A model for evaluating e-learning systems quality in higher education in developing countries

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ABSTRACT

The rapid growth of Information and Communication Technology (ICT) has brought about significant changes in the practice of e-learning globally. In recent years, there has been an increasing adoption of Learning Management System (LMS) assisted e-learning in higher education institutions (HEIs) in developing countries. Despite the perceived benefits attached to e-learning, several studies concur that there are still many challenges facing e-learning. These include but are not limited to: course development, assessment, learner support, institutional factors, user characteristics and overall performance. The overall implication is that that developing countries still lag behind in adopting ICTs in their education systems. Accordingly, further investigation into e-learning practices is required in order to fill in this gap of research. This study presents a model for evaluating LMS assisted e-learning through reviewing the existing e-learning frameworks and models for quality evaluation. The review which was based on the six dimensions of quality and their constructs targeted: the P3 Course Evaluation Model, the PDPP evaluation model, the e-learning Quality Framework, the TMLE framework and the e-learning maturity model. A comprehensive e-learning quality evaluation model was obtained which is to be validated through a survey of 200 respondents from JKUAT university in Kenya by structured equation modeling.

Keywords: *e-learning, Quality Evaluation Model, Course development, Learner Support, user characteristics, learning context, technological factors, overall performance.*

INTRODUCTION AND BACKGROUND

While developed countries have made significant strides toward integrating e-learning platforms in Higher Education (ECAR,2013; Gaebel et.al, 2014; Allen & Seaman, 2015), developing ones have not yet effectively adopted such technologies (Makokha, 2016; Kashorda & Waema, 2014; Ssekakubo,2011; Tarus,2015; Matipa and Brown,2015; Azawei,2016; Makokha,2016; Mayoka,2012; Kisanga, 2016; Raspopovic, 2014; Mtebe;2014b). Studies recognize serious challenges that inhibit the quality integration of e-learning in HEIs (in developing countries (Tarus,2015; Makokha,2016; Chawinga ,2016; Baloyi ,2014a; Muuro, 2014; Baloyi,2014b; Queiros and de Villiers,2016; Chawinga,2016; Arinto,2016;). As such, while considering the benefits of e-learning as a mode of education to enhance and improve the process of teaching and learning, barriers to adopting this technology should also be considered.

Several studies have come up with models and frameworks for e-learning quality evaluation to bridge the quality gap in e-learning provision (Khan, 2004; Omwenga & Rodriguez, 2006; Zhang & Cheng, 2012; Masoumi & Lindstrom, 2012; QM, 2014; Wright, 2014). However, it needs to be investigated as to whether these models and frameworks are suitable for deployment in the context of developing countries. According to Biggs & Tang (2007), quality in higher education

can be enhanced by designing courses that have intended learning outcomes aligned with the teaching and learning activities and the assessments, providing context for effective learning and teaching and reviewing the overall performance of an education system on a regular basis.

The study conducts a comprehensive literature review on e-learning systems based in developing countries and obtains six factors that are used as a basis for reviewing the existing e-learning models and frameworks: the P3 Course Evaluation Model (Khan, 2004), PDPP evaluation model (Zhang & Cheng, 2012), E-learning Quality Framework (Masoumi & Lindstrom, 2012), TMLE framework (Omwenga & Rodriguez, 2006) and e-Learning Maturity Model (Marshall, 2006). Finally, a comprehensive e-learning system quality evaluation model that is suitable for developing countries is obtained.

Problem Statement

According to the ECAR (2013) survey, almost all institutions in the world are involved in some forms e-learning, however a study across HEIs in most developing countries have established that the implementation and growth of e-learning has not been successful due to challenges associated with course development, learner support, assessment, intuitional factors, user characteristics and overall performance(Makokha,2016; Chawinga ,2016; Baloyi ,2014a; Queiros and de Villiers,2016; Arinto,2016; Ssekakubo,2011; Matipa and Brown,2015; Azawei,2016 Kisanga, 2016).

Although some studies have proposed frameworks and models of e-learning system quality evaluation (Khan, 2004; Omwenga & Rodriguez, 2006; Zhang & Cheng, 2012; Masoumi & Lindstrom, 2012; QM, 2014; Wright, 2014), their suitability for deployment in developing countries needs to be confirmed. Accordingly, this study proposes to develop a framework for evaluating e-learning system quality through adopting and extending the Biggs Framework of quality education. In the process, the study will review existing quality evaluation models and frameworks and come up with a comprehensive e-learning evaluation model that fits the context of developing countries. The model will be validated through a survey of 200 respondents consisting of students, instructors and technicians in JKUAT university in Kenya.

Research Objectives

The following objectives were formulated for the research:

1. Identify the e-learning system dimensions, constructs and indicators that determine the quality of e-learning in developing countries.

2. Use the e-learning system quality determinants as a basis for reviewing the existing e-learning models and frameworks of quality for suitability of use in developing countries.

3. Develop a comprehensive e-learning quality evaluation model based on other e-learning frameworks, models and literature that is suitable for use in developing countries context.

LITERATURE REVIEW

Introduction

This chapter reviews the literature on e-learning quality evaluation and the e-learning frameworks and models of evaluation. The chapter commences with the identification of the determinants of e-learning quality systems followed by empirical literature review targeting studies from

developing countries only. With the validation of the model expected to be done in JKUAT university in Kenya, the study also provides an overview of the status of e-learning in Kenya. After the examination of the existing e-learning models and frameworks of evaluation, the key factors of e-learning are revised and a conceptual model is presented as an attempt to integrate the theoretical framework and the key issues emerging from the literature and the research objectives.

Status of e-learning in Kenya

Kenya had 33 public and 17 private universities (CUE, 2015) by the year 2015. Most of these institutions had started offering a few courses using e-learning in a blended and fully online format (Kashorda & Waema, 2014), with the main mode of learning being asynchronous LMS supported e-learning (Ssekakubo, 2011). However, most of the universities which use blended learning have not invested sufficiently in e-learning infrastructure and quality e-learning course materials (Kashorda & Waema, 2014). Several studies concur that the most common quality issues affecting e-learning in Kenya include: inadequate ICT and e-learning infrastructure, Financial constraints' lack of affordable and adequate Internet bandwidth, lack of operational e-learning policies, lack of technical skills on e-learning and e-content development by the teaching staff were the main challenges facing e-learning (Ssekakubo, 2011; Tarus, 2015; Makokha, 2016; Muuro, 2014).

Course Development

Mtebe and Raisamo (2014) found out that instructors should develop quality course content that meet intended educational benefits, appropriate to learners' knowledge, skills and abilities in order to maximize Learning Management System(LMS) use, and increase learners' satisfaction with the system. Course quality has positive effect on learners' satisfaction towards the system as well as having positive effect on LMS use. Other studies (Tarus, 2015; Chawinga, 2016; Kashorda & Waema, 2014) which also applied employed a descriptive survey research design emphasized that there was need to improve learning materials and manuals in order to improve course quality.

On the same note, Makokha (2016) using a descriptive survey methodology with primary data collected using three research tools: questionnaire, in-depth interviews, and focused group discussion observed that most of the course modules were not interactive at all; hence quality of e-learning is still relatively low with over 60% of the course modules merely uploaded lecture notes. He added that most of the lecturers used their LMS as a document repository where materials such as PowerPoint presentations, lecture notes, and essential readings are uploaded.

The measures of this construct (course information, course layout, course structure and course organization) were adapted from Quality Matters Rubric Standards (QMRS, 2014) and the Criteria for Evaluating the Quality of Online Courses (Wright, 2014) both of which are regarded as standard measures of the quality of courses offered in technology enhanced learning.

Learner Support

Learner support (LS) deals with all measures extending beyond the production of study materials which support students in the learning process (Simpson, 2002). This construct will regard learner support to constitute content support, social support and admin support (Chen ,2007). Wright (2014) observed that multimedia clips, such as audio and video clips, should form core components of content support.

Muuro (2014) and Queiros and de Villiers (2016) employing descriptive survey using a cross-sectional and mainly quantitative data confirmed that strong social presence (through timely feedback, interaction with facilitators, peer-to-peer contact, discussion forums and collaborative activities) was key in learner support. Jung (2012) applying a descriptive survey from a large number of distance learners scattered across several Asian countries observed that e-learning administrative support should form psychological support for students (e.g., counseling services), enrollment and admission services, guidelines for funding and financial management and learner welfare (e.g., financial aid and health care for students.

Assessment Design

E-learning assessment normally consist of continuous assessment tests(CATs), assignments and end semester examination. In a study by Chawinga (2016), it was established that there was delayed feedback of assignments and release of end of semester examination results. In a related study, Makokha (2016) observed that some instructors failed to include online quizzes and self-assessment tests in their courses.

Assessments are critical in measuring the learning objectives and therefore they ought to be feasible, relevant, accurate, and congruent with the both objectives and the content (Wright,2014; QM,2014). Besides, learners should be given clear expectations and criteria for credit assignments, reasonable number of assignments and their due dates and appropriate links to institutional policies on grading and evaluation Wright (2014). Delay in providing assessment feedback should be avoided as it can negatively impact on student performance Chawinga (2016, p.15)

Institutional Factors

Tarus (2015) revealed that that computers; network connectivity; Internet bandwidth play a critical role in facilitating accessibility to e-learning by the users. Makokha (2016) supported this view by stating that Insufficient Internet connectivity; Lack of computers/laptops and Inadequate computer laboratories were the major challenges hindering quality e-learning systems.

Similar sentiments were expressed in Iraq by Azawei (2016) using a descriptive research design in Iraqi public universities who maintained that low internet bandwidth and Lack of ICT infrastructure were the main stumbling blocks to e-learning quality and hence unsuccessful implementation. Matipa and Brown (2015) added that into in order to improve and motive for LMS use by lecturers and students, computer network should be on all the time.

Secondly, computer labs should be maintained in such a way that they're fully functional and students should be allowed to use their own devices in class such as laptops, tablets, and smartphones. Other factors include operational e-learning policies and financial allocation for e-learning activities like installation and maintenance of the e-learning platform (Tarus, 2015)

User Characteristics

Students and staff require training in e-learning skills to prepare them to take courses through e-learning as well as sensitization and training of lecturers on e-learning through workshops, seminars and other forms of training are a necessity. Mayoka (2012) maintained that universities should work towards improving knowledge and skills of students and staff through training in order to increase chances of technology acceptance by users. Training improves perceived ease of use which directly translates into quality.

Another study using a descriptive survey with quantitative data argued that teachers' positive attitudes could be attributed to their computer experiences while their negative attitudes could be attributed to poor facilitating conditions or environmental factors (Kisanga, 2016). Instructors being known to fear exposing their low or no level of ICT literacy calls for the need for digital inclusion to create urgency for lecturers to be more personally motivated to adopt ICT (Matipa & Brown, 2015). Similarly, Tarus (2015) supported these views by adding that other courses of e-learning failure included lack of technical skills on e-learning and e-content development by teaching staff, lack of interest and commitment among the teaching staff, and longer amount of time required to develop e-learning courses.

Overall Performance

Mayes & Freitas (2013) as cited in Biggs (1999) argued that institutions should evaluate on their teaching processes in terms of whether the objectives of the course in particular and the institutional goals in general have been achieved by the educational system.

ENQA (2013) stated that approval, monitoring and periodic review of programmes and awards should be emphasized. Such reviews should be geared towards investigating whether the e-learning system provides user satisfaction, information quality, service quality and academic achievement (Raspopovic ,2014; DeLone and McLean,2003; Mtebe,2014b).

Key factors of Evaluation

Table 1*:Key factors of Quality Evaluation*

	Key Factors	Constructs	Measurements	Source
1	Course development	Course information, course structure, course layout,	Course objectives, list of textbooks, list of lecturers, current and accurate, content, easy to use interface	QM Higher Education Rubrics (2014), Wright (2014), Makokha (2016); Tarus (2015)
2	Learner Support	Social support and course support, admin support	Group work, feedbacks including: emails, phone calls, chats, forums etc.	Baloyi (2014a); Muuro, (2014); Baloyi(2014b); Queiros and de Villiers (2016)
3	Assessment	Assignments, quizzes, CATS, examinations	Assignment due dates, missing grades, assignment feedback, exam feedback.	Chawinga (2016); Arinto (2016); Makokha (2016); (2014), Wright
4	User characteristics	Learner factors, instructor factors, technician factors	Self-efficacy, training, motivation, incentives, experience	Azawei (2016); Makokha (2016); Mayoka (2012); Kisanga, 2016
5	Institutional factors	Policies, funding, infrastructure, training,	Availability of internet Availability of computers, maintenance of infrastructure, seminars & workshops,	Kashorda & Waema, 2014); Ssekakubo (2011); Tarus (2015); Matipa and Brown (2015)
6	Overall performance	user satisfaction, learning effectiveness, academic achievement, cost effectiveness	information quality, service quality, better grades, savings on education	Raspopovic,2014; DeLone and McLean,2003; Mtebe,2014b)

Based on the literature discussed above, the study can now confirm that the aforementioned dimensions, constructs and indicators affect the quality of e-learning systems in developing

countries. Based on these factors, a comprehensive review of the existing models and frameworks of e-learning system quality is conducted with the objective of reviewing the factors as well as determining the suitability of the frameworks/models. The key factors for this model are summarized in table 1.

The six key factors of e-learning quality and their constructs are initially represented as a model of evaluation shown in figure 1.
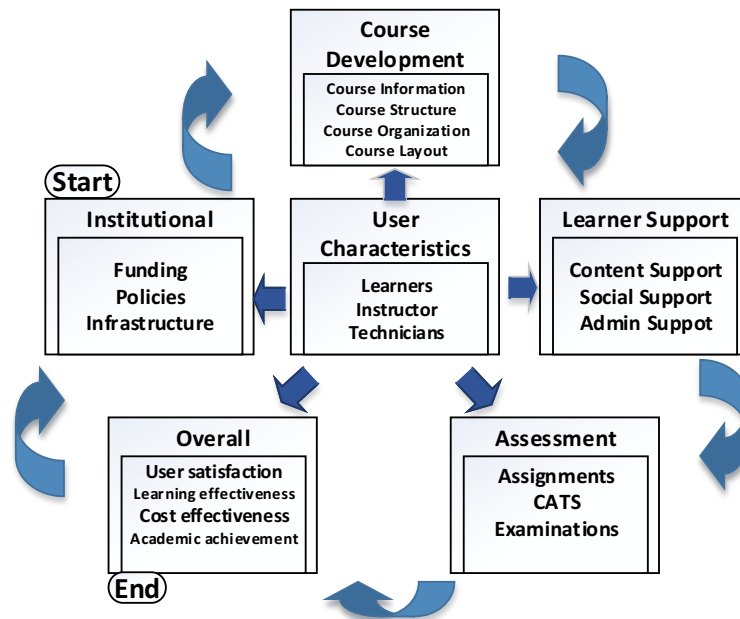

Figure 1: Proposed e-learning Quality Evaluation Model

To further refine the model's dimensions, constructs and indicators, comparisons are made with five e-learning frameworks and models of evaluation with the view refining them after answering the following six broad questions:

1. Is the model or framework characterized by an analysis of course development consisting of course information, course structure, course organization?

2. Is the model or framework characterized by learner support that constitutes content support, social support and administrative support?

3. Is the model or framework characterized by assessment methods made up of CATs assignments and end semester examinations that are appropriately administered?

4. Does the model or framework take into consideration institutional factors such as availability of polices, funding and infrastructure provision on e-learning?

5. Does the model or framework take into consideration the effect of user characteristics such as training, experience, motivation and incentives?

6. Does the model or framework propose conducting regular reviews of the e-learning education system in order to determine user satisfaction, learning effectiveness, academic achievement and cost effectives of e-learning?

Our proposed model will henceforth be referred to as the EQEM model in the subsequent sections.

Mapping Evaluation Models and Frameworks to EQEM Model

The P3 Course Evaluation Model

The P3 model was developed by Khan (2004) and advocates for the evaluation of three dimensions of e-learning. The People, the Processes and the Product. The specific factors involved are the Planning process, the Design processes, the Development processes and Evaluation processes. This model is represented in figure 2.
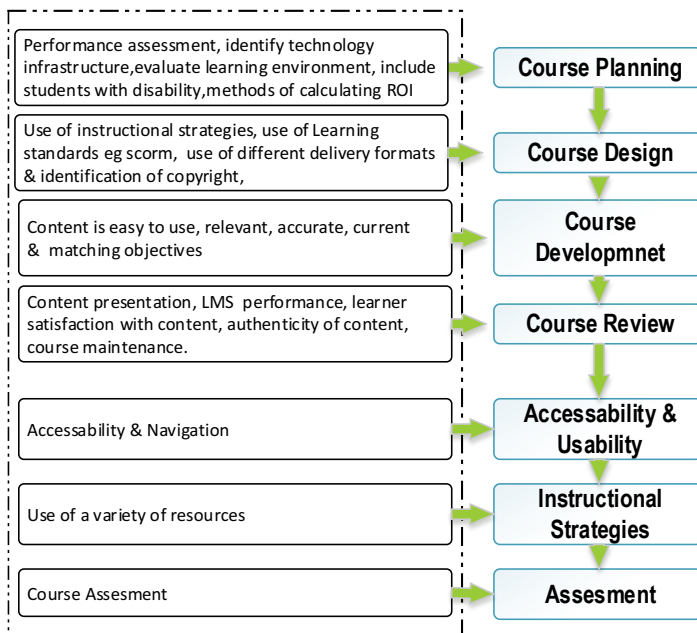
Figure 2*: P3 Model*

Mapping P3 Model to EQEM Model

Mapping of the P3 model factors into the EQEM model factors was done in order to determine the common factors in both models as well as factors that are not accounted for in either model or framework. Figure 3 shows EQEM model after mapping has taken place. All the dimensions are supported by P3 model in this case. However, the constructs marked red are unsupported while the rest are supported. This is summarized in table 2.
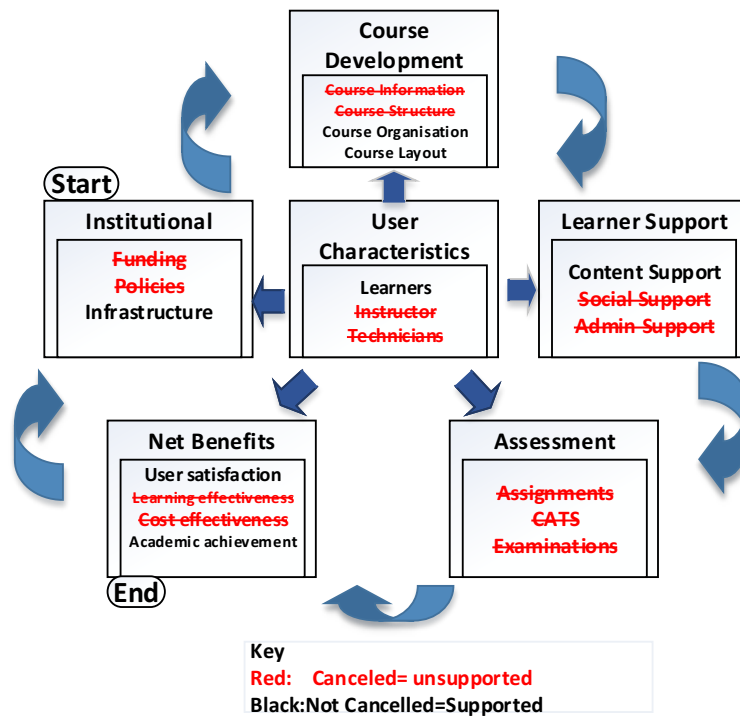
Figure 3: *Mapping P3 Model to EQEM Model*

Table 2: *P3 model Mapping Details*

What P3 does not Support	What P3 Supports	What P3 adds
Funding, policies, course information, course structure, course organization, social support, admin support, assessment methods, learning effectiveness, cost effectiveness	Infrastructure, maintenance, learner's characteristics, content support	Under Course review: MS performance, user satisfaction, authenticity of content

The PDPP Evaluation Model

The Planning, Development, Process, and Product (PDPP) evaluation model consists of four-phases of evaluation for e-learning course quality: Planning evaluation includes market demand, feasibility, target student group, course objectives and finance. Development evaluation includes instructional design, course material development, course website design, flexibility and student-student interaction, teacher-tutor support, technical support and, and assessment. Process evaluation includes technical support, Web site utilization, learning interaction, learning support and flexibility (see figure 4).
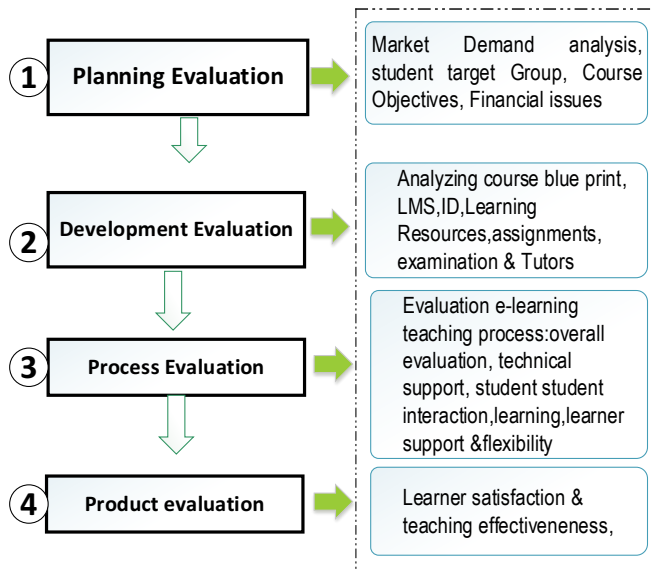
Figure 4: *The PDPP evaluation model*
(Adapted from: Zhang & Cheng, 2012, p.68)

The PDPP model concentrates on fours aspects of quality: planning; development; process and product. By contrast there is very little about determining what role is played by the context of e-learning such as institutional and administrative support as well as the effect of user characteristics such as training and experience. The PDPP evaluation model was used in a case study of an e-learning course on a Distance Education programme at the University of Hong Kong (Zang & Cheng, 2012).

Mapping PDPP Model to EQEM Model

Mapping PDPP model EQEM model shows that there are both supported and unsupported and common factors as illustrated in Figure 5. The mapping details are given in table 3.

Table 3:*PDPP Model Mapping Details*

| What PDPP does not support	What PDPP supports	What PDPP adds
Policies, infrastructure, course information, course structure, technician characteristics, admin support, assessment methods, cost effectiveness, academic achievement	Funding, learner and instructor characteristics, learner's characteristics, content support, social support	Course review: user satisfaction, learning effectiveness
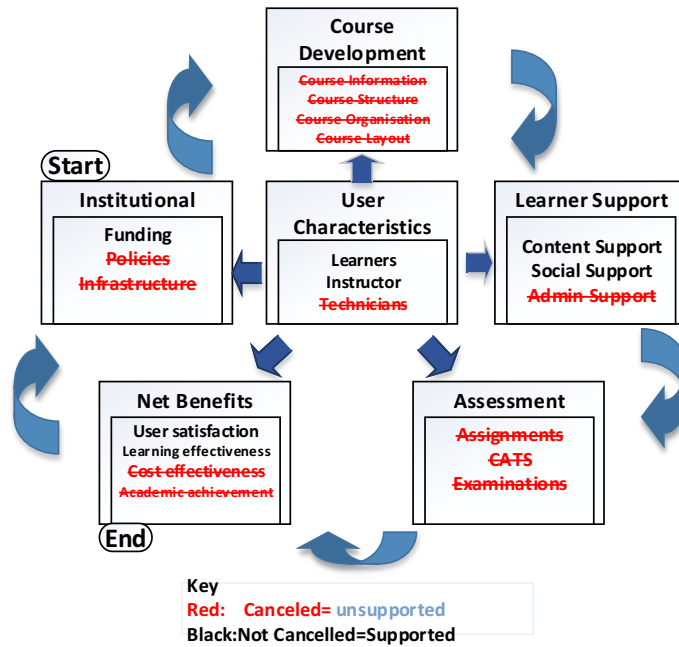
Figure 5: Mapping PDPP Model to EQEM Model

E-learning Quality Framework

The E-learning Quality evaluation framework (EQF) bases its evaluation criteria on 7 factors: institutional factors, technological factors, pedagogical factors, student support factors, faculty support factors, instructional design factors and course evaluation factors (see figure 6).
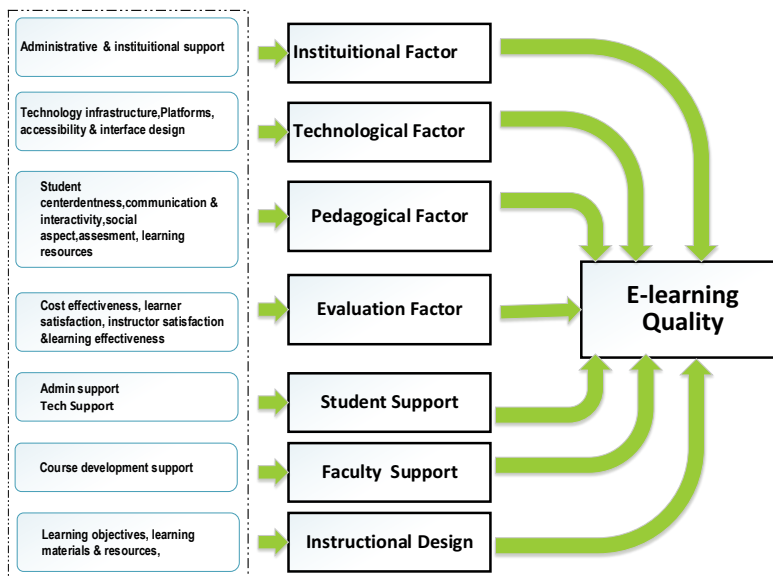

Figure 6: e-learning quality framework
(Adapted from: Masoumi & Lindstrom, 2012, p.29)

The seven factors of the model can be explained as follows.

- **Technological factor:** deals with infrastructure, LMS platform and accessibility.
- **Institutional Factor**: deals with administrative institutional support.
- **Instructional Design factor:** deals with learning objectives, learning materials and resources.
- **Faculty Support**: This factor is partially related to the technological factor and it partially covers the field of a course creation.
- **Student Support***: deals with administrative support and technical support.
- **Evaluation Factor***: This can be divided into a subjective and an objective group. Subjective group consists of the students' satisfaction and teacher's satisfaction. Objective group is formed by learning effectiveness measurable tests or alternatively by the results classification. Cost effectiveness is the combination of the financial burden at the teacher side and the financial benefit at the student side.
- **Pedagogical factor***: This is largely oriented to content, communication and used resources.

The framework was used in Measuring of e-learning as a Cultural Artifact of Iranian Virtual Institutions in the year 2012 and also in the University of Gothenburg, Sweden in the year 2013 to measure the pedagogical aspects in assuring quality in virtual education environments (see figure 8).

Mapping E-learning Quality Framework to EQEM Model

The mapping of the e-learning quality framework to evaluation factors is shown in figure 7 while the summary of the mapping is shown in table 4.
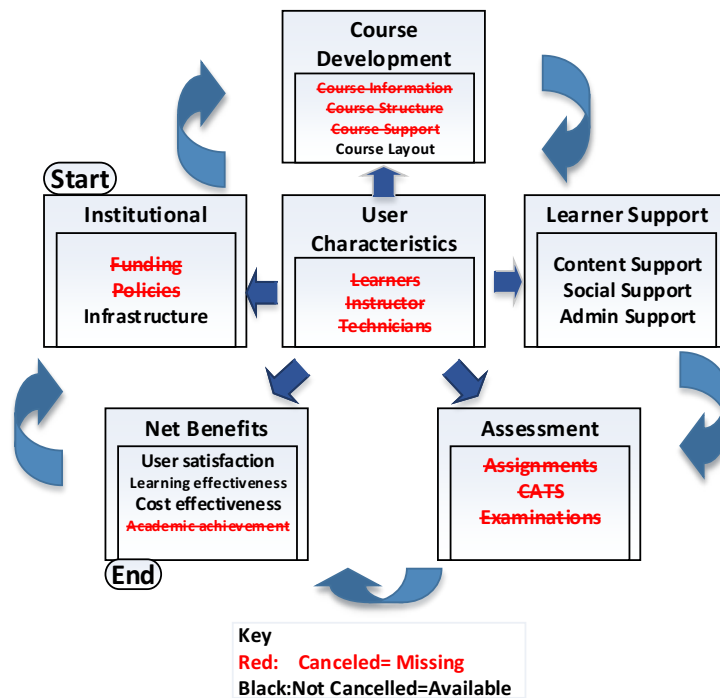

Figure 7: Mapping EQF to EQEM Model

Table 4:*EQF Mapping Details*

What EQF does not support	What EQF supports	What EQF adds
Funding, Policies, maintenance, course information, course structure, course organization, learner, instructor & technician characteristics, assessment academic achievement	Infrastructure, course layout, content support, social support & admin support	Course review: Cost effectiveness, learner satisfaction, instructor satisfaction & learning effectiveness

TMLE Evaluation Framework

The Technology Mediated Learning Evaluation Framework (TMLE) proposes that any technology mediation for educational purposes has a structure, a process and an outcome (SPO) which can be applied at three main levels: that of the technical system functioning, the human perspectives of those involved, and the overall impact on the education system. Technical aspects of a system fall most directly under structure, human perspectives fall under process and the education system falls under outcome. The framework was used to evaluate the e-learning courses developed at Nairobi University in the year 2006. The summary of the framework is shown in table 5.

Table 5:*TMLE Evaluation Framework (Source: Omwenga & Rodriguez, 2006, p.51)*

Factors	Structure	Process	outcome
System functionality	What Hardware & software requirements are needed?	What Instructional methods are used?	Have learning Specifications been met?
Human Perspective (instructor)	What are the necessary changes in e.g. in skills, working conditions?	Has the user's mode of operation changed?	Has the user become more effective?
Human Perspective (Learner)	Behavior modification	Is there a Change of learner experience?	Does the use of the system result in changes in the quality of service and better education for the recipient?
Human Perspective (the administrator)	Is the system a reasonable, cost-effective and efficient alternative to existing structures?	Does it change the character of the administrator's job?	Does the system improve specific education provision on a reasonable metric?
Education System	Does it change the balance between the functions of the different education providers?	Does it affect practice and delivered quality of education provision?	Does it improve the education status and development potential of the population it serves?

The TMLE can be seen to be primarily concerned with the human elements like skills, learners' experience and the behavior modification for the users and the system functionalities like availability of hardware and software. The TMLE does however look at some of the educational aspects like learning improvement and cost-effective education.

Mapping TMLE Framework to EQEM Model

The mapping of the TMLE framework to evaluation factors is shown in figure 8 while the details of the mapping is provided in table 6.
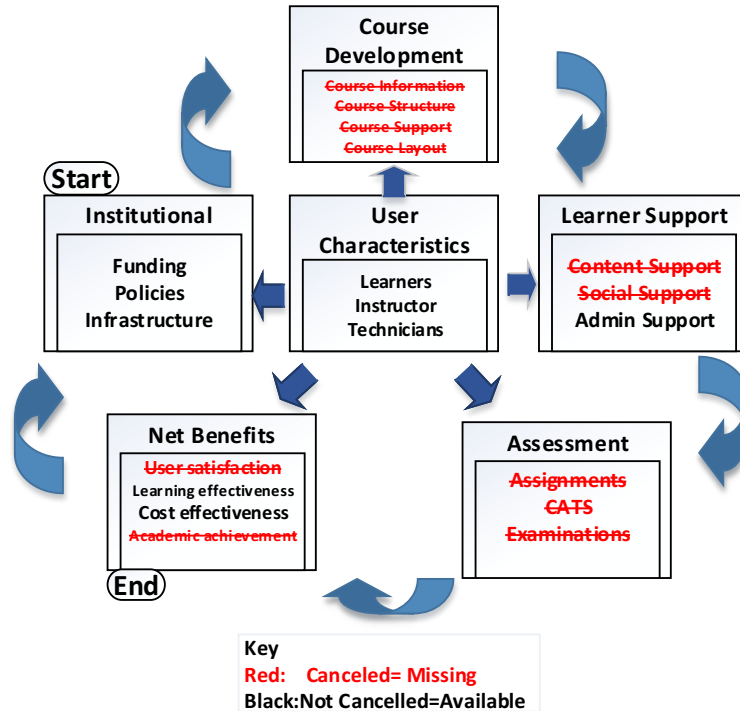

Figure 8: Mapping TMLE Framework to EQEM Model

Table 6:TMLE Mapping Details

What TMLE is does not support	What TMLE supports	What TMLE adds
Course information, course structure, course organization, course layout, content support, social support, assessment, user satisfaction and academic achievement	Funding, Policies, maintenance, Infrastructure, admin support, learner, instructor & technician characteristics	Course review: learning improvement and cost-effective education

e-Learning Maturity Model(EMM)

The eMM takes the ideas of process capability maturity and uses them as a foundation for a form of benchmarking explicitly intended to improve the quality of e-learning for the benefit of students, staff and institutions. Since its initial conception (Marshall and Mitchell, 2002), the eMM has evolved from version 1 to version 2 which make the eMM more usable by institutions and researchers conducting their own assessments. Based on the SPICE model, the eMM divides the capability of institutions to sustain and deliver e-learning into six major categories or process areas: learning, development, co-ordination, organization and optimization (Table 7).

Table 7: *e-Learning Maturity Model*
Source (Marshall, 2002; Marshall, 2006)

| Dimensions	Description
Learning	Processes that directly impact on pedagogical aspects of e-Learning
Development	Processes surrounding the creation, support and maintenance of e-Learning resources
Co-ordination	Processes surrounding the oversight and management of e-Learning
Evaluation	Processes surrounding the evaluation and quality control of e-Learning through its entire lifecycle.
Organization	Processes associated with institutional planning and management.
Optimizing	Continual improvement in all aspects of the e-Learning process

Mapping EMM to EQEM Model
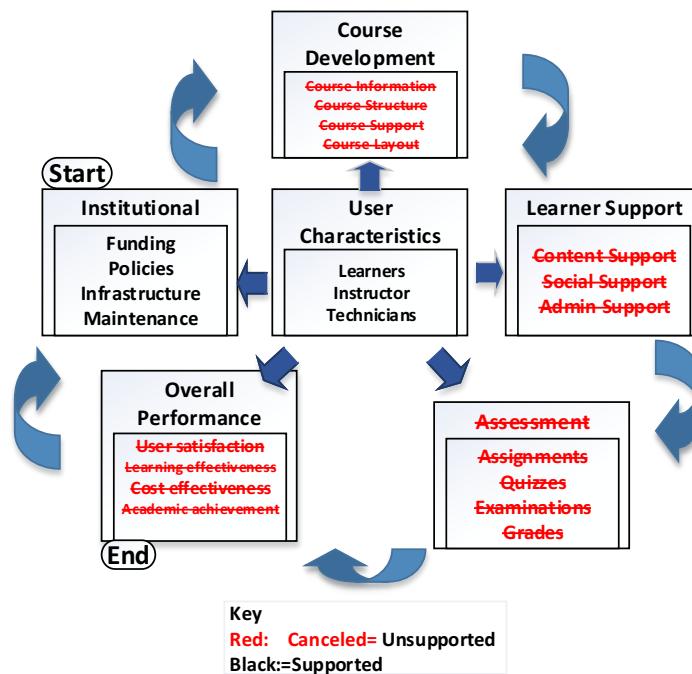
Figure 9: *Mapping Emm to EQEM Model*

Table 7: *eMM Mapping Details*

What EMM does not support	What EMM supports	What EMM adds
Course development constructs, learner support constructs, assessment and overall performance constructs	User characteristics and institutional factors	Process oriented approach to evaluation

Summary of Review of Literature, Frameworks and Models

The review of empirical literature, frameworks and models of e-learning systems quality leads to the conclusion that there are indeed factors within literature that are not accounted for by the existing frameworks and models of e-learning evaluation. Two terms, supported and not supported will be used This factor are referred to as supported or not supported. Factors that are either supported or unsupported are identified and tabulated.

The study establishes that there are six dimensions of e-learning system quality in developing countries: course development, learner support, course assessment, institutional factors, user factors and overall performance. These dimensions are broken down into several constructs and indicators relevant to developing countries. In essence, 6 hypotheses and 20 sub hypotheses are formed from the model. This will be tested using empirical data from JKUAT.

The hypotheses and sub hypotheses are listed in the next section.

Hypothesis 1
H_1: Course development factors significantly affect e-learning quality.
    $H_{1.1}$: Course information significantly affects e-learning quality.
    $H_{1.2}$: Content structure significantly affects e-learning quality
    $H_{1.3}$: Course Layout significantly affects e-learning quality
    $H_{1.4}$: Course organization significantly affects e-learning quality

Hypothesis 2
H_2: Learner Support significantly affects e-learning quality.

    $H_{2.1}$: Content support significantly affects e-learning quality
    $H_{2.2}$: Administration support significantly affects e-learning quality
    $H_{2.3}$: Social support significantly affects e-learning quality.

Hypothesis 3
H_3: e-learning assessment factors significantly affect e-learning quality.

    $H_{3.1}$: assignment factors significantly affect e-learning quality
    $H_{3.2}$: continuous assessment factors significantly affect e-learning quality
    $H_{3.3}$: examination factors significantly affect e-learning quality

Hypothesis 4
H_3: e-learning institutional factors significantly affect e-learning quality.

    $H_{4.1}$: funding factors significantly affect e-learning quality
    $H_{4.2}$: infrastructure factors significantly affect e-learning quality
    $H_{4.3}$: policy factor significantly affects e-learning quality

Hypothesis 5
H_6: e-learning user factors significantly affect e-learning quality.

    $H_{5.1}$: instructor factors significantly affect e-learning quality
    $H_{5.2}$: learner factors significantly affect e-learning quality
    $H_{5.3}$: technician factors significantly affect e-learning quality

Hypothesis 6

H_6: evaluating e-learning overall performance significantly affect e-learning quality.

$H_{6.1}$: evaluating user satisfaction affect e-learning quality

$H_{6.2}$: evaluating cost effectiveness significantly affect e-learning quality

$H_{6.3}$: evaluating learning effectiveness significantly affect e-learning quality

$H_{6.3}$: evaluating academic achievement significantly affect e-learning quality

Proposed Model

There is a need for a model that encompasses all stages in e-learning quality evaluation. Based on the review conducted in this study, there is no complete model or framework for evaluating e-learning system quality and there is therefore a need to develop a new one.

Such a model should take into consideration whether an e-learning system evaluates course development, learners' support, assessment, intuitional factors and overall performance. With all this information, the study therefore proposes an e-learning quality evaluation model that fits developing country context. The model is based on existing empirical literature and five e-learning quality frameworks and models. The model is represented in figure 12.
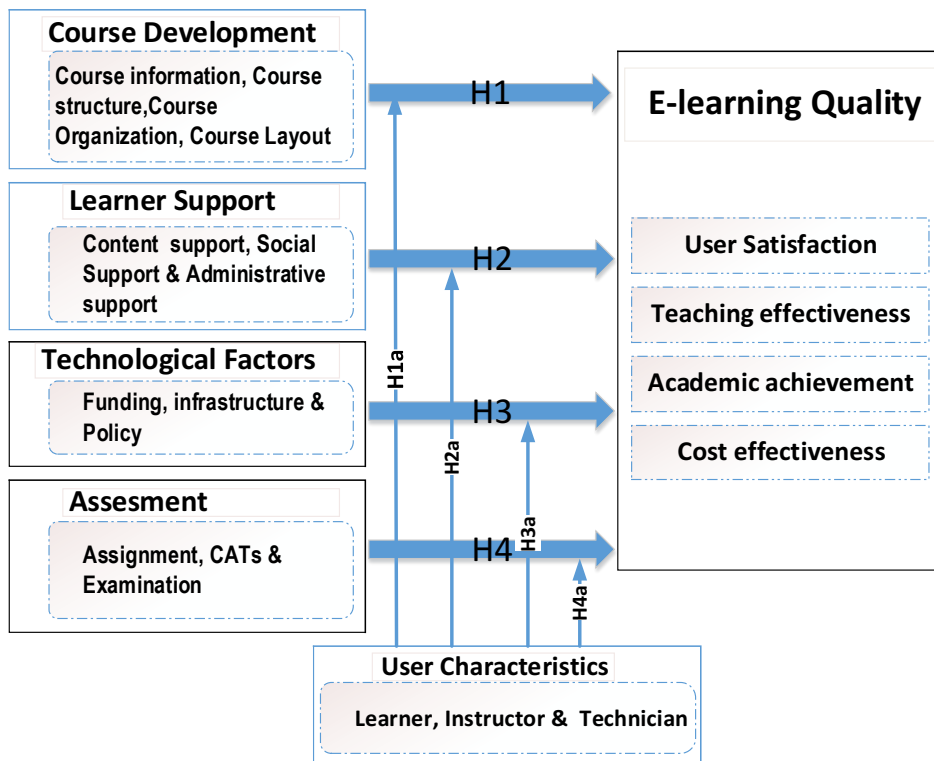

Figure 10: *Proposed e-learning Quality Evaluation Model*

CONCLUSION

In this study, e-learning quality evaluation and challenges in this field were considered important and from the literature it was proposed that a model for evaluating quality of e-learning in HEIs in developing countries could be developed as a tool for successful implementations.

After considering empirical literature developing countries on e-learning systems quality, six dimensions and twenty constructs were obtained. Then the most commonly used models and frameworks of e-learning evaluation were introduced and assessed after which further refinement of the factors was undertaken. The review of the existing frameworks and models also contributed to the awareness as to whether they were suited for developing countries context or not.

We can as a result of these findings conclude that the model so obtained from this study is the most suitable for evaluation of e-learning systems quality in developing countries because its development has been founded on the challenges affecting e-learning systems in this region.

The validity of the dimensions and constructs will be assessed using empirical data from JKUAT university in Kenya. The model fit will be determined using structured equation modeling(SEM) via AMOS statistical software.

We believe that the context of Kenya is a typical representative of many situations facing HEIs in developing countries and is therefore adequate for conducting the test. It is hoped that the findings of this study will help those who are involved in the implementation of LMS assisted e-learning in developing countries to evaluate their systems in order to prepare corrective measures and strategies to avoid future system failures.

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