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Post-Covid 19 E-Learning Strategy Based on Usability Maturity Model for Higher Learning Institutions, Kenya

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Abstract - COVID-19 will leave no sector in any country in the world unaffected, and its consequences will be felt for years to come and higher Education is not an exception. The global economy will be adversely affected and external higher education funding for research minimized. Currently, most Institutions of learning in Kenya are struggling to accomplish the unfinished syllabi using Radio, TVs and incomplete e-learning platforms to substitute the face to face approach that the prevailing situation has brought down. The approaches that have been attempted concentrates on asynchronous learning where the interaction between the teacher and the learner is not fully focused on and less inclusive. There is also need to understand the theoretical foundations behind adoption and implementation of e-learning innovations. There is therefore need for a well thought-out framework that cane used as a benchmark to measure the extent to what it is improving the learning processes and ensure improvements in student learning outcomes is raised. The paper is therefore aimed at assessing and identifying the theories and adoption models and propose the e-learning maturity level of the universities in the Kenya by adopting the e-learning Maturity Model (e-MM). The current state of e-learning in the Kenya in terms of the drivers for the using e-learning, the technical challenges faced by the learners and role of government with the current e-learning systems will be investigated in attempt to consolidate the findings. The eLearning Maturity Model was considered beneficial, as it is aimed at providing a structured, although quite a resource heavy, approach to form a comprehensive and multilevel overview of the institution´s current status of processes surrounding the e-learning. The study exposes the drivers and barriers to effective implementation eLearning systems in Kenyan universities

Keywords - *e-learning approaches, eLearning Maturity Model (eMM), e-learning strategy, theory, model.*

1. Introduction

Institutions, including universities, depend on their capabilities and knowledge base in terms of making strategically right decisions. Higher learning Institutions – whether private or public – have faced an age of digitalization of learning and training. There have been many attempts to identify what is needed to promote the adoption of technologies within higher education institutions locally and globally. Several authors have made suggestions that could help spur growth in higher intuitions of learning such as leadership, technology infrastructure, institutional vision and provision of resources (for example, [1]; [2], [3]).

The rapid development of a variety of information technologies, such as the Internet, Cloud Computing and emerging apps, have provided solid support for the development of on line education that culminates as an emergency response in situations where the face to face teaching is not practicable such as the prevailing COVID19 era. The Inter-university and Intra-University sharing of quality curricula for very much demanded courses that lack adequate experts in the country, is of great significance in improving the quality of teaching and research in universities in Kenya. Within Kenyan institutions of higher learning (both public and private) there has been deliberate effort in creation of online distance and e-Learning units/ directorates, the purchase of an institutionally-supported virtual learning environments (VLE) and the development of an institutional e-learning strategy.

Higher education institutions are facing pressures to develop the effectiveness and quality of their operations. The accountability of higher education institutions, also in terms of performance and quality, has seen a significant increase during the last two decades [4]. The development has led to greater utilization of various metrics and process improvement activities on a wide scale. A learning higher institution creates and sustains circumstances that support

collaborative construction, open sharing, storing and utilization of knowledge [5]

2. E-Learning Fundamental Concepts

2.1 E-Learning Beyond COVID 19

In essence, COVID-19 has caused a lot of disruptions to tertiary and university education systems just like other levels of education which need to be addressed accordingly. This is due to the fact that the pandemic has exposed higher education shortcomings like diminished resources, personal and academic challenges for institutions and students, poor infrastructure to support continued distance and blended learning models, inadequacy to support Remote/online learning in universities, student's challenges and societal issues that hinder learning during the pandemic. According to [3] [15], virtual learning presents a significant advancement in the delivery of information technology and services as it is capable of enhancing collaboration, agility, scaling, and availability. It also provides potential for cost reduction through optimized and efficient computing. Thus, virtual learning offers compelling advantages in cost, speed and efficiency by providing on-demand access to a shared pool of computing resources in a self-service, dynamically scaled and metered manner.

Digitalization of education is considered as a major reforming megatrend in higher education. E-learning is hence perceived to offer the following advantages: 1. Accommodates Everyone's Needs; 2. Lectures can be take a number of times including recordings; 3. Content is more up to date; 4. Delivery of lessons is quick; 5. E-Learning is scalable; 6. E-learning is consistent; 7. There is reduced costs; 8. The e-learning paradigm is effective; 9. There is less impact on environment. However, it is worth to note that e-Learning should be able to develop other skills including Cognitive, Interpersonal and Psychomotor skills.

The quality of e-learning can be defined in many ways, showing stakeholders the complexity of the process and systems that conform to the higher education environment. Furthermore, to talk about quality, we should refer to known conceptions such as the concept of quality at software level. The maturity model derives from the principles of the Capability Maturity Model (CMM) [6]. Capability maturity in software engineering is an approach of "common sense" for software and process improvements. The different levels of maturity, Key Process Area (KPA), features and practices have been discussed and reviewed in the research community.

2.2 E-Learning Dimensions

E-Learning platforms differ in the degree of interactivity, richness in content, the manner in which content is delivered to the learner, and the degree of learner-instructor interaction. The table 1 below summarized by (Wagner, 2008), provides various dimensions of E-learning.

Table 1: Dimensions of E-Learning

Dimension	***Attribute***	***Meaning***	***Example***
E-Learning Synchronicity	Asynchronous	e-learning content is delivered at a different time that receipt by the learner	The e-leaning modules are delivered via emails, blogs, wiki, and discussion forums
	Synchronous	Content delivery occurs at the same time as receipt by the student	Lecture delivery via Chats, whiteboard, and Live Web cast
Geographical Location	Same place	Learners use an application installed at the same physical location	Using GSS or even projectors to replay information
	Distributed	Learners use an application at various locations, separate from the students and instructor	Using GSS to conduct a lecture remotely
Independence	Individual	Students are able to work independently and complete tasks assigned	e-learning modules autonomously by the learners

	Group	Here, learners work collaboratively with one another to complete learning tasks	Use of discussion forums by learners and instructor
Mode of delivery	Electronically only	e-learning content is delivered via e-learning technology and there is face-to-face interaction	A distance learning course offered electronically
	Blended	e-learning activities are used to supplement traditional face-to-face learning	In face-to-face lectures being enhanced with hands-on computer exercises

2.3 E-Learning Approaches

There are two general approaches to e-learning: First is where Self-paced learners are alone and completely independent: Learners are offered e-learning courseware (also called Web-based training (WBT)), which can be complemented by supplemental resources and assessments. Courseware is usually housed on a Web server, and learners can access it from an online learning platform or on CD-ROM. The second is Facilitated and instructor-led e-learning courses provide different levels of support from tutors and instructors and collaboration among learners. E-learning approaches in Universities can combine different types of e-learning components such as: (a) e-learning content; (b) e-tutoring, e-coaching, e-mentoring; (c) collaborative learning; and (d) virtual classroom. eLearning activities can be categorized as either synchronous or asynchronous. In Synchronous e-Learning, activities may involve use of Chat and Information Messaging, Video and audio conferencing, Live webcasting, application sharing, Whiteboard and polling. On the other, Asynchronous activities may involve use of e-mail, discussion forum, Wiki, Blog and Webcasting

3. Methodology

COVID-19 Pandemic has come as both a curse and a blessing for Kenya education system. For the case of Universities, I see it as "an eye-opener'. [13] [14] [27] provides a review of a number of different initiatives for developing e-learning practice and concluded that: There appears no ready model—no single, clearly successful path—that ensures e-learning will be embedded. The operational context is thus crucial to the choice of tactics that are likely to lead to success. [15] and [16] also argued persuasively that: Clearly understanding where you are starting from is as important as understanding where you want to get to. Expanding the use of eLearning in an institution requires a clear and honest analysis of the organization in terms of strengths and weaknesses viewed against its strategic goals.

The paper employed Extensive Literature Review on use of Design science in measuring maturity of eLearning systems in universities as depicted in Figure 1 above. In Design Science in Information Systems Research - paradigm (DSISR), understanding and awareness of current issues and correspondent solutions develops during development and utilization of artefacts. eMM was considered a very thorough model that provides tools for addressing issues explicitly in a complex system. As a maturity model, the eMM also provides a way to measure and monitor development, which was seen as a positive characteristic.

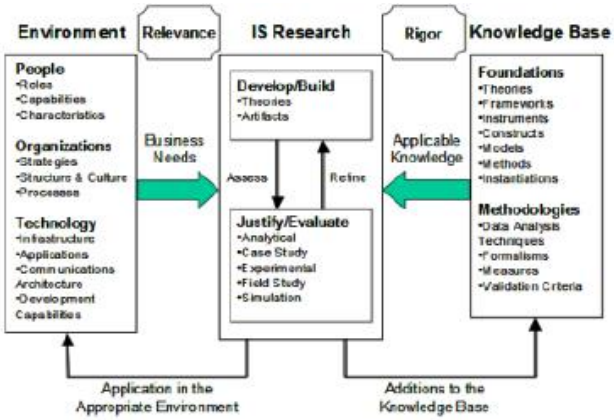

Fig. 1 Information Systems Research Framework [21].

During the process of evaluating eMM [23] and assessing the institution´s processes, better understanding was developed on how a structured approach can be beneficial in assessing the current state when it comes to the capability to consistently develop, deploy and support circumstances for high quality e-learning throughout an institution. Consistency and sustainability is supported by strategies, policies, principles, stake holder involvement,

formal and systematic top-down and bottom-up quality assurance and enhancement practices.

4. Theories and Adoption Model Applicable to E-Learning Systems

4.1 Theory of Reasonable Action

Is one of the most popular theories used and is about one factor that determines behavioral intention of the person's attitudes toward that behavior. [8] defined "attitude" as the individual's evaluation of an object and defined "belief" as a link between an object and some attribute, and defined "behavior" as a result or intention. A second factor is the person's subjective norms of what they perceive their immediate community's attitude to certain behavior This affects Culture within a University.

The theory of reasoned action (TRA) [[9]) maintains that volition and intention predict behavior. According to TRA, if people evaluate the suggested behavior as positive (attitude) and if they think others want them to perform the behavior (subjective norm), this results in a higher intention (motivation) and they are more likely to perform the behavior.

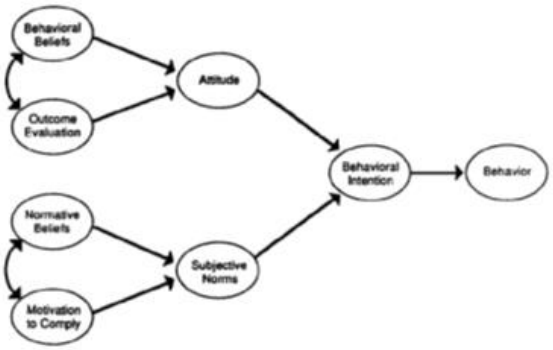

Fig. 2 The Theory of Reasonable Action [8]

A high correlation of attitudes and subjective norms to behavioral intention and to behavior has been confirmed in many studies. However, a counter-argument against the strong relationship between behavioral intention and actual behavior led to the evolution of the theory of planned behavior, a model which includes the impact of non-volitional factors on behavior.

4.2 Theory of Diffusion of Innovations

Rogers [26] proposed that the theory of 'diffusion of innovation' was to establish the foundation for conducting research on innovation acceptance and adoption. The innovation and adoption happened after going through several stages including understanding, persuasion, decision, implementation, and confirmation. [26] S-shaped adoption curve of innovators, early adopters, early majority, late majority and laggards is as shown in Fig. 3.

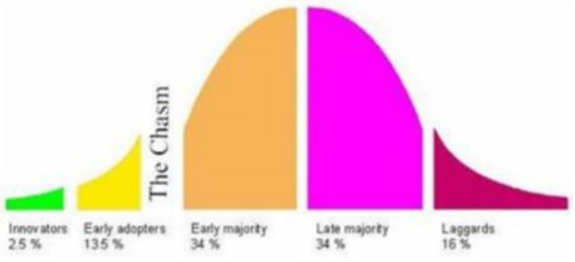

Fig. 3 Innovation Adoption Curve [26]

- Early adopters are institutions who like to innovate. They are willing to use technology to gain a competitive advantage. They have IT staff, management, and executives who are used to doing things new and differently. Many high technology-enabled universities fall into this category.
- Early majority universities will adopt new approaches to stay ahead of the market, but tend to wait until there are some reference customers to learn from. If you are in this type of university, you probably find your executives asking, "What other universities can we benchmark ourselves against?" or "Who else is doing this?"
- Late majority Universities like to wait until all the bugs are worked out. These institutions gain market share through strong customer service, support, and proven solutions – so they are wary of doing things first. They want to be fast followers. Their approach is to let someone else take the arrows, learn from them, and do it better. This is the largest segment of any market, with about 60-70% of all universities falling into this category.
- Late adopters are universities who tend to show up late. They are sometimes disorganized, distracted, or perhaps busy with other critical business issues. Many late adopters may, in fact, do the best job of implementing a solution because they take the time to study, plan, and organize themselves for success. The only risk these universities have is that the solution they chose may become obsolete during the time they decide to implement.
- Laggards wait until the market is almost over and then jump in. These universities are the ones that are now developing web sites, for example

4.3 Task Technology Fit

Goodhue et al. [20], Task-technology Fit (TTF) emphasizes individual impact. Individual impact refers to

improved efficiency, effectiveness, and/or higher quality. [20] assumed that the good fit between task and technology is to increase the likelihood of utilization and also to increase the performance impact since the technology meets the task needs and wants of users more closely.

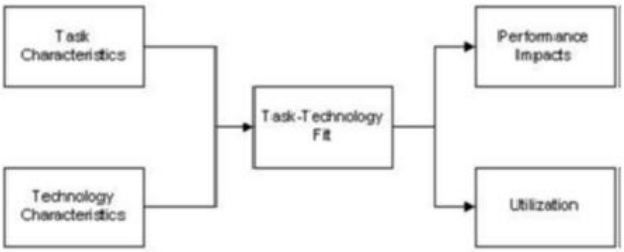

Fig. 4 Task-Technology Fit [20]

4.4 Unified Theory of Acceptance & Use of Technology (UTAUT)

[28] came up with four predictors of users' behavioral intention: performance expectancy, effort expectancy, social influence and facilitating conditions. Performance Expectancy: perceived usefulness, extrinsic motivation, job-fit, relative advantage and outcome expectations; Effort expectancy captures the notions of perceived ease of use and complexity.

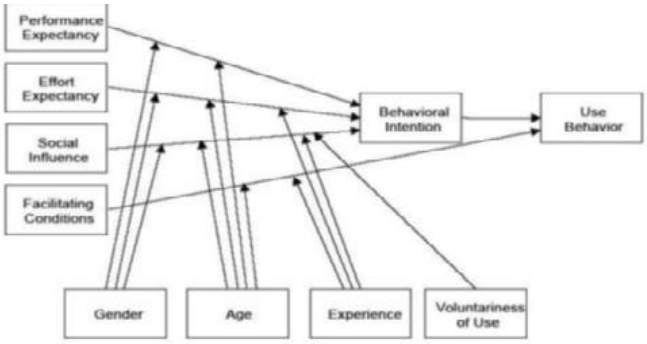

Fig. 5 Unified Theory of Acceptance and Use of Technology (UTAUT) [28]

4.5 e-Learning Adoption based on Technology Adoption Model (TAM)

[29] developed an integrated model of technology acceptance known as TAM3 shown in Figure 6. The authors developed the TAM3 using the four different types including the individual differences, system characteristics, social influence, and facilitating conditions which are determinants of perceived usefulness and perceived ease of use. In TAM3 research model, the perceived ease of use to perceived usefulness, computer anxiety to perceived ease of use and perceived ease of use to behavioral intention were moderated by experiences. The TAM3 research model was tested in real-world settings of IT implementations.

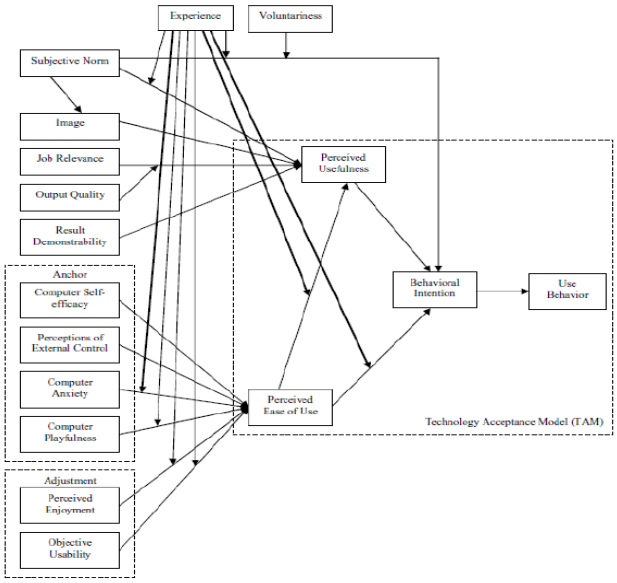

Fig. 6 Technology Acceptance Model (TAM 3) [29]

5. Theories and Adoption Model Applicable to E-Learning Systems

5.1 Measuring Success Based on ISS Model

DeLone and McLean ISS model [19] can be applied to measure success of information systems such as eLearning in universities. This model emphasizes the works of [16] and [18] which considers success being pegged on ease of use, and user acceptance of the system. This does not exclude the fact that e-learning systems have to be acceptable to all the end users in a university.

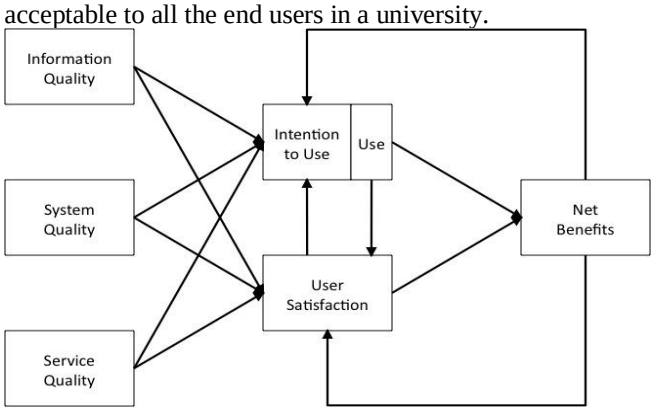

Fig. 7 Information System Success (ISS) Model [19]

- Information Quality: defined metrics such as reliability, precision, comparability, timeliness, accuracy, understandability, currency, conciseness, relevance, format, completeness, and meaningfulness. Relates to content for eLearning
- Service Quality: encompasses areas such as training, accessibility of equipment and providing support; training, flexibility of program; Qualities include: Reliability, availability, assurance, empathy, responsiveness, efficiency
- System Quality: defines what is needed in aspects of Hardware (available for user) and software application (made for future use and needs) in the perspective of e-learning. Includes also Network and internet access. Features of high quality ELS are: accessibility, usability, awareness of user expectations, and learning ease. This shows that attitude towards technology, skills and resource are all important for the e-learning implementation success [25].

5.2 Measuring Success Based on Capability Maturity Model

Derived eMM for Capability Maturity Model [24] of software and SPICE (Software Process Improvement and Capability Determination -ISO/IEC 15504 Information technology – Process assessment. Key idea of maturity models in general, is that organizations including universities need to develop their capabilities within processes in order to achieve higher level maturity of the processes. CMM includes a group of plan, do, check and act –activities -PDCA-cycle.

Table 2: key process areas of e-learning(kpa)

S/No	Process Category	Brief Description
1	Learning	Processes that directly impact on pedagogical aspects of e-learning
2	Development	Processes surrounding the creation and maintenance of e-learning resources
3	Support	Processes surrounding the oversight and management of e-learning
4	Evaluation	Processes surrounding the evaluation and quality control of e-learning through its entire life cycle
5	Organization	Processes associated with institutional planning and management

eMM is a framework for quality improvement. help institutional leaders to evaluate the maturity of an institution with regard to e-learning, and performing systematic improvements in the activities of e-learning in the institution. The different levels of maturity, Key Process Area (KPA), features and practices have been discussed and reviewed in the research community. The KPAs (Learning areas) of e-learning are: - learning, - development, - support, - evaluation and; - organization.

5.3 E-Learning Maturity Model (eMM)

Every process is evaluated from the synergistic perspective of: (1) delivery, (2) planning, (3) definition, (4) management and (5) Optimization. eMM is represented in the figure 8:

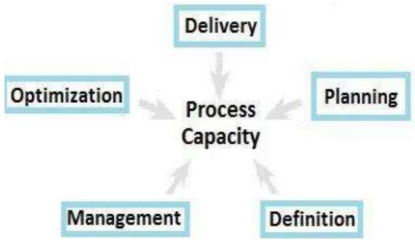

Fig. 8 eLearning Maturity Dimensions ([23])

- Level 1: Delivery dimension: creation and supply of the process results. process to be operational inside the institution. Ad-hoc processes
- Level 2: Planning dimension: clear and measurable objectives of eLearning projects
- Level 3: Definition dimension: Defined process for development and support of e-learning. Use of standards that are institutionally defined and documented. It also defines guidelines, templates and policies during the application process.
- Level 4: Management dimension: Ensuring the quality of both the e-learning resources and student learning outcomes. How an institution manages the development process and assures the quality of the results.
- Level 5: Optimization dimension: Continual improvement in all aspects of the e-learning processes. Gets the measure in which an entity uses formal approaches to improve the activities of the process.

5.4 eLearning Projects failure as Explained from eMM

This is explained in this paper with reference to measurement of success of eLearning initiatives in Universities. We draw recommendations of causes of failure after evaluation of Theories and models of adoption as discussed in precious sections. The possible causes of

failure of eLearning projects can be as a result of the following:

i. Poorly defined University business need:
This is by far the most common cause of failure with: projects not matching to business need of university; no targets for successful outcomes (or targets poorly defined); abdication by senior management (who don't wish to get involved in something they may not understand or feel is peripheral to the business)

ii. Lack of hybrid skills for learning professionals:
Successful outcomes of good e-Learning include improved staff performance; a change in behavior. Project developers have to grasp issues related to learning, to technology, to marketing, to change management and to design

iii. Poor Project Planning and Management:
It also contributes to failure even when the business need is clear. Failing to plan is planning for failure (e.g. High demand where tech or people can't cope). A Key requirement for eLearning platform in universities include: (1) System administration (2) Course management (3) Content management (4) Collaboration and videoconferencing (5) Electronic register (6) Anti-plagiarism

iv. Lack of involvement with key stakeholders:
Classroom trainers can have the biggest negative impact (and may do so deliberately), Line managers (line CODs and Deans) are excluded both from the content and the launch. They are unable to add value to the learning experience. Senior (Top management of university) and line managers are unwilling to support or regard them as periphery to their core activities

v. Failure to understand learner's environment:
Learning design and launch implementation fails to take account of the need to be interrupted, that PCs are shared or limited, that delivery systems are old and slow or no internet for those in rural setup or even no finance or that managers are not supportive.

vi. Failure to Demonstrated Value
It may seem ironic but a significant cause of failure is attributable to not reporting successes. The outcome of an e-learning system is often nebulous and therefore too easy for sponsors/ top managers of university to feel worried that it shows no return or is not hitting targets. This makes it vulnerable to cut backs or cancellation by those controlling the budget. Demonstrating that learning has been successful learning can be difficult. Some of the causes of failure include: lack of e-assessment, usage measurement, record keeping, evaluation recording, and links to competency measurement or business evaluation (value for money).

6. Conclusions

The eMM model is a useful tool that provides detailed information on institutional capacity for eLearning delivery; therefore, it is of use to authorities and decision makers. Kenyan universities need to develop better strategy of e-
learning beyond covid 19 era. The managers must know and be aware of the variety of ways in which the e-learning manifests itself in the institutions.

Assessing e-learning maturity with eMM is an intensive and resource demanding process that benefits from the participation of people from different domains including strategic management, quality assurance, e-learning pedagogy, e-learning support and e-learning technology development Also, student involvement in the process is something to consider carefully in future re-assessments of maturity by higher learning institutions. Even though institutional culture would rather promote different kind of approaches to assessing and developing processes, introducing oneself with eMM can widen perspectives on the field.

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