

# A FRAMEWORK FOR EVALUATING THE EFFECTIVENESS OF BLENDED E-LEARNING WITHIN UNIVERSITIES

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**Abstract:** Since the inception of e-learning technologies, there has been an increase in the use of e-learning systems to support blended learning in Universities by providing a mix of face-to-face classroom teaching, live e-learning, self-paced e-learning and distance learning. Despite the existing benefits of using e-learning, some higher education institutions have not utilised e-learning to its full potential and yet there are limited studies that offer a comprehensive framework for effectively using e-learning systems. It is therefore imperative that learning technologists understand the factors that influence the effectiveness of blended e-learning. An expert survey was conducted to establish which factors are important for evaluating the effectiveness of e-learning systems. This paper describes a methodological framework for assessing the effectiveness of e-learning within Universities. The framework will act as a guiding tool for further research into ways of effectively planning, implementing and improving blended e-learning within Universities.

## Introduction

In the wake of the 20<sup>th</sup> Century, there has been a paradigm shift in the education offered by higher education institutions of learning with the emergence of Electronic learning (hereafter e-learning). Mayes and De Freitas (2005) define e-learning as the use of technology to support and enhance learning practice. Consequently, the adoption of e-learning technologies has impacted the planning, learning design, management and administration of the learning process and delivery of learning content to the students (Namahn 2010) thereby promoting blended e-learning. Blended e-learning in Higher Education Institutions (HEIs) such as Universities currently encompasses the use of a mix of improved course delivery strategies during face-to-face classroom teaching with live e-learning, self-paced e-learning facilitated by Virtual Learning Environments (VLEs) (Sharpe et al. 2006). Such environments include learning management systems such as Moodle, WebCT, Blackboard as well Web 2.0 technologies which have become enablers for collaborative learning amongst students and lecturers, online discussions and distance learning. Over 80% of HEIs in the developed world are actively engaging in the use of e-learning systems for supporting their teaching and learning, with 97% of Universities reported to be using one or more forms of VLE (Britain and Liber 2003).

On the other hand, Universities in developing countries especially sub-Saharan Africa are progressively adopting these e-learning technologies for teaching, research and supporting students' learning so as to reap the same benefits harnessed by the developed economies. However, education in sub-Saharan Africa are grappling with the continuing economic downturn, high demand for higher education in emerging knowledge-driven economies as well as inadequate availability of experienced and skilled teachers (UNESCO 2006). There is a need to improve on the quantity and quality of teachers in order to meet the high demand for education. Universities in sub-Saharan Africa are also still facing numerous challenges such as high volume of students, limited ICT infrastructure, high illiteracy levels, ineffective computer system maintenance and poor ICT support relative to the implementation of e-learning (Ssekakubo et al. 2011, Andersson 2008).

E-learning has grown to complement traditional classroom-based learning Arabasz et al. (2003), by combining the use of technology with effective pedagogy and reflective teaching thereby transforming higher education. Besides, e-learning in higher education may be used as a resource to provide online student and instructor support, online student management, and provision of formative and summative assessment feedback to the students. Currently, the greatest attention is on assessing effectiveness of e-learning systems within HEIs (Arabasz et al. 2003, Oecd 2005).

Although e-learning has become a household word amongst many academics in Universities from both developed and developing countries, there is still inadequate research focusing on the development of a comprehensive model to define, assess and measure the effectiveness of blended e-learning so as to deal with the aforementioned challenges. Hughes et al. (2006) argues that e-learning developers and practitioners are preoccupied with advancing e-learning technologies towards desired quality of e-learning systems rather than providing leverage to the teaching and learning processes. However, there are limited studies focusing on the development of an holistic solution for evaluating the effectiveness of current blended e-learning strategies. To ensure effective blended e-learning, we propose a framework that focuses on having a well balanced mix of effective pedagogy in e-learning course design and delivery, apt institutional readiness for e-learning and use of quality e-learning systems to meet institutional and student learning goals. These are important aspects of evaluating blended e-learning effectiveness, once used as a tool, it will inform decisions made by policy makers, Universities and Governments thus influencing an increase in; rate of graduation, student retention, enrolment levels, return on investment, institutional recognition, and academic achievement (Kirkpatrick 1994) as well as improving the performance and quality of teachers, research and education.

## E-Learning and Effectiveness of Blended E-Learning in Universities

In a University consisting of undergraduate degree programmes, postgraduate programmes such as Certificates, Diplomas, Taught Masters, Masters by research, and PhD degrees, typical stakeholders of e-learning include: Students, E-learning experts, E-learning system developers, learning technologists, and Lecturers (Arabasz et al. 2003). In Namahn (2010), e-learning systems architecture offers a view of all design elements and functions such as functionality, usability and aesthetics that ought to be integrated in any e-learning system. This is a prerequisite of any system development team to engage adequately in requirements elicitation and analysis for the intended system in order to identify its processes, functionality, interface and benefits. Systems design also being a vital aspect of system development must ensure that the predominant principles of system design are followed. Namahn (2010) lists these principles as; open architecture, scalability, global, integration, flexibility, rapidness and timeliness.

Khan (2010) developed an e-learning framework comprising eight dimensions, namely; pedagogical, technological, interface design, evaluation, management, institutional, resource support, and ethical shown in table 1. This e-learning framework offers a platform that enhances the success of the learner's experience once completely embraced by higher education institutions.

**Table 1: Framework for e-learning implementation**

<b>Dimension</b>	<b>Focus on E-learning Environment</b>	<b>Specific components</b>
Pedagogical	Teaching and learning	<ul style="list-style-type: none"> <li>• Analysis of content, audiences, goals, media,</li> <li>• Organisation and layout of e-learning systems,</li> <li>• Design strategies, methods and approaches.</li> </ul>
Technological	Technology infrastructure	<ul style="list-style-type: none"> <li>• Infrastructure planning,</li> <li>• Hardware and software.</li> </ul>
Interface Design	Aesthetics and Design	<ul style="list-style-type: none"> <li>• Page, site and content design,</li> <li>• Navigation, accessibility,</li> <li>• Usability testing</li> </ul>
Evaluation	Assessment of learning and environment	<ul style="list-style-type: none"> <li>• Assessment of learners,</li> <li>• Evaluation of instruction,</li> <li>• Evaluation of learning environment,</li> <li>• Evaluation of content development processes</li> </ul>

		<ul style="list-style-type: none"> <li>• Evaluation of individuals involved in content development</li> <li>• Evaluation of institutional e-learning program.</li> </ul>
Management	Maintenance of learning environment	<ul style="list-style-type: none"> <li>• Managing information distribution,</li> <li>• Managing e-learning content development,</li> <li>• Managing e-learning environment.</li> </ul>
Resource Support	Technical and human resource support	<ul style="list-style-type: none"> <li>• Online support,</li> <li>• Teaching and learning support,</li> <li>• Technical support,</li> <li>• Online and offline resources</li> </ul>
Ethical	Social, cultural, digital	<ul style="list-style-type: none"> <li>• Social and political influences,</li> <li>• Cultural diversity,</li> <li>• Learner diversity, digital divide,</li> <li>• Legal issues,</li> </ul>
Institutional	Administration, academic affairs and student services	<ul style="list-style-type: none"> <li>• Admissions, finances, payments, ,</li> <li>• Information technology services, policies</li> <li>• Graduation and grades,</li> </ul>

Reiser (2001) defines Instructional Technology as an initiative towards problem elicitation and analysis, design of solutions, implementation, management, and evaluation of instructional processes and resources to improve learning and performance in higher education institutions. E-learning has grown to complement traditional classroom-based learning Arabasz et al. (2003) by combining the use of technology with effective pedagogy and reflective teaching thereby transforming higher education. In addition, e-learning in higher education may be used as a resource to provide online student and instructor support, online student management, and provision of formative and summative assessment feedback to the students.

### **Evaluation of E-Learning in HEIs**

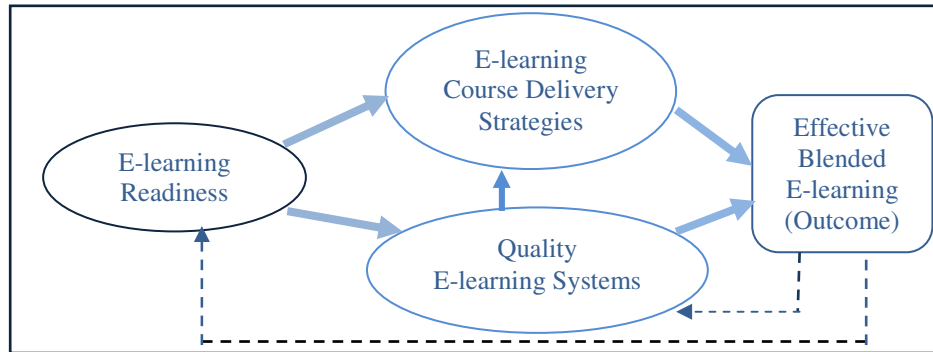
In their empirical investigation, Ozkan and Koseler (2009) sought to validate their methodological framework, focused on measurement of students' perceived satisfaction with the learning management system in higher education context relative to six dimensions of the hexagonal model . These six dimensions in the proposed hexagonal e-learning assessment model included; service quality, system quality, content quality, learner perspective, instructor attitude and supportive issues. Their results showed that there was a close relationship between students' perceived satisfaction and each of the six dimensions of the Hexagonal model. Antonis et al. (2011) proposed a learning design methodology focused on the design, development and evaluation of distance-learning services that are web-based learning design for adult computer science courses. The framework was based on three main evaluation axes, namely; (1) Information and support provided to learners at the beginning of and during their studies, (2) the learner's performance and (3) the learner's satisfaction. The results showed that the tutors' presence played a significant role in extending support towards the students' accomplishment of the web-based course because of the pedagogical approach to support students. Students judged their satisfaction with the web-based course design on the basis of: enjoyment, benefits, content, adequacy and applicability. In this case, the students were satisfied with the web-based course which greatly impacted on their performance. The students' perceived performance was high as they had great expectations to acquire knowledge and skills, although they were challenged with maintaining their motivation.

As a result, variables were identified from these frameworks to guide the process of developing the proposed framework for evaluating the effectiveness of blended e-learning. These frameworks focus on the impact of quality e-learning systems on students' perceived satisfaction and achievement which constitutes only part of criteria for assessing the effectiveness of blended e-learning. In this paper, we propose a comprehensive framework for evaluating the effectiveness of blended e-learning within Universities.

### **Framework for Evaluating the Effectiveness of Blended E-Learning**

The established theories, models, frameworks and prior research findings, have influenced the development of the proposed framework which suggests that effectiveness of blended e-learning can be determined by evaluating four

(4) main dimensions, namely E-learning Readiness, E-learning Course Delivery Strategies, Quality E-learning Systems and Effects of Blended E-learning. The interactions between these dimensions are illustrated in figure 1. E-learning Readiness in terms of costing and budgeting, policies, support, cultural awareness, and infrastructure have an influence on the quality of e-learning systems and e-learning course delivery strategies, which in turn have an impact on the effectiveness of blended e-learning.



**Figure 1: Proposed framework for evaluating the effectiveness of blended e-learning within Universities**

The aim of the proposed framework is to aid; understanding of factors influencing the effectiveness of blended e-learning and measure the level of effectiveness of blended e-learning in Universities. The relationship between the dimensions, components in the framework are shown in table 2. A total of 67 items were created, with 23 items for Course Module Design Strategies dimension, 24 items for E-learning Readiness dimension, 15 items for Quality E-learning Systems dimension, and 7 items for Effective Blended E-learning.

**Table 2: A synthesized list of dimensions, components and items for measuring for assessing e-learning readiness, e-learning course delivery strategies, quality of e-learning system and effective blended e-learning**

Dimension	Component	Item
E-learning Course Delivery Strategies	Course Module Layout	Course module outline
		Course module prior knowledge
		Course module understandable
		Course module progression levels
		Course module learning outcomes
		Course sequentially organised
	Course Module Evaluation	Course module alignment
		Course module requirements
		Course module periodic updates
		Course module resources
		Course module expectations
		Course module difficulty
		Course module teaching quality
	Student Assessment	Randomised online assessments
		Knowledge of assessment criteria
		Constructive feedback
		Grading policy
	Course Module	Student Learning needs analysis
		Course resource analysis
		Instructional strategies
Course module learning materials		

	Planning	Student enjoyment
		Learning media analysis
E-Learning Readiness	Institutional Policies	University vision to integrate e-learning
		ICT Policies on e-learning staff representatives
		Staff mentoring on e-learning use
		E-learning special funds
	E-learning Culture Awareness	Beliefs about the value of e-learning
		Attitudes towards e-learning
		Academic achievement with e-learning
		Societal norms on e-learning
	E-learning Infrastructure	Access to computing technologies
		Tools for course module development
		Up-to-date system platforms for course module delivery
		Lecture recording capture system
	E-learning Costs	Cost of development of course module material
		Cost of implementing e-learning systems
		Cost of maintaining e-learning platforms
		Cost of technical and e-learning support
	E-learning Support	E-learning induction training
		Course module development support
On-demand support		
Staff capacity development on use of e-learning		
E-learning staff webinars		
		ICT training support
Quality E-learning Systems	E-learning Management System Design	Adaptability of course module platform
		Ease of navigation
		Consistency of course module platform
		User-friendliness
		Multi-culturally appealing
		Accessibility of course module content
		Event management
		User management
		Security of user data
		Collaborative learning
	Interactive learning	
	Student Learning Management	Student tracking
		Time management
Learning tracking		
Use of e-portfolios		
Effective Blended E-Learning	Impact on E-learning Readiness, Quality of E-learning Systems and E-learning Course Module Delivery Strategies	Student retention
		Student access to learning
		Cost effectiveness
		Performance and quality of lecturers
		Academic achievement
		Improvement of research and education

## Conclusion

The main challenge for HEIs is to find a model that can be used to evaluate the effectiveness of blended e-learning within Universities. In a bid to address this challenge, a pilot study will be conducted to further investigate the drivers and effects of blended e-learning within Universities. The data obtained from the study will be used to perform a factor analysis to establish the actual factors that influence the effectiveness of blended e-learning and later used to do a structural equation modelling. This framework acts as an instrument to be used to conduct an explorative study to facilitate stakeholders like University administrators, lecturers, e-learning experts, policy makers and Government in their decision making processes. These processes involve constant monitoring and evaluation of blended e-learning strategies to ensure that we derive an effective institutional outcome.

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