



# Usability Maturity Model for VLS: Conceptual Framework

Kelvin K. OMIENO<sup>#1</sup>, Laban OENGA<sup>#2</sup>, Dr. George RABURU<sup>\*3</sup>

<sup>#</sup>*Department of Computer Science, Masinde Muliro University of Science & Technology  
Box 190 Kakamega 50100 Kenya*

<sup>1</sup>[komiemo@acm.org](mailto:komiemo@acm.org)

<sup>3</sup>[labanoenga@yahoo.com](mailto:labanoenga@yahoo.com)

<sup>\*</sup>*Jaramogi Oginga Odinga University of Science & Technology, Kenya*

<sup>2</sup>[graburu@hotmail.com](mailto:graburu@hotmail.com)

**Abstract-** E-learning software systems have been proposed by many researchers and academics as alternative platform for pedagogy other than traditional face-to-face. One of such information systems (IS) is Virtual learning Systems (VLS). VLS are becoming an increasingly common form of education due to the need for a platform that provides ability to connect people with required sets of skills, regardless of their location in the world. However, user satisfaction has always been a major factor in the success of software, regardless of whether the software is closed proprietary or open source software (OSS). Although user-centred designs are gaining recognition among virtual learning systems (VLS) community, many design scenarios still do not incorporate usability as one of their primary goals. Accordingly, many individuals believe that if VLS was more usable, its popularity would increase tremendously. Although there are strong usability models for IS, there is still potential to improve the usability of VLS. The usability assessment of VLS projects is an area where relatively little research has been conducted, and, accordingly, the main contribution of this work is a methodology that evaluates the usability maturity of a VLS project. Consequently, the study presents a usability maturity model that is aimed at usability-related issues for virtual learning system projects. The model to be developed is a response to a need for measuring the extent to which virtual learning systems software projects support usability. Specifically, it is intended for assessing and improving the usability aspect in VLS software development. The deductions from the research findings will be especially useful to e-learning practitioners, ICT and Education professionals and policy makers and researchers in Virtual Learning Environments.

**Key words:** - Virtual Learning Systems; Information and Communication Technology; e- Learning; information systems; pedagogy; VLS maturity model;

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## 1.0. INTRODUCTION

One of the problems faced by university academics in developing countries such as Kenya is to facilitate learning with a changing profile of students, in bigger and bigger classes (Perry, Harker & Volkov 2003). The environment in higher education is undergoing major changes as many academic institutions are offering courses either partially (Web enabled) or totally (Web exclusive) online to facilitate learning (Light and Cox 2001, Clifton, Jason & Gupta 2007, Omoda-Onyait & Lubega , 2011). Use of ICTs can offer a rich choice of learning experiences that are appropriate to needs, space, pace, aspirations and learning styles (Flood 2002, Kinuthia 2009, Omwenga, 2011). One of such technologies is use of virtual learning systems (VLS) as an e-learning system. But, virtual learning systems can suffer from severe usability problems such as conceptual disorientation and inability to manipulate objects (Kaur et al. 1996, Squire & Preece, 1996).

Nielsen posits that, a VLS will be accepted or not from the users, according to its practical acceptability and usefulness that include its usability and utilization (Nielsen, 2003). If a website is difficult to use, people leave. If the homepage fails to clearly state what a company offers and what users can do on the site, people leave. If users get lost on a website they leave (Nielsen, 2003). In creating a successful online community, there are two critical components: sociability and usability (Nielsen, 2003, Sirje & Wood, 2004). In creating a successful virtual learning system one of the critical components is usability of the system. Usability is defined as the extent to which a system can be exercised to achieve specific goals and complete well-defined tasks effectively, efficiently and with satisfaction (Dix, 1998).

Usability is a qualitative attribute that assesses how easy user interfaces are to use (Nielsen, 2003). It is an attribute to measure the ease of use, the ease-of-learning to use, efficient and effective use and satisfaction of a user while using the system or in other words it measures the quality of user's interaction to the learning environment. The usability of the virtual learning system is thus an important attribute because it influences the user's satisfaction, the ability to learn and to remember the content of the learning environment (Mary and Christine 2006); in minimizing number of errors during interaction with the learning environment which leads to more effective and efficient learning.

Despite VLS being very useful platforms for learning, there are no methods for evaluating the usability of VLS systems has been reported. It may be argued those conventional usability evaluation methods, such as heuristic evaluation (Nielsen, 2003) and DeLone and McLeen Information system success model (DeLone & McLeen 2003) or ISO 9126 model could be applied to Information systems. However, these models provide little support when it comes to VLS. For instance, the Information System success model (DeLone & McLeen 1992, DeLone & McLeen 2003) and the e-learning success model (Holsapple & Lee-Post 2006) posit that the success of IS and e-learning systems is dependent on the intervening variables (user satisfaction and system use), which are in turn dependent on the quality of information, system, and service. Technology acceptance model (TAM) developed in the IS area has emerged as a useful model for explaining e-learning system usage and satisfaction (Landry, Griffeth & Hartman 2006). Besides,

ISO 9126 proposed a product oriented usability approach (Beval Negal ISO 9126). However, usability should address several requirements that the user can affect, including both use preparation and results evaluation. This provides a basis to investigate the problems of virtual learning systems evaluation

### 1.1 PROBLEM STATEMENT

Virtual learning systems evaluation has been studied (Nielsen 2003, Mary and Christine 2006, Ahmed 2010, Kaur et al. 1996) but there has been little research in the context of usability (Costabile, Marsico, Lanzilotti, Plantamura and Roselli 2005). It's important to note that, the success of a virtual learning system (VLS) depends to a considerable extent on student acceptance and use of such an e-learning system. As such, there is clear need for well-designed measures for evaluating VLS. After critically assessing models of technology adoption, including the Technology Acceptance Model (TAM), TAM2, ISO 9126, the Unified Theory of Acceptance and Usage of Technology (UTAUT) and the DeLone and McLeen Model of Information Systems Success, the researcher noted little information on issues of usability of VLS. Those existing frameworks have not been validated empirically and/ or they may have been validated, but are not in this study area meaning we can't consume them directly due to unique characteristics of VLS. The study aims to build a conceptual model to explain usability of virtual learning systems in the context of universities.

### 1.3. RESEARCH PURPOSE

To develop a usability maturity model for virtual learning system

### 1.4. OBJECTIVES

- a. To investigate the characteristics of virtual learning systems
- b. To develop a virtual learning system usability maturity model
- c. To develop measures for virtual learning system
- d. To validate the proposed measurement model

### 1.5. RESEARCH QUESTIONS

- a) What are the characteristics of virtual learning systems?
- b) Which is a virtual learning system usability evaluation framework?
- c) What metrics that can be used to indicate usability of virtual learning system?
- d) To what extent are the measures and the proposed framework meeting their specification?

### 1.6. SCOPE AND DELIMITATION OF THE STUDY

The study will employ a case study of a university in Kenya that has integrated VLS. It will concentrate on aspects of usability in virtual learning systems. It will focus on the different entities of a university set up that includes students and lecturers.



### 1.7. JUSTIFICATION

Usability Maturity model for Virtual Learning Systems to be developed will likely:

- a) Provide a set of metrics for any university that aims to implement VLS as a platform for learning
- b) Provide measures that can be adapted by any university in the process of implementing VLS.
- c) Help in decision making and policy implementers on the best practices for effective creation of virtual learning systems in universities.

### 1.8. SIGNIFICANCE OF THE STUDY

The intended final outcomes of the research will: contribute to deeper understanding of integration and usability metrics for virtual learning systems in universities which still lacks. It will add to the already existing knowledge by acting as evidence for the development of guidelines for virtual collaborative teams using virtual learning systems and other collaborative technologies in higher education. In addition, the research will generate knowledge towards development of a framework that will help decision makers to formulate more effective policies and policy implementers to enable them to make informed choices about their approach to virtual learning. Also, the study will provide baseline

information for planning and for making comparisons across universities. On the other hand, the study will give recommendations on future work on virtual learning systems as well as its suitability as a platform for effective teaching and learning. Lastly, the deductions from the research findings will be especially useful to e-learning practitioners, ICT and Education professionals and policy makers and researchers in computer-mediated learning systems

### 2.0. CONCEPTUAL FRAMEWORK

The most important goal of VLS systems is to deliver instructions that can produce equal or better outcomes than face-to-face learning systems. To achieve the goal, an increasing number of empirical studies have been conducted over the past decades to address the issue of what antecedent variables affect students' satisfaction and learning outcomes and to examine potential predictors of VLS outcomes (Ahmed 2010, Saba, Rehman & Sulong 2009). Important aspects such as pedagogy of choice, student empowerment, student self-regulation, and collaborative student learning strategies have been key elements in VLS. The research model developed is adapted from ISO 9126 Software quality model and is a blend of a management information systems (MIS) success model (DeLon and McLeen 1992) depicted in figure 1

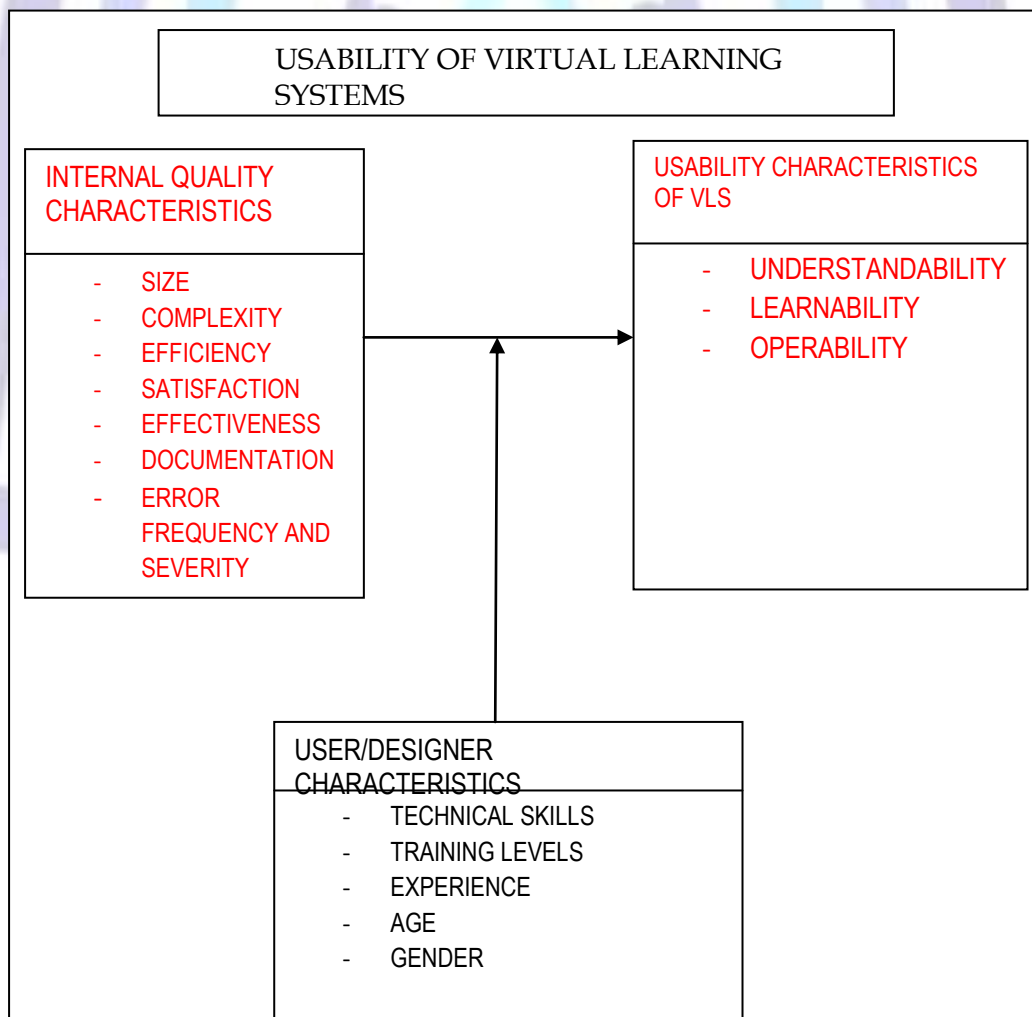


Figure 1: Conceptual Framework (Adapted from ISO 9126 Quality Model)



### 3.0. CONCLUSION

The interactive use of VLS aims at support of student active and exploratory learning. For example, the interactive use of computer models and simulations by students can enhance learning through hands-on problem solving and what-if analysis. Interactive use of VLS in the classroom in form of networked computers in conjunction with specialized software tools referred to as groupware can greatly enhance communication and discussion. For example, use of these systems allows students and faculty to brainstorm and share ideas, comment on and criticize these ideas, and collaborate in solving problems and performing various learning tasks. Success of the delivery stage is evaluated along two success factor dimensions: use and user satisfaction of the outcome stage is evaluated along the net benefits dimension. As such, for proper implementation of VLS, there is need for well-established set of metrics that can help in decision-making. The study thus aims to present a Usability Maturity Model (UMM) that aims to solve the above stated objectives.

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