

# Cloud Computing in the Design of Learning Management Systems: A Way to Provide Equity in Access to Centralised Learning Resources

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**Abstract:** *Secondary schools are mainly located in rural areas hence are isolated geographically and socially. Thus they face a number of problems in ensuring quality curriculum delivery. Problems like lack of teachers, inadequate teaching and learning resources as well as poor quality teaching among others is a common phenomenon in developing countries. They are therefore disadvantaged as far as learning resources are concerned compared to urban areas. The governments in such countries are working very hard to raise the quality of education and also to expand access yet the scarce resources are limiting this good move. Hence the need to look for an equalizer as far as provision of resources and quality curriculum delivery is concerned. This survey focuses on the design and development of improved Learning Management System (i-LMS) software to enhance learning through sharing of resources by all schools so as to ensure a uniform access to learning resources using the concept of cloud computing.*

**Keywords:** Rural, isolated, quality, inadequate, Learning Management System, i- LMS, enhance, learning resources, cloud computing.

## 1. Introduction

Technology acceptance and usage being an active area of research, has seen several models and theories proposed so as to understand the driving force behind technology adoption [1]. Challenges that may make successful ICTs integration in curriculum delivery fail are many. These may include lack of ICTs equipment, lack support infrastructure like electricity, lacking maintenance mechanisms as well as the teacher who may not deliver as expected among others.

Some rural secondary schools have acquired personal computers (PCs) through self-effort or government supplies however the said equipment has created a gap in curriculum delivery amongst schools between the schools with and without such equipment. This has therefore hindered the move towards successful ICTs use in the classrooms.

Thus, this paper proposes the development of an improved interactive-learning management system (i-LMS) for secondary schools so as to make use of the few available ICT resources to improve teaching and learning functions. This will ensure that secondary schools are able to access the same resources for teaching and learning as well create and share content for learning purposes, further ensuring equitable way of curriculum delivery. The i-LMS to be developed will further make it possible to access such content from anywhere using devices like laptops, tablets and phones thus making learning in different environments possible and satisfying.

## 2. Related Literature

### 2.1 Content Management Systems and Sharing

[8] defines a Content Management System (CMS) as a system used to manage the content of a Website. She further explains; a CMS consists of two elements: the content

management application (CMA) and the content delivery application (CDA). The CMA element allows the content manager or author, who may not know Hypertext Markup Language (HTML), to manage the creation, modification, and removal of content from a Web site without needing the expertise of a Webmaster. The CDA element uses and compiles that information to update the Web site. The features of a CMS system vary, but most include Web-based publishing, format management, revision control, and indexing, search, and retrieval. A CMS thus allows publishing, editing and modifying content as well as maintenance from a central interface. One major deficiency of CMSs is that they do not accommodate a module for users to send own data.

### 2.2 Learning Management Systems

A learning management system (LMS) is a server-based or cloud based software program. It contains information about users, courses and content. An LMS provides a place to learn and teach without depending on the time and space boundaries. Learning management systems are also known as Course Management Systems (CMS), Personal learning Environment (PLE), e-learning courseware and Virtual learning Environments (VLE) [9].

### 2.3 User Data Capture in Today's LMSs

Feedback is an essential component in all learning and serves a variety of purposes including evaluation of students' achievements, development of students' competences and understanding, and elevation of student's motivation and confidence according to [5]. However in most cases feedback is directed to the student and none seems to come from the student to the other side. [10] assert that an LMS could be perceived as a student's desktop and thus, it could be more effective if the feedback was delivered on the desktop of the student. However, open source LMSs like Moodle do not

seem to include an efficient, built in functionality for providing user feedback on software usability or created content. One category of LMS tools that can support the provision of formative feedback to students is online assessment in form of quizzes consisting of multiple-choice, true / false and the fill-in-the-blank type of questions [10]. However there is no module to capture data and analyze user actions. This can as well be used to design a module for capturing data from the students.

#### 2.4 User Data in the Improvement of LMS Delivery

[2] in their book introduces a customer-centered approach to business by showing how data gathered from people while they work can drive the definition of a product or process while supporting the needs of teams and their organizations. This makes it possible to improve delivery of the various aspects of the LMS. Quality assurance in curriculum delivery relates to a continuous process of assessing, monitoring, guaranteeing, maintaining and improving the quality of delivery. It is important to the success of an institution in terms of its mission, goals and objectives. Quality in education is the degree to which education can be said to be of high standard, satisfies basic learning needs, and enriches the lives of learners and their overall experience of living [11]. However developing standards in education and maintaining the desired quality remains a major challenge across education systems throughout the world.

The [3] argues that the confidence of students and other stakeholders in higher education is more likely to be established and maintained through effective quality assurance activities which ensure that programmes are well-designed, regularly monitored and periodically reviewed, thereby securing their continuing relevance and currency.

According to [1] further research in this area should specifically be focused on students in an educational environment where an educational technology is introduced to them. It is particularly important therefore to note the fact that previous studies have not shown a focus in learner use of LMSs to give content that can be used to improve the LMS in use as well as provide a pool of data to be used by other users.

This calls for research focusing on the learners' use of the LMSs to create and upload for purposes of improving delivery through ICTs use in the classroom.

### 3. Cloud Computing in Improving Collection and Sharing

Cloud computing, a new technology is now being embraced to provide timely data. [7] states a cloud is a type of parallel and distributed system consisting of a collection of inter-connected and virtualized computers that are dynamically provisioned and presented as one or more unified computing resource(s) based on service-level agreements established through negotiation between the service provider and consumers. [7] further clarifies cloud as a model for enabling convenient, on-demand network access to a shared pool of

configurable computing resources (e.g. networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. Specifically he describes cloud computing as the improvement of Distributed Computing, Parallel Computing, Grid Computing and Distributed Databases. On cloud, [4] highlighted the services distribution for the consumers by service providers in different geographical locations.

### 4. The Model Application

**Administrator Module** – This will be used to ensure the proper working of all the functionalities of the system. From this module, the Administrator will be able to monitor all functionalities, do troubleshooting and access an error failure/error log forwarded by a reporting tool to the Administrator's desk.

**User Modules** - The system will have modules for the students, teachers, and any other stake holder. Different user categories will be able to access and use stored data as well as create and upload data into the central repository for sharing by all. As well, administrators will provide updates for users to access at convenient times.

**3G Gateway** –It will majorly rely on a **3G** network to be able to support the required data uploading and downloading. The necessary protocols will be put in place.

**The i – LMS Server-** The server will be the central server controlling all components and communication thus the **i – LMS** server will form a backbone to the central database submitting and retrieving and making necessary manipulation to take place.

**Mobile Service Provider** - In the case of the **i – LMS** local mobile service providers will be used e.g. Vodaphone, Airtel, etc. Choice will depend on the one providing the required signal strength.

**Internet** – This will be used for safe data storage over the network (cloud computing) to ensure security in all data for the system and as a channel of information transmission to and from various points of action using the system.

**Phone / Tablet / Laptop** -Users will be able to use their mobile phones / tablets / laptops to access the website, download required data or updates and to upload created data. They can as well request for any support / assistance required concerning ICT integration and related issues. They will also be able to receive continued reminders on required data on ICT integration. Since the **i – LMS** is a two way application developed for data access; it will have a much broader appeal since it will create a communication network to all relevant parties involved in ICT integration planning and implementation practice. This will in return provide the required data and information for timely use towards successful ICT integration in the classrooms.

## 5. Conclusion

Firstly, the model will allow for all schools and students to access stored data at their own convenience which would otherwise not have been the case if such data was stored at different servers based in the few schools with ICT infrastructure. This is further improved by the fact that stored data can be accessed from anywhere and with different devices like desktops, laptops, tablets and phones alike. Thus the portability aspect of the learning resources enhances learning from within and without school settings.

Secondly, it has a low cost of implementation for infrastructure as well as an unlimited storage capacity which shall be needed here due to the large amounts of digital content involved. Again some organizations like Google, IBM, and Microsoft offer the cloud cost free for the education purposes, so it can be used in right way which will provide high quality education [6]. There is need thus to develop a tool to help in collecting and storing created data for reuse during learning in the classrooms.

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## Author Profile



**Anthony Mutua Nzioki** started teaching in 1986 after acquiring a Certificate in Teacher Education. Over the years he has grown his career and is now teaching Computer Studies in secondary school employed by the Teachers Service Commission, Kenya. He has a Diploma in Information Technology (Jomo Kenyatta University of Agriculture and Technology, Kenya), Bachelor of Education majoring in Mathematics, Computer and Information Technology (Kampala University, Uganda) and is now finalizing his thesis for a Masters in Computer Systems at Jomo Kenyatta University of Agriculture and Technology, Kenya. Aside of that he is one of the few key national trainers in ICT integration in teaching and learning in Kenya. He is currently among a cohort of fifty people undergoing the UNESCO ICT CFT online professional development course after successfully being identified by the employer as a competent teacher with a passion for ICT integration. The pioneer group will roll down the skills to other teachers in the field. On behalf of the Ministry of Education, Kenya, he doubles up as a quality assurance officer (dubbed ICT Champion) in ascertaining the correct quality of ICT equipment is delivered to schools by contracted supplies in the on-going equipping of schools by the government.