Factors affecting asynchronous e-learning quality in developing countries. A qualitative pre-study of JKUAT University

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ABSTRACT

The purpose of the present study was to identify the influencing factors of asynchronous e-learning system quality particular in developing countries via a review of current literature and a qualitative pre-study conducted at Jomo Kenyatta University of Agriculture and Technology (JKUAT). Despite the perceived benefits of these systems to overcome challenges facing education sector in the region, studies show that the majority of them have not been successful. After a thorough review of existing literature on developing countries and a qualitative pre-study conducted at JKUAT University, the study identified the factors that influence quality of e-learning systems as: Course Design, Content support, social support, and Student Characteristics, Instructor Characteristics, Technician Characteristics, Course Assessment and Institutional factors. It is hoped that the findings of this study will help those who are involved in the implementation of Learning Management System (LMS) assisted Asynchronous e-learning in developing countries prepare corrective measures and strategies based on these factors to avoid future system failures.

Keywords: Asynchronous e-learning, Quality Factors, Course Design, Content Support, Social Support, Support, Student characteristics, Instructor characteristics, Technician characteristics, Institutional factors.

INTRODUCTION

The current study investigates the factors that influence the quality of asynchronous e-learning systems in developing countries via a review of existing literature and also conducts a qualitative pre-study at Jomo Kenyatta University of Agriculture and Technology (JKUAT) in Kenya in in order to explore all the important elements of an e-learning system quality.

With the development of ICTs, e-learning provides instant, convenient, flexible, and long-distance learning to the students. Online based e-learning environments can be divided into a triad of synchronous, asynchronous and hybrid or blended learning environments (Perveen, 2016). Synchronous learning environments provide real time interaction which can be collaborative in nature incorporating activities such as video conferencing and group chat, with the condition that both the instructor and the student must be simultaneously present (Shahabadi, 2015).

On the other hand, asynchronous environments are not time and space bound i.e. learning can occur in different places at different times, with the students using tools such as discussion boards, blogs and e-mail at their own pace (Shahabadi, 2015). However due to the cost implications of synchronous e-learning such as costs incurred in ensuring adequate bandwidth and the necessary infrastructure plus the numerous advantages attached to asynchronous e-learning, most developed countries have implemented asynchronous e-learning that is supported

by Learning Management Systems or LMS (Ssekakubo, 2011; Kashorda & Waema, 2014;Azawei, 2016).

Nowadays quality is considered as a major issue for modern education generally, but particularly so for institutions involved in e-learning (Ajmera, 2014).it can be used as an evaluation of excellence and can be viewed and considered by different aspects so it is important to set standards for e-learning quality. Every context of a discussion is unique and therefore the definition of quality tends to reflect the context.

In the context of Higher Institutions of Education (HEIs) practicing e-learning, Mayes & Freitas (2013) as cited in Biggs (1999) argued that institutions should evaluate their teaching processes in terms of whether the objectives of the course and the institutional goals have been achieved by the educational system. Some studies found out that besides monitoring and periodic review of courses and programmes, HEIs should be geared towards investigating whether the e-learning system provides user satisfaction, information quality, service quality and academic achievement (Raspopovic, 2014; De-Lone and McLean, 2003; Mtebe, 2014).Based on the arguments above, quality in this study will refer to the ability of an institution to meet its mission, goals and objectives through education as well as the provision of overall satisfaction and academic achievement.

Although the use of e-learning systems in the recent years have been popular, their implementation, adoption and use have not followed suit. This problem could possibly be attributed to the lack of quality enhancement of the inputs, processes and outputs of such systems. Several influencing quality factors for education using e-learning systems exist according to the numerous studies exploring these relevant issues. Biggs & Tang (2007), for example observed that quality in an education system can be enhanced by designing courses based on the constructivist theory which states that quality can be achieved by aligning the intended learning outcome with the teaching and learning activities, the assessments, providing context for effective learning and teaching and reviewing the overall performance of an education system.

Other studies found that e-learning system quality could be influenced by considering student factors, instructor factors, course design factors, course support factors, course assessment factors and institutional factors(Raspopovic, 2014; Chawinga, 2016;Muuro, 2014; Kisanga, 2016; Makokha, 2016).

Therefore, e-learning system quality and its determining factors were important issues that required further explorations. This study emphasize that success of an e-learning system could not be fulfilled without achieving high level of system quality that puts into consideration the identified factors of quality.

Background

According to the Organization for Economic Co-operation and Development(OECD), most countries today, both developed and developing regard higher education as a key agenda issue as economic development depends in part on the presence of an educated and skilled workforce and on technological improvements that raise productivity (OECD, 2014).The desire to expand and increase access to higher education has seen many countries introduce information and communication technologies (ICTs) in the form of electronic learning(e-learning)so as to meet the ever increasing demand for higher education.
This rapid expansion through the use of ICTs faces significant challenges related to quality which requires that institutions providing education via ICTs remain vigilant with regard to the factors

that influence quality of education specifically e-learning if any benefits are to be achieved(OECD, 2014).

According to a study by the Ambient Insight Regional Report (AIRP, 2011-2016), Africa has an improved growth rate in e-learning compared to other countries in the world. For instance, the growth rate for self-paced e-learning in Africa is 15.2%. But despite the progress that has been made, the continent still faces e-learning system challenges that are related to internet connectivity, infrastructure, availability of locally developed e-content that is aligned with national curriculums and training and professional development for its e-learning staff.
But despite all these challenges,HEIs are more eager to protect their critical market as well as to maintain the standard of their services and products through the provision of quality e-learning (Ajmera, 2014). The growing concern with quality has made institutions to look for ways of managing quality holistically by trying to identify the factors that influence quality and then using them for evaluating and eventually enhancing the quality of the e-learning systems (Raspopovic, 2014; Muuro, 2014; Kisanga, 2016).

Some studies have confirmed that myriad quality issues are experienced across developing countries practicing asynchronous e-learning. The major issues highlighted include but are not limited to: poor ICT infrastructure, lack of ICT skills to use e-learning, e-learning support, low internet, poor administrative support, insufficient financial support ambiguous policies, demotivated instructors, lack of training, lack of full utilization of LMSs (Azawei, 2016; Kisanga, 2016; Baloyi, 2013; Makokha, 2016; Raspopovic, 2014).

Problem statement

Despite the initiatives taken by developing countries to introduce e-learning in their education systems so as to increase access to higher education and provide a flexible mode of learning, e-learning implementation, adoption and use is still limited and can be considered as a failure in these countries. Many scholars point out that the failure to successfully implement, adopt and use e-learning is highly linked to lack of quality in the e-learning systems. They have recommended that the successful use of these systems requires HEIs to first identify the factors that influence quality and then use them to evaluate and finally enhance their systems.

Purpose of Study

The main purpose of the study was to identify the factors that determine the quality of asynchronous e-learning systems in developing countries through reviewing existing literature and by conducting a qualitative pre-study at JKUAT University.

LITERATURE REVIEW

Status of E-learning in JKUAT

JKUAT started e-learning initiatives way back 2006, however it was not until the year 2012, the former school of e-Learning was merged with a directorate that was offering the fast depleting continuing education and formed the School of Open Distance Education and Learning-SODEL(Sodel, 2016). JKUAT uses asynchronous e-learning mode of study supported by Moodle LMS hosted at JKUAT(Kihoro et al., 2014). Among the programmes offered include five masters, seven undergraduate, tree diplomas and three certificates (Sodel, 2016).A short survey was carried out to find out the learners experiences at the Cooperative University College of Kenya (CUCK), a constituent campus of JKUAT. The main focus of the study was to get students general e-learning experience and the issues that they thought should be addressed if future

units were to be offered online. The findings of the study established that inadequate internet connectivity, poorly developed courses, lack of online support, lack of online interaction with students and teachers,hard quizzes with irrelevant questions and lack of computers/computer labs were the main challenges hindering e-learning quality (Kihoro et al.,2014)**.**

E-learning System Quality Factors From Literature

Course Design
According to the Quality Matters Rubric Standards (QMRS, 2014) and Wrights guidelines for online courses (Wright, 2014), e-learning course design consists of what constitutes the course e.g. instructional objectives, course information, course layout and course organization. A descriptive study by Mtebe (2014) found out that well designed courses had a tendency to increase satisfaction and maximize Learning Management System (LMS) use, and increase learners' satisfaction with the system. Studies by Tarus (2015) and Chawinga (2016) confirmed that well designed courses appropriate to learners' knowledge, skills and abilities improved quality. Makokha (2016) in a study to establish the status of e-Learning in public universities in Kenya through a descriptive survey observed that poorly designed courses led to low interactivity and unsuccessful implementation of e-learning.

Content support
Content support encompasses any interactive activities and services intended to support and facilitate the learning process. They include the use of multimedia, discussion forums and LMS group chat. The use of multimedia coupled with solid content and appropriate instructional methods can greatly influence the learning process (Tchoubar, 2014). Multimedia Improves learning by keeping the learners engaged and motivated to learn. Using audio narrations can reduce overload and help learners remain focused on the visual (animations) in the screen while the use of videos and animations can explain complex concepts more effectively than standalone text (Kazaine, 2015).

The effect of using discussion forums is beneficial and useful to e-learning students in terms of improving their learning skills and quality. This was confirmed in a study by Shana (2009) titled "Finding out the effect of using discussion forums to augment a traditional-style class". From the study, the students described forums as a flexible, convenient, attractive, motivating and satisfying mode of communication. Muuro (2014) added that forum activity in e-learning enables participants to asynchronously share and exchange their ideas and experiences independently with or without their instructor's participation. Similar interaction can be achieved through the LMS chat, although in a synchronous mode. A chat develops student's independent learning as they are engaged in acquiring information from others without the help or intrusion of instructors. (Muuro, 2014; Soliman, 2014)).

Social Support
Social support is commonly categorized into four types of supportive behaviours: Informational Support, Instrumental Support, Affirmation support and Emotional Support(Munich, 2014). Weng(2015) in a study on social support as a neglected e-learning motivator affecting online students observed that user satisfaction in e-learning was supported by managerial support, peer support as well as family support.

The students also confirmed that they received social support from different sources, such as, peers, forum, chat and e-learning group work (Weng, 2015). Instrumental support came in the form of time off of work during examinations and encouraging students to study during quiet times and allowing access to computers. Colleagues at work provided resources for assignment and editorial assistance or *affirmation* support. Employers and colleagues both provided *affirmation*

support by telling the students they were doing a great job bringing in new knowledge to the work place.

Another study by Muuro (2014) and Queiros and de Villiers (2016) using a descriptive survey with cross-sectional approach 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.

Course Assessment
E-learning course assessment in this context refers to the administration of assignments, continuous assessment tests (CATs) and end semester examinations. 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 which led poor performance of the learners.

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; QMRS, 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
These factors attempt to address technological infrastructure issues, policy, culture and funding. Tarus (2015) revealed that 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 and Lack of interest and commitment among the teaching staff to use e-learning were the cchallenges hindering Implementation of e-Learning in Kenya.

Similarly, Azawei (2016) in a study to establish the barriers and opportunities of e-learning Implementation in Iraq observed that Low internet bandwidth, Insufficient financial support, Inadequate training programs, Lack of technical support, Lack of ICT infrastructure, Ambiguous plan and policies and lack of interest and motivation were the main barriers to quality e-learning implementation.

The findings by Tarus and Azawei were further confirmed by Mayoka (2012) in a study to analyze the adoption of e-learning Information System in Ugandan Universities observing that lack of computers and software for implementing e-learning, lack of e-learning skilled staff in universities, lack of policy and guidelines for using e-learning in universities, lack of government support for e-learning projects, high cost of telecommunication services and lack of resources for implementing e-learning projects were the main quality issues facing e-learning adoption in Uganda.

Learner Characteristics
Baxter(2012) revealed that student retention and progression in e-learning can be improved by interaction through the use of social networking tools such as Facebook to help social and academic integration and forming early strong interpersonal relationships between staff, students and their peers. How lecturers perceive students and how students interact with each other may increases self confidence in e-learning. Baxter added that positive past learning experiences i.e. success in passing modules created confidence in e-learning students.

Kuo et al., (2013) confirmed these findings by stating that learner to learner interaction influenced student satisfaction in e-learning because it acted as a two-way reciprocal communication between or among learners who exchange information, knowledge, thoughts, or ideas regarding course content.

Kuo added that besides interactions, internet self-efficacy or one's capability to organize and execute Internet-related actions required to accomplish assigned tasks positively influences learner satisfaction and hence achievement and persistence in e-learning.

Further studies by Hartnett (2016), Bonk and Khoo (2014) on online student motivation observed that learner motivation (intrinsic & extrinsic) is crucial to the learners' success in an online coursework environment because it can influence their decisions to stay in or drop out of a course, their degree of engagement in the course, the quality of the work, and their level of achievement in the online course (Hartnett, 2016; Bonk & Khoo, 2014).

Instructor Characteristics

According to a study by Wang and Cowie (2008) on challenges of e-Learning for University Instructors in Taiwan, instructors are continuously faced with pedagogical, personal, and technological challenges such as having little or no formal training in the effective use of technological resources in e-learning, computer anxiety in the early stages of e-learning adoption ,time needed to prepare e-learning lessons.

A similar study by Mtebe (2014) on the challenges of Instructors' Intention to Adopt and Use Open Educational Resources in Higher Education in Tanzania observed that inadequate ICT infrastructure, a low level of internet connectivity and an inadequate number of computers were hindrance factors. In a study by Busaidi & Alshihi (2010), instructor factors such as self-efficacy, attitude towards e-learning, experience and motivators or incentives for instructors were found to play a key role in determining quality.

QUALITATIVE PRE-STUDY

Following the development of the factors for e-learning system quality from literature, a qualitative pre-study was conducted at JKUAT in order to explore all the important elements of an e-learning system quality. This study was conducted between July and August 2016. According to Manerikar and Manerikar (2014), explorative studies are undertaken in order to provide a greater understanding of a research problem by clarifying and defining the nature of that problem. In this study, the opinions of instructors, students, technicians and the e-learning deputy director at JKUAT University regarding e-learning provision were sought using a focus group interview.

METHODOLOGY

A total of four (6) interviews with five students per group, four technicians, five instructors and one e-learning director were conducted and audio recorded with the respondent's consent. All the respondents had previously interacted with the JKUAT e-learning system. The transcribed data was analyzed using qualitative data analysis with SPSS version 23. Patterns were identified across categorized data which was followed by drawing conclusions and recommendations on factors that need to be addressed in order to enhance the quality of the e-learning system at JKUAT.

The interviews were conducted using themes based on the study objectives and having open ended questions. The questions asked included the perceived determinants and challenges of JKUAT e-learning system, the technicians' and instructors' role in e-learning and the challenges

faced by the students and the recommendations on the way forward in order to reap maximum benefits from e-learning use.

The next section discusses some of the key factors identified from the pre-study as perceived opportunities and challenges based on stakeholder's perspectives and their potential impact on the JKUAT e-learning system quality.

KEY FINDINGS FROM QUALITATIVE PRE-STUDY

a) Administrative support

The e-learning students reported that the administrative support they receive such as physical orientation of the university, academic advice, course registration and any other relevant information that is needed for their studies was critical in assisting them to adapt to the e-learning mode of study quickly. The students are expected to visit the campus on two occasions. During course registration at the beginning and during examinations and continues assessment tests at the end of the semester.

b) Course Support

The e-learning students complained that their course content was not sufficient to enable them attempt their examinations. The content was too brief and there were also no supporting links in some cases to compensate for the brief content. Although other students reported the availability of videos in some of their courses, the majority concurred that their content was mainly made up of text in the form of pdfs or PowerPoint.

c) Technician Support

E-learning technicians are responsible for maintaining the Universities' computer services and equipment. Their duties include troubleshooting computers to detect and solve technical problems, installing or updating required hardware and software and recommending computer products or equipment to improve universities e-learning system. The JKUAT e-learning center (SODEL) is assigned four (4) e-learning technicians who informed the researcher that their jobs included: installing and customizing the LMS, creating users, uploading content and even assisting students with issues regarding the technical aspects of e-learning. The technicians expressed concern that their morale was low, as there was minimal motivation from the Institution regarding the role that played in maintaining the e-learning system. They also added that they were facing hurdles in providing quality e-learning as a result of limited or lack of funds for support and expansion and lack of a good e-learning infrastructure.

d) Instructor Characteristics

The JKUAT e-learning instructors expressed fear that t lack of motivation and incentives related to e-learning instruction was a source of concern. They added that limited funding for e-learning support and expansion, poor instructor remunerations and handling too many students were hindering quality e-learning provision. A number of the instructors suggested that they would rather look for part time classes in other universities to earn extra money that struggle trying to facilitate e-learning.

e) Course Assessment

Although majority of the students reported that they were generally happy with the way their assessment were conducted as a whole, others expressed dissatisfaction with the way their assignments, examinations and continues assessment tests were handled. While some complained that there were too many assignments with constrained deadlines, others added that they were never given feedback from their assignments and CATs.

Another group of students reported that some of their examinations marks had been misplaced by the university forcing them to repeat the examinations in the form of special or supplementary exams. Other students were also adamant that delays in the outcome of their exam results did occur at times forcing them to commence a new semester without having received results for completed semester.

f) Training and Professional Development

All the respondents interviewed had a lot to say about the need for adequate training in LMS use for students and course development for instructors. Some of the Instructors expressed concerns that that having been brought up in a world with limited technology, they have always found it difficult to use computer and internet technology to engage and support learning. They called for periodic training in order for them to grasp the concepts behind teaching with e-learning, to have hands-on experience using the LMS. Students on the other hand requested for more training related to the use of the LMS.

g) Lack of Funds

Getting e-learning systems successfully implemented was closely linked to availability of funding to support various resources including e-learning equipment, training, maintenance and support. The respondents particularly the instructors and the e-learning director noted that there was always a shortage of funding to meet these obligations.

h) Internet Connectivity

The students complained about the inaccessibility of the JKUAT e-learning portal at times due to internet connectivity issues. Universities should be able to provide adequate connectivity. In addition, the bandwidth must be capable of carrying compressed multimedia objects so that students can have access to the wide variety of educational materials available in different formats such as video, sound and images.

i) Poorly Created Learning Materials

A section of students reported that most of the learning materials posted on their LMS platform consisted of PDFs and PowerPoints which they did not find to be interactive. The students suggested that it would be better if their instructors included some audio, video and images to make learning a bit livelier.

LINKING THE PRE-STUDY FACTORS TO QUALITY FACTORS FROM LITERATURE

A close examination of the pre-study factors identified in this phase confirmed that many could be linked to the constructs already identified in literature. This confirmed to the researcher that some of the factors identified in literature are relevant for developing countries. However, some of the

factors could not be linked to literature so they were added to the factors identified in the literature.

Determination of the e-learning Quality Factors

The main objective when conducting both the literature review and the pre-study was to examine if it was possible to categorize the factors identified by the e-learning major stake holders (Students, Instructors and Technicians) with those identified from literature. The end result was that the qualitative pre-study supported all of the factors found from literature except for two cases as illustrated in table 1. The pre-study thus contributed two new constructs and four new indicators: administrative support, technician support e-learning culture, examinations, assignments and CATs. Building on the above mentioned qualitative pre-study and literature review, the factors that determine the quality of asynchronous e-learning in developing countries were established.

Table 1: Pre-Study and Literature Review Quality Factors Combined

	Constructs	indicators	Source	Author
1	Course Design	Course information, course structure, course layout,	Literature	Higher Education Rubrics-QMRS(2014), Wright (2014), Makokha (2016); Tarus (2015)
2	Course Support	Announcements & reminders, Use of multimedia, Constructive feedback, Authentic learning activities	Literature and pre-study	Tchoubar (2014), kazaine (2015), Shana (2009), Soliman(2014)
3	Social Support	Group work, chats, forum, user-to-user communication	Literature	Weng & Chung(2015), Munich(2014), Muuro (2014),Queiros and de Villiers (2016)
	Administrative Support	Registration support, orientation, call center,	Pre-study	
4	Assessment	Assessment policies, assignments, CATS, examinations	Both Literature and pre-study	Chawinga (2016); Arinto (2016); Makokha (2016); (2014), Wright
5	Institutional Factors	Policies, funding, infrastructure, culture,	Both Literature and pre-study	Kashorda & Waema, 2014); Ssekakubo (2011); Tarus (2015); Matipa and Brown (2015)
6	Learner characteristics	Computer and internet experience, Passion about e-learning, Motivation from instructors, Good access to university e-learning system	Literature	Baxter(2012),Kuo, .et, al. (2013), Hartnett (2016),Bonk & Khoo (2014)
7	Instructor characteristics	Self-efficacy, training, motivation, incentives, experience	Both Literature and pre-study	Wang and Cowie (2008),Mtebe (2014), Busaidi & Alshihi (2010)
8	e-learning system quality	user satisfaction, learning effectiveness, academic achievement, cost effectiveness	Literature	Mayes & Freitas (2013), Biggs (1999), Raspopovic (2014), De-Lone and McLean, 2003; Mtebe (2014).

CONCLUSION AND RECOMMENDATIONS

This study set out to establish the factors that influence the quality of asynchronous e-learning systems in developing countries. The study discovered that the key factors responsible for determining the quality asynchronous e-learning systems are: course design, content support, course support, social support, administrative support, learner characteristics, instructor characteristics and technician characteristics. With the competitive expansion of e-learning in developing countries, HEIs that provide e-learning must improve the quality of their e-learning systems based on these factors if they are to succeed in the implementation, adoption and use of e-learning.

The present study may also contribute to a better understanding of the developing countries e-learning systems by offering the determinants of quality systems and may serve as a benchmark for e-learning providers and policy makers to integrate learners' and instructor's and technicians perceptions into HEIs e-learning systems. In addition, it can be used to identify weak areas in e-learning systems operations from the learners and instructors point of view and suggest effective strategies for improving learner experience in asynchronous e-learning systems.

Although the qualitative pre-study this was conducted in the context of one developing country (Kenya), the results are also generalizable to a greater extent in the context of other developing countries. Therefore, it can be concluded that the factors developed in this study can be used in the in the context of developing countries that are practicing e-learning.

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