and adhered to. It also carries out periodic evaluations that inform policy and practice.

The Research, Monitoring and Evaluation (RM&E) Unit at the eCampus aims at improving the quality of its programmes operations and services. It further aims at maintaining high-quality outcomes in the physical and virtual spaces of the eCampus as per the approved quality assurance practices. This is achieved through ongoing monitoring and evaluation of content development, learner support, capacity building and administrative processes at the eCampus. As such, the RM&E unit does not only conduct a review against the Commission for university Education ODEL Standards and Guidelines, but it also picks on the good practices and standards from international institutions with which the eCampus benchmarks, as well as quality improvement schemes like the Commonwealth of Learning (CoL) Quality Assurance rubric, ECBCheck and ACDE quality toolkit. Since student learning is the focal point of the eCampus, the RM&E unit examines all activities at the eCampus which contribute to quality learning outcomes.

The eLearning Postgraduate Research Support platform has been designed for the postgraduate student, and the aim is to support students at all levels of the postgraduate studies. As such, this area will link the student to fellow graduate students in all Schools and Departments within Maseno University eCampus. This allows students to share and discuss coursework and research experiences with other participants (peer researchers) and supervisors.

One key area of concern had been the postgraduate students' research process. Due to the concerns raised on the process, the eCampus created a post-graduate students research support area to assist in continuous monitoring and evaluation of the research processes. Specifically, given the challenges students face at various levels of research phase of their studies, such as formulating research/study/project concepts, study/questionnaire designs, study methodologies, data collection strategies, data analyses and interpretations as well as write-ups, it was realized that mentorship through sharing of experiences and expertise is the only sure way to unlock students' research potential, improve their research skills and accelerate the pace of post-graduate studies. The discussions are accessible to all online participants, facilitators, supervisors and lecturers as they are free to comment and assist.

The role of the Coordinator in charge of Research, Monitoring and Evaluation (RM&E) at eCampus is to coordinate all monitoring and evaluation activities including the graduate students on the eLearning platform. It is hoped that students shall be able to access supervisors, research information and resources needed for post-graduate studies. Through this platform, the eCampus endeavor to offer real time monitoring and support to individualized challenges in the research phase of learning. This is an example of an open but innovative way of offering online monitoring and mentorship not only to students but also to the supervisors both in knowledge and use of online technological tools in research.

### **3. Change process that cause genuine paradigm shift in university instructional strategies**

In order to make the institutional transition from possible, organizations and institutions interested in adopting blended learning models must have a clear vision and a strong support from the various stakeholders involved in the change process [31–33]. The eCampus identified three such change agents. The first is that adoption of the blended learning model must be part of the educational institution's strategy. The second factor is related to the organizational support, understood as facilitating conditions. Facilitating conditions in this case was the degree to which individuals believed that sufficient resources existed to support learning in a blended setting. Facilitating conditions have been conceptualized in terms of training and provision

of organizational support. The third factor was the organizational capabilities to effectively execute and deliver a blended learning program. Here organizational capabilities are understood as the organization's ability to manage all the people involved in a learning process to gain advantage [34–36]. This means that low-budget institutions should focus first on helping instructors shift to student-centered styles of pedagogies before making large investments in IT infrastructure.

When we consider the culture of the HEI as a set of instructional values, traditions, and beliefs ingrained in the fabric of the educational community, the idea of cultural change offers both promise and pause for HEIs looking to implement a blended learning program. Cultural change does not happen overnight, and can create significant growing pains for those with longstanding ideas about educational practices. Proper implementation of this shift depends on a leadership team that sets clear goals and acts in support of those goals [1] and, in turn, ensures that teachers are prepared to successfully adopt new technologies and pedagogies [37, 38].

eCampus identifies with researchers who maintain that Innovation in education can be particularly challenging because change has the potential to affect student achievement [39]. Creating a culture of innovation also requires structure and process, capacity, resources, policy environments, and learning agendas [40].

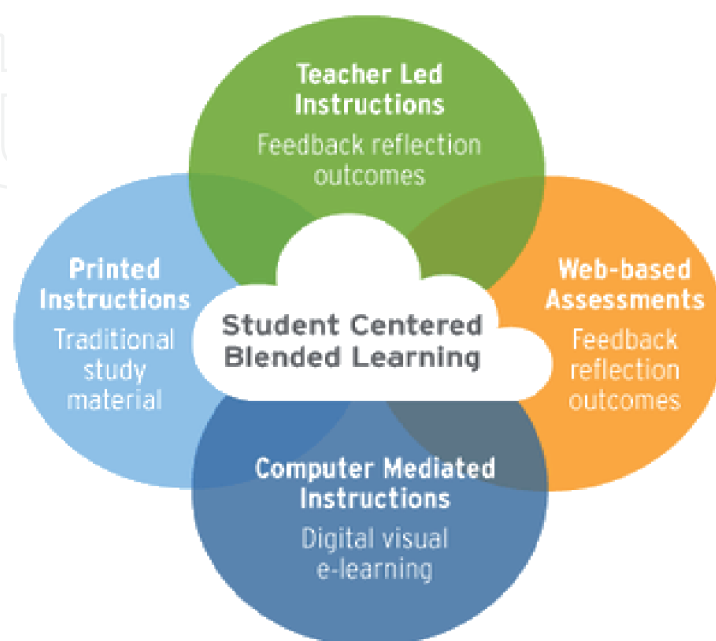
- i. Structure and process includes the formal systems in the institution, some of which may need to be altered during the transition to blended learning. It also includes the habits of stakeholders and how those habits are reinforced. Building a blended learning culture may require educators and students to build new habits.
- ii. Capacity, in terms of culture, is less about physical capacity and more about mindset and the ability to carry forward the blended plan. An institution that has capacity will exhibit a growth mindset and show diligence and patience in pursuit of blended learning.
- iii. Resources include the obvious financial considerations, but also include time and team resources. Successful institutions pay particular attention to balancing time and human considerations to keep the culture on track.
- iv. Policy environments include both the written and unwritten institutional policies that enable or prevent the changes needed to support blended learning. Maseno University as an institution had to look for ways to make blended learning easy and attractive to implement.
- v. Learning agendas should include an emphasis on measuring progress and managing the change process. Progress should be measured against the SMART goals created by the institutional leadership team and by student achievement data.

### **3.1 Blended learning model as an institutional strategy**

Blended learning is a formal education program in which a student learns at least in part through online delivery of content and instruction with some element of student control over time, place, path, and/or pace. The methodology behind blended learning is to combine classroom learning with mobile learning and online learning. Maseno University already has a robust and very interactive learning management system running on Moodle (Modular Object-Oriented Dynamic Learning Environment). However, the institution had not been able to adopt online

for its regular face to face students because of tradition. In the advent of the COVID-19 pandemic, the institution had to find a strategy that fitted closely with its already existing resources, facilities and a ready workforce. It was out of this analysis that the institution settled on a model that had originally suggested by Bhaskar [41]. It compares well with other models [42–45]. This model fits the practice at the university as it already has a digitally literate workforce; an operational and robust learning management system; already trained pool of lecturers able to develop and facilitate online courses and able to act as mentors to the rest; organizational objectives supportive of blended learning; a student pool that already has common IT skills because all their courses is taught with IT; and it has an existing library of printed instructional materials already in use in the traditional classroom. Tech teams have identified seven main modes of practicing blended learning: Lab rotation, station rotation, individual rotation, flipped classroom, a la carte, and enriched virtual. However, the model [41] below converges around 6 main modes which are all practiced at the Maseno University eCampus. These modes are: Face-to-face Driver – the teacher guides learning with technology as a supplementary resource; Rotation – the learner has a fixed schedule rotating between face to face and online schedules; Flex – the model where most of the learning is done online and the face-to-face model exists to provide on-site support; Online Lab - a model of blended learning that characterizes programs that rely on an online platform to deliver the entire course while teachers interact with students through pre-recorded videos, audio and video conferences or discussion forums and email; Self-Blend - a fully individualized approach that allows students to choose to take one or more courses online to supplement their traditional school curriculum; and Online Driver- involves online platform as well as teachers to deliver the curricula and students work from remote locations most of the time but come to school for required face-to-face classes (**Figure 4**) [41].

The practice in MU was a blend of these six models from one extreme end to the other. For example, some lecturers had face to face classes but occasional sent work or instructions to students through short messaging services (SMS) or WhatsApp. Others had all the content on LMS and students only consulted where there was a need. Yet still a big majority gave all instructions fully in F2F classes only. It is these



**Figure 4.**  
*Model of blended learning [41].*

extremes that forced the university to come up with the blended approach as the university strategy for instructions.

### **3.2 Resources to support the blended learning strategy**

MU already had a robust and very interactive learning management system running on Moodle platform. Moodle is free and open-source LMS which easily integrates to other systems like the University Management Information System (MIS) for seamless flow of information from the classroom to management. The current MU learning management system also allows for notes and assignment uploads by both lecturers and students. Besides content, the LMS has a web-conferencing facility that allows lecturers to capture what they are teaching to be uploaded online for students. This web-conferencing facility has also assisted with defense for post-graduate student, especially those that cannot attend the F2F defenses either because of geographical location or a tight work schedule or any other genuine reason.

MU had trained some of its lecturers in online content development and delivery. Specifically, the lecturers from the following schools had already been trained on several occasions and were able to develop online content and facilitate online teaching.

- a. School of Art and Social Sciences – Mainly lecturers from the Department of Socially and Anthropology
- b. School of Business and Economics – Almost all lecturers
- c. School of Computing and Informatics – Almost all lecturers
- d. School of Education – Only one quarter of the lecturers from the School have received some meaningful training
- e. School of Mathematics Statistics and Actuarial Science – Three quarters of the lecturer
- f. Planning and Architecture – Almost all lecturers
- g. School of Public Health and Development – Only lecturers from Department of Public Health lecturers

The other 4 schools within the university had not been trained and had no capacity as at now to develop or teach on the online platform. It was therefore important to have capacity building of lecturers to be able to turn their face-to-face content into e-content. Currently, the University had a total of 102 courses each having at least 5 modules, making e-content development a capital investment that would require proper planning to finance.

### **3.3 Organizational capabilities to effectively execute and deliver a blended learning programme**

For students and staff to have meaningful engagement in the online platform, a number of materials and equipment needed to be made available. These include:

- a. Computers or other hand held devices
- b. Internet bundles
- c. Online library resources

### *3.3.1 Basic computers for students and staff*

It can be estimated that almost 80 percent of Maseno University students do not own basic computers. A big percentage of staff on the other hand had their personal Computers that they use in and out of the campus. It is important to note however that there were still staff who did not own any personal computers. Therefore the university management made a big investment in computer resources within the computer labs for students where they get practical experience for the Information Technology courses it offers to all undergraduate students. But with the rise in undergraduate student numbers, the resources are still not enough. This means that in the current situation brought about by COVID-19 pandemic, it would be very difficult to engage student in online learning as most of them have been relying on University computer labs to get access. Staff offices are also fitted with computers that have internet access and this allows them to share the computers for work purposes. However, the University came up with a policy on “Bring your own device (BYOD)”, so that students would be in a position to own at least some basic computer for classroom use. Such a policy was easier to implement for new students by including it in their calling letters. For continuing students, it required a lot of sensitization to get them to acquire computers and also implementation of the online examinations mandated every student to have a laptop with internet and a webcam. The examinations therefore became catalysts for the BYOD policy and accelerated its implementation.

### *3.3.2 Internet bundles*

Maseno University students have always relied on the university Wi-Fi for their online engagement in academic work. Online learning requires dependable and constant internet for learning to succeed. The University through Kenya Education Network (KENET) engaged the local telecommunication companies through a government to private sector partnership programme on affordable internet provision to students. They offered the students an education bundle of 10GB at approximately 5 USD with unlimited access for one month. This allowed students to study from wherever they were and in future likely to ease the bandwidth demands within the University.

The offer from the telecommunication companies was very helpful for students who were at a place that had network connection. Even though most parts of Kenya are covered by these companies, it must be noted however that there are several regions in Kenya that still lack connectivity (National internet penetration stands at 43%, [46]). This makes it difficult to engage students equitably without bias on the online platform while they are at home because of diversity in locations and internet environment. The arrangement with private telecommunication providers has proved useful for students in the light of blended learning implementation as an institutional policy in future.

### *3.3.3 Library resources*

Within the university Learning Management System, Maseno University has an e-library with an e-librarian deployed to assist students with access to virtual library resources. Access to e-resources is through the Maseno University website and online public access catalog (OPAC). The only missing link was for the e-library to install an EZ-proxy to allow students to access all electronic resources the University subscribes to from the comfort of their homes. Due to improved practice in blended learning at the university, the librarian developed innovative ways to make immense contribution in the knowledge era by supporting knowledge gathering, creation and dissemination using new technology-based tools. With these new developments,

it is still instructive to note that most of the traditional professional knowledge that defines librarianship will remain essential; the profession will also need a new set of skills to adapt to the evolving environment of higher education [47]. He goes on to assert that responsive and scalable organization needed today and even more in the future will rely on a culture that embraces user awareness and engagement. It is also important to note that user populations will continue to evolve and libraries need robust user assessment programs that can scale what they learn about changing populations to revise and extend services with limited growth in resources. They also need to develop learning cultures that harvest trends, skills and local institutional dynamics delivering service and value to users and institutional decision makers. Scaling what they learn and what they do will better position the libraries for tomorrow's educational environment.

### 3.3.4 Student assessment

Blended learning at Maseno University drew a lot of its lessons on online assessment from its common courses that were already available on the online platform. These courses already attracted large student populations of up to six thousand students in one single offer. They included HIV/AIDS Course, Communication Skills, Common IT courses for School of Medicine and Nursing, and Common mathematics courses. For these courses to run successfully, all Continuous assessment Tests (CATs) were done on the online platform that allows for computer-based assessment. The Moodle platform used in the LMS was customized for computer-based assessment and an in-built grade book allows the students to view their results immediately. In the current situation where the University closed before summative assessment was undertaken, it became an urgent need to explore and identify software that could be used to offer the examinations online for students. This also meant that the policy examinations had to be reviewed to embed the

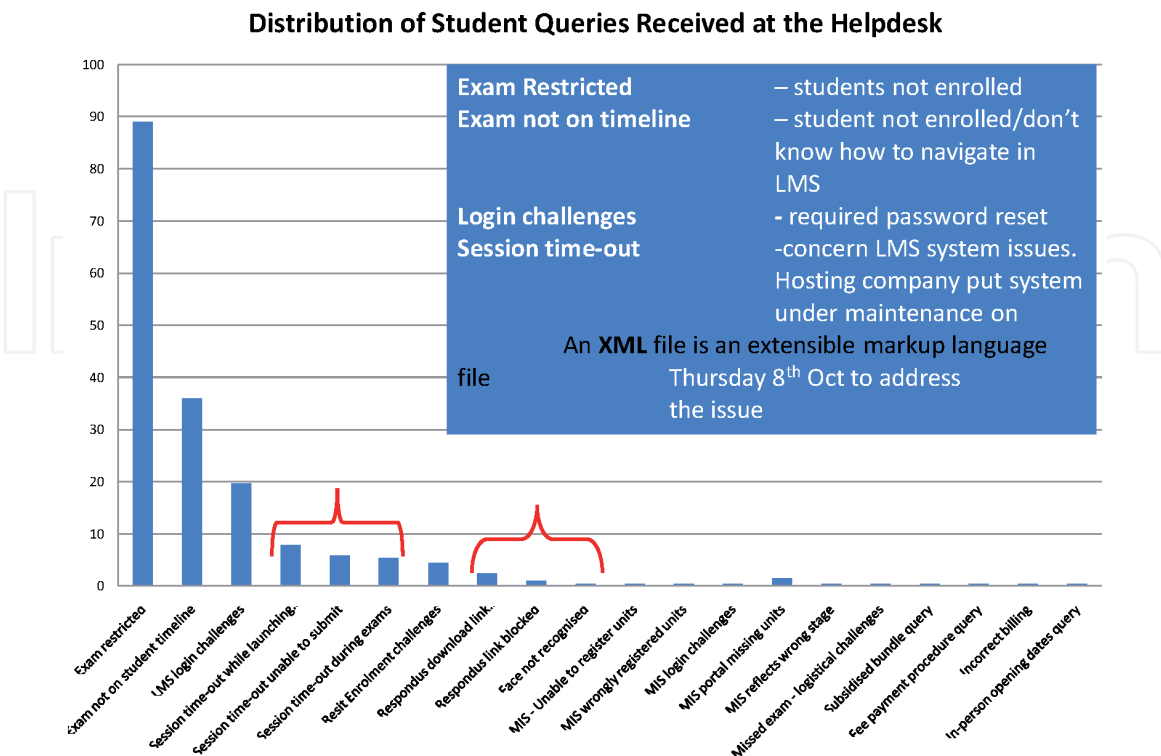
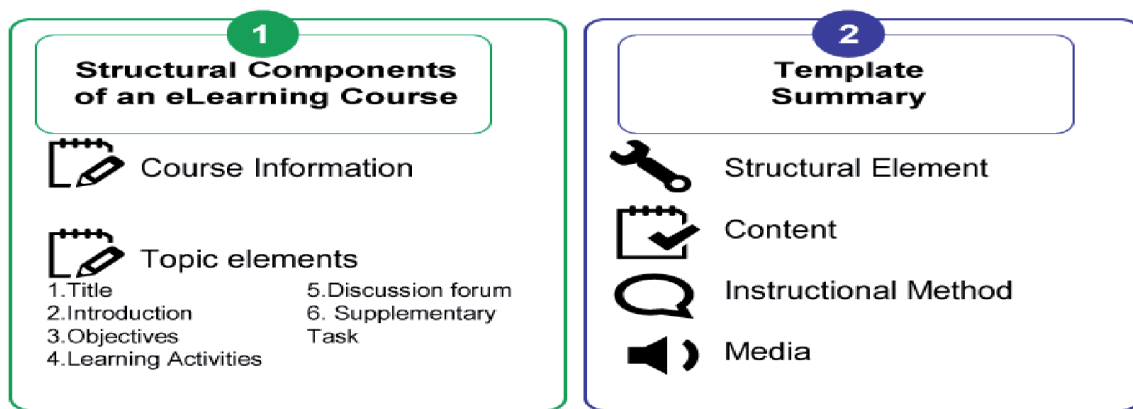


Figure 5. Distribution of student queries from the helpdesk [48].

online examination component in the existing policy. This is because the examination policy had no provision for online examinations. With the reviewed policy, the University embarked on extensive planning for its first ever summative examinations covering all undergraduate students. This required the upgrade of the existing LMS from a concurrency of 1000 to 3000 and in a mode that was compatible with the safe exams browser; purchase of other software for examination like the script conversion software from word to Moodle compatible XML file. The team then embarked on a search for an online proctoring examination system existing currently in the market and yet affordable for use with the large number of students at the university. The experience and challenges experienced in these first online exams is presented in **Figure 5** [48].

### 3.3.5 Quality assurance measures in place

All Maseno University courses presented to Commission for University Education (Kenya) for approval to ensure they meet the requisite internal and external quality assurance mechanisms and standards. All the courses are approved for three different modes of offer: Face to Face offer, Blended Learning offer, and Online learning offer. This allows the university to be ready for any of these modes of offer by using the same content, but variation brought about by the classroom activity used.



**Figure 6.** Internal Maseno university eCampus QA tools for content development [49].



**Figure 7.** eCampus Online Content Review Tools [49].

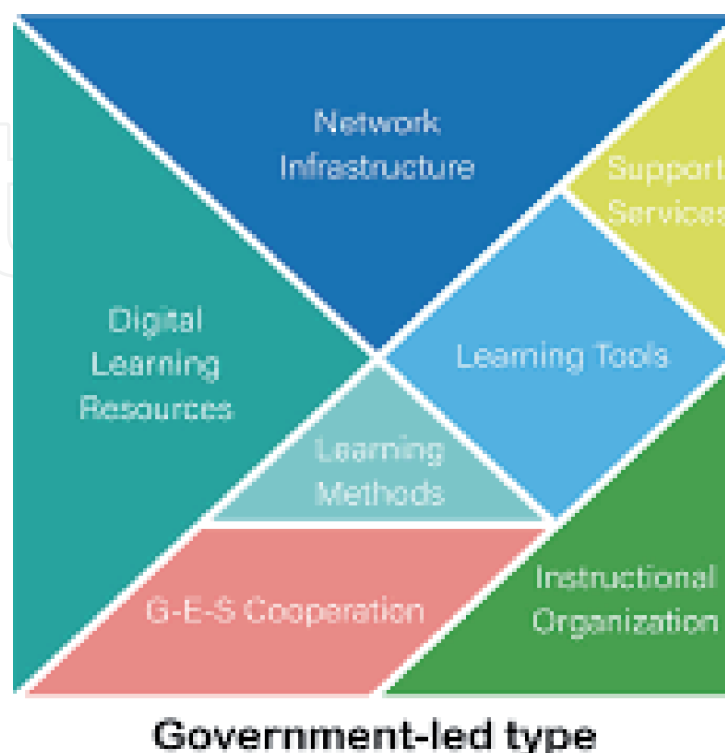


Furthermore, the eCampus has developed a series of tools that are used internally to measure and monitor quality both at the point of development and offer. Samples of these tools are appended below (**Figures 6 and 7**) [49].

#### 4. Choosing low cost but effective technologies for classroom instructions in the light of existing economic constraints within a university

In considering effectiveness, researchers contend that BL coalesces around access, success, and students' perception of their learning environments. Success and withdrawal rates for F2F and online courses are compared to those for BL as they interact [50] and outcomes show that BL students are more successful than either face to face or fully online learners. Blended learning is an innovative concept that embraces the advantages of both traditional teaching in the classroom and ICT supported learning including both offline learning and online learning. It has scope for collaborative learning; constructive learning and computer assisted learning (CAI). Blended learning needs rigorous efforts, right attitude, handsome budget and highly motivated teachers and students for its successful implementation because it incorporates diverse modes so it is complex and organizing it is a difficult task. The cost-effectiveness therefore of a BL technology is based on learner perception of the specific technology. According to the UNESCO Handbook [51] on flexible learning, affordable technologies largely available for institutions in Africa are categorized as in **Figure 8** [52] that follows.

The type of technologies for BL are based on six dimensions resources serve in a BL environment, namely infrastructure, learning tools, learning resources, teaching and learning methods, services for teachers and students, and cooperation between enterprise, government, and schools/institutions. These technologies were costed and presented to the university in terms of priority and summarized in the **Table 2** [53] that follows.



**Figure 8.**  
*Affordable technologies [52].*

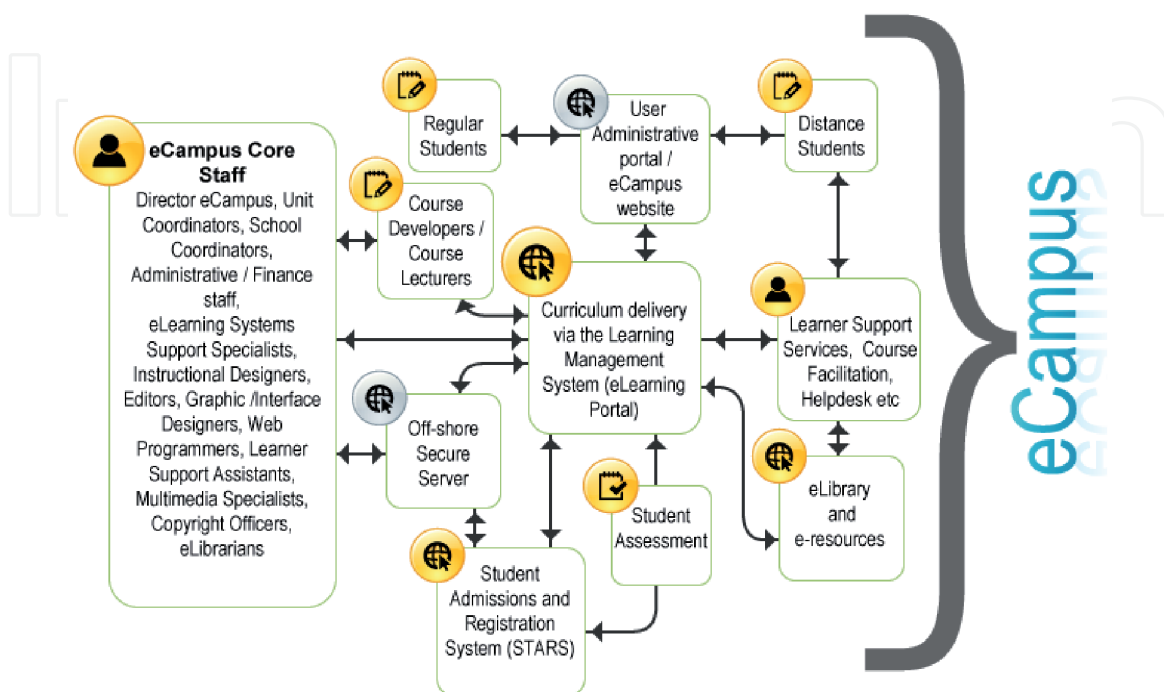
One Time Cost	Periodic Cost	Recurring Costs
<ul style="list-style-type: none"> <li>• Bandwidth &amp; Wireless/Wired Connectivity</li> <li>• Furniture</li> <li>• Power Access (laptop carts and/or wired outlets)</li> <li>• Design, Implementation &amp; Consulting Services</li> <li>• Initial Professional Development</li> </ul>	<ul style="list-style-type: none"> <li>• Technology devices</li> <li>• Headphones and Other Accessories</li> </ul>	<ul style="list-style-type: none"> <li>• Learning management System</li> <li>• Licenses for Digital Content &amp; Tools</li> <li>• Licenses for HLMS or Other Integrated Platforms</li> <li>• Blended Learning technical leads</li> <li>• Increased IT Support or IT staff</li> </ul>

**Table 2.**  
 Priority on Technology for Blended Learning adapted from blended learning toolkit [53].

#### 4.1 The MOODLE learning management system infrastructure

The main infrastructure at the eCampus for BL is the learning management system which runs on Moodle and supported by the Moodle community through continuous development and improvement. There are about 20 different types of activities available to Moodle users (forums, glossaries, wikis, assignments, quizzes, polls, scorm players, databases etc) and each can be customized to suit the user organization. This activity-based model permits combining of activities into sequences and groups, which can help a teacher guide participant through learning paths [54]. This LMS has been customized in such a way that it supports all the operations of the university listed above including student communities, administrative centres and teacher support areas. This becomes clear when we examine a representation of the eCampus at a glance presented as a **Figure 9** [55] below.

The use of technologies to enhance teaching and learning and help instructors and departments to process administrative work in Maseno University is flexible. A variety of simple web 4.0 tools are used to help learners generate content and interact with peers, such as blogs, wikis, and social networks [56]. Additionally, several technology-based communication mediums, such as emails, WhatsApp and instant messaging



**Figure 9.**  
 Maseno university eCampus at a glance [55].

applications are used. This makes the instructors and administrative staffs' work much more convenient. Originally online learning in Maseno was limited to a few digital tools such as multimedia courseware, learning objects and on-line forum discussions, it has since expanded to include video conferencing in addition to audio and video streaming.

#### **4.2 Gaps identified in the universities resource provision**

The university set up a committee to assess the prevailing gaps in its provision of resources for blended learning and the following were duly identified.

**eLearning Multimedia Spaces** – these are physical spaces designated for content development and fully equipped with software and digital resources to enable formatting course content, audio and video recording, editing and upload of these resources onto the LMS.

**Smart Classrooms** – These are large lecture halls customized mounted with large screens and speakers to support BL. This allows it to accommodate the large numbers of students who may attend Common Units or courses with large student population. These halls are customized to hold the necessary multimedia equipment and fitted with smart screens where students can follow the scheduled live session as required and others from external locations following on their computers or phones.

**Internet Access Points** – these are necessary to allow for students' access to Learning Management System. The limited number of Wi-Fi access points across the university needed to be increased to allow for social distancing in an effort to meet the Ministry of Health (MoH) and Ministry of Education (MoE) requirements for social distancing and prevent crowding at the available access points.

**Dedicated Computer Laboratory Space** - To cater for the students who may desire to access the eLearning Platform (LMS) content while they are within the university grounds, but do not have web-enabled personal devices, a dedicated laboratory space equipped with access terminals and internet connectivity are required.

**Capacity Building Gaps** - There have been capacity building trainings for the teaching staff across Schools. Most of the trainings have however focused on online content development and the spread has not been uniform. Out of the thirteen Schools in the university four have received adequate exposure; three have received moderate exposure while five have received minimal exposure. The committee therefore identified the following as eLearning capacity gaps among the teaching staff to adequately handle the requisite components of eLearning: online content development; e-facilitation and e-moderation; technical skills for LMS; familiarity with proctoring systems for online assessment and skills to ensure quality assurance. The committee further identified the need for collaborations and mentorship that will lead to the development of these capacities with institutions and organizations such as University of Edinburgh, Association of Commonwealth Universities, The United Nations Educational, Scientific and Cultural Organization (UNESCO), Proctorio (an online examination proctoring company) and Cisco Systems. Further, the committee recommended pursuit of partnerships with institutions and organizations such as Volkswagen, Safaricom and Airtel that can facilitate acquisition of laptops for both teaching staff and students at low cost in order to improve access to eLearning.

**Human Resource Gaps** - In order to achieve quality in teaching and learning the committee noted that the university needs a strong and qualified staff in online pedagogy. For this to be actualized human, the committee noted that there was need to improve technical staff at the School of Education that trains in pedagogy of teaching

and learning and the eCampus that trains in online pedagogy. Additional teaching and technical Staff in the School of Education included Technician specialized in operations, Management & Maintenance; Technician specialized in multimedia Production, Multimedia production, Graphic Art and Photography, and Audio Visual projectionist.

Additional technical staff for required at the eCampus included a Coordinator for Research Monitoring and Evaluation to be responsible for quality assurance and standards, Copywrite Editor, Multi-Media resource Specialist, Web programmer, Graphic Designer, Data base administrator, and a Systems Specialist.

## **5. Lessons learned from MU's transition from face to face to online and blended learning**

The transition in MU from F2F to ODTL became a learning laboratory for the university in various aspects of online and blended learning. The lessons learned can broadly be categorized into the following six areas: Attitude of Lecturers and Students; Online Assessment; Technologies; The Digital Divide; Change management; Capacity Building Best practice.

### **5.1 Attitude of lecturers and students**

The forced shift from F2F to online and blended learning exposed the fact that a majority of lecturers and students had a strong negative attitude towards online learning activities. This came out mainly through the various social media platforms used by lecturers and students. The best lesson however was that with continued use, the attitude continued to improve. Secondly, the prevalent attitude made the university go back to the drawing board of having to deal with the negative attitude to improve future engagement as supported by other researchers [57–59].

### **5.2 Online assessment**

The online assessment undertaken at MU during this period realized that the proportion of students who were eligible to do exams was 70.4%, meaning that 29.6% of the entire student population had not paid fees and/or registered in MIS hence were ineligible to take the examinations. It was further realized that only 32.4% of the total student population potentially qualified to progress to the next academic level. Nationally, this was the best performing university in online examinations both numerically and qualitatively, which was a good report for the university. But considering the low output from students, pertinent issues were raised on online assessment and by extension online learning. The barriers to assessment were more technological in nature as opposed to pedagogical. Most students had laptops that could not support the proctoring software; a large population had no laptops, network connectivity, and network coverage in their localities. A few students however cited lack of lecturer support during the online examinations as well as challenges with the proctoring software. These challenges became learning points in preparing students for the subsequent examinations. The best outcome from this experience though was the fact that the university integrated online examinations in its examination policy which opened the door for online examinations as a practice in the university. It further exposed the technical staff at the eCampus to a variety of proctoring soft-wares which allowed the team to identify a cost-effective proctoring system.

### **5.3 Technologies**

One of the key benefits from the shift to online and blended learning in MU is the new technological investments the university management had to make in new learning technologies which will make immense contribution to improvement of the quality and equity towards course content and facilitation of online learning [60]. Continued use of these technologies (Zoom, BigBlueButton, LMS, examination proctoring system, video creation software etc.) is naturally killing technophobia and ushering the university into a new dawn.

### **5.4 The digital divide**

The shift exposed the deep digital divide among government sponsored students in public universities. This was possibly the greatest hindrance to students realizing the full potential of e-learning, yet lecturers still expected students to submit assessment tasks and engage with course activities on the LMS. This confirms the sentiment that due to high level of digital divide between Africa countries and other nations of the world the global information society benefits are but mirage to the larger Africa society vis-à-vis higher educational institutions (HEIs) in Africa [61]. This digital divide among government sponsored students at MU is caused by social exclusion, digital exclusion and access factors [62–64] which has further led to digital exclusion. The digital exclusion was even direr among learners with special needs in MU as was the case for this learners in other institutions [65]. But hope is not lost as this exposure has led to Higher Education Loans Board in Kenya creating a fund for provision of laptops for government sponsored students in public universities in Kenya.

### **5.5 Change management**

Implementing online education, the MU team discovered that it requires a comprehensive strategic approach to change management [66, 67]. The MU experience further exposed the fact that student attitudinal issues were as a result of challenges with access to technological tools needed. On the other hand, the lecturer attitudinal issues were mainly as a means of resisting change [68]. It is from this experience that the MU team learned that the most suitable way for change management in eLearning environment is capacity building and the negotiatory process of persuading the lecturers with a view to enhancing their digital literacy and thus gradually changing their attitude in a positive direction.

### **5.6 Capacity building best practice**

Through the concluded experiences the following principles were realized through capacity building sessions: High relevance between online instructional design and student learning; Effective delivery of online instructional information impacts online learning; Adequate support provided by faculty and learner support assistants to students improves learning; High-quality and participatory and activity oriented content improves the breadth and depth of student's learning [69].

## **6. Conclusion**

This chapter gives a detailed account on the need for Maseno University to adapt a flexible and blended learning approach which was as a result of the

disruption caused by COVID-19. It gives details of the planning, the training and resource mobilization that was undertaken to make the move to blended learning possible. Throughout, the chapter refers to mentorship, training and studies of best practice that assisted in the transition from F2F to ODTL. It is hoped that other low budget universities can learn from this experience and have the courage to use low-cost technologies available in the market to give its students quality learning and collaborative experiences HEI students benefit from in blended learning.

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