E-Learning Management Systems General Framework

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Abstract—The recent development in learning technologies leads to emerge many learning management systems (LMS). In this study, we concentrate on the specifications and characteristics of LMSs. Furthermore, this paper emphasizes on the feature of e-learning management systems. The features take on the account main indicators to assist and evaluate the quality of e-learning systems. The proposed indicators based of ten dimensions.

Keywords—E-Learning, System Requirement, Social Requirement, Learning Management System.

I. INTRODUCTION

THE e-learning management system is considered as a useful tool to manage electric educational resources since the web-based technology has caused a rapid change in computer software and hardware [1]. Many e-learning systems had build to assess an educational process which is complex and time consuming tasks; in addition it is contain many functions, which may present overhead in management in classical courses presentations [3], [4]. Consequently, it may be difficult to develop an e-learning management system framework with complete functions and sometimes the framework may introduce unexpected interactions between diverse parts of the software systems. It is well-known that classical educational process causes time delays and requires additional personal extending the time and effort required from the instructor [2]. For example, software engineering course with 40 students required on average 2-3 hours per week for follows and marking student project using an e-learning management system; however the time may be double or trouble without using automated management system.

Development of management systems is a complex task. It is not easy to visualize the complete information system with complete functionality. Learning Management Systems are composed of several viewpoints. The student, instructor, course, department and application domain influences these views. Most system stakeholders are non technical persons. It is possible to create business frameworks that will be used to develop a learning management system [5]-[7].

Cysyk and Choudhury [3] provided a high-level up-to-date survey and evaluation of open source electronic publishing systems most suitable for supporting publishing in a predominantly scholarly, scientific, or academic culture. Based on an initial review of several open-source e-publishing

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systems, the authors developed a list of existing desired functionalities. This list was distributed and given a feedback to support electronic publishing. The study also explored and enumerated the APIs provided by each system, all in the context of e-publishing systems. The evaluation consisted of local installation, reading supporting documentation, and functionality features. The authors considered several broad areas: institutional affiliation and other indicators of the viability of the open-source project, technical requirements, maintenance, scalability, and documented APIs; and administrative functions; and access, format, and electronic commerce functions.

Some other studies made some effort to solve specific issues related to the e-management systems, i.e., [8]-[12]. Different overviews of the archiving solutions were provided along with the pros and cons of each. The study may considered to be a useful reference for all institutions that are planning to invest in well thought through and sustainable archiving solutions, in order to ensure that their current electronic collections and access to them will not be ephemeral but long lasting.

II. PROPOSED FRAMEWORK

The objective of this research is to develop a theoretical, comprehensive, and measurable framework for assessing the quality of eLMS in order to provide straight forward criteria to encourage improvements of web-based content management systems design and implementation. A multi-phase approach was adopted that included a wide range of literature review, review of attractive features in existing eLMS, identification of quality factors from research and industry literature, and using our own experience in the field. Our process overlaid industry and academic research to identify quality factors in order to meet the objectives of this research.

The proposed framework attempts to integrate knowledge and experience from disparate sources, a range of reference disciplines and empirical practices. The objective is to identify measurable quality features and indicators that currently comprise a successful eLMS. A set of features is developed that comprise a current representation of a perfect eLMS. The proposed framework can be used to compare between the quality of existing systems, to identify a path for improvement of a system, and to provide a guideline for designers and developers when creating new systems.

After we reviewed existing features available in current eLMS, we added the good indicators to the suitable place of the proposed four dimension criteria, besides adding some

indicators which we identified through our own experience. Our criteria include all main indicators of the previous studies of evaluating the quality of eLMS. The dimensions of the proposed criteria are content management, administration services, user interface, and help and support. Fig. 1 summarizes the hierarchy of the proposed framework.
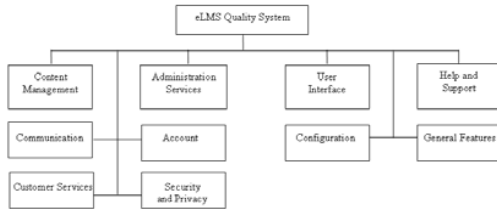

Fig. 1 Hierarchy of the proposed framework

A. Content Management

Content management is the main feature of any content management systems. In websites, content is called the king dimension of any website, since it is the major source of value to users. Content quality has been addressed by a variety of researchers in different ways. Some researchers studied the content quality without taking it into consideration as a main dimension, while others considered it as one of the basic dimensions of their evaluating models.

B. Administration Services

Administration services process in e-learning system has a big unseen chunk which is concerned about controlling and tracking the educational process [8]. The main objective of this diminution is to facilities and management power given to the system administrator. The administrative services quality features are classified into seven indicators along with their check elements: course, logs, compatibility, flexible authorization, multi-course support, and DB tools. Table II summarizes the main indicators and check elements of the administrative services dimension.

TABLE I
INDICATORS AND CHECK ELEMENTS OF THE CONTENT MANAGEMENT DIMENSION

Indicators	Checklist
Automatic features	Automated event-notification Automatic publishing Automatic alerts Automatic course/student/semester/subject generator table of contents generation automatic queue arrangements automatic id generator time-based actions automatic update activates status Automatic submission
Grades	General settings Grade category settings Scales Outcomes Letters Feedback
Actions and statistics	Charts Usage statistics
Dynamic features	Create group Space Allocated Queue rearrangement Dynamic report creation Course content status change
Categorization	Course Lecturer Department Faculty Study plan Student enrollment Grade-based scale students performance A-Z categorization
Online interaction	Online grading (marking) User registration online submission Student feedback Online messaging
Batch processing actions	Reminders Announcement
Monitoring	All levels of users student performance Student Project Groups
Supplements	Short bio Image Video Movies
Tracking	All levels of users
	student performance
	course status

TABLE II
INDICATORS AND CHECK ELEMENTS OF THE ADMINISTRATION SERVICES DIMENSION

Indicators	Checklist
Courses	Add/delete/edit courses
	Enrolments
	Course request
	Backup
DB Tools	Backup
	Cleaning old versions
	Import
	Export
Logs	Logs with justifications.
Compatibility	Browsing compatibility
	Integration with other LMSs
	Data standardization (XML)
	Platform independent
Flexible authorization	Multi-level users (student, instructor, invigilator, clerk, coordinator, administrator)
	Multi-level authorizations to users
Multi-course support	Supporting more than one course
Filters	Provide filters feature
Language	Language settings
	Language editing
	Multi-language support
	Language packs
Location	Location settings
	Update time zones
Reports	Grader report
	Overview report
	User report
	Unit tests
	Questions
	Statistics

C. User Interface

This dimension concerns with many issues that help any user regardless of his/her education or experience to deal with the JMS within a reasonable time, the capability of the system to maintain specific level of performance when used, and interactivity or connectivity which emphasize the existence of interaction between users and the system using different tools. Most content management systems usually include this dimension or at least one or more of its indicators in their criteria model because of its importance [6]. The user interface quality features are classified into six indicators along with their check elements: web-based GUI, color-based status classification, multi-language interface, customization, secured sign-in, and compatibility. Table III summarizes the main indicators and check elements of the user interface dimension.

TABLE III
INDICATORS AND CHECK ELEMENTS OF THE USER INTERFACE DIMENSION

Indicators	Checklist
Web-based GUI	Web-based GUI
Color-based status classification	Color-based status classification
Multi-language interface	Provides more than one language of interface
Customization	User customization
Secured sign-in	Provides user accounts and passwords
Compatibility	Browsing compatibility
	Integration with other JMSs
	Data standardization (XML)
	Platform independent
	Available to search engines
Appearance	
Themes	Provide multiple theme

D. Help and Support

This dimension provide the documents, tutorials, demo and any other methods to support and help managing the system to skip any problem or/and to assist all kind of users with suitable guidelines in order to accomplish their jobs. The help and support quality features are classified into four indicators along with their check elements: demo, guidelines and instructions, documentation, and searching. Table IV summarizes the main indicators and check elements of the help and support.

TABLE IV
INDICATORS AND CHECK ELEMENTS OF THE HELP AND SUPPORT DIMENSION

Indicators	Checklist
Demo	Supporting demo
Guidelines and instructions	Author submission guidelines
	Reviewer instructions
Documentation	Online help support
	Supporting documentation
Searching	Searching different level
	Meta search
Guidelines and instruction	Student/lecturer guidelines
	Student/lecturer instructions

E. Communication

This dimension concerns on the ability to provide various type of the communication between users in the system. The communication quality features are classified into two indicators along with their check elements: synchronous and asynchronous. Table V summarizes the main indicators and check elements of the communication.

TABLE V
INDICATORS AND CHECK ELEMENTS OF THE COMMUNICATION

Indicators	Checklist
asynchronous	Forum,
	bulletin board or message board
	E-mail
synchronous	Discussion Room,
	Virtual Classroom (real-time chat room)

F. Accounts

The user is the main objectives in the e-learning system. In account dimension the quality feature is classified into one indicator along with their check element. Table V summarizes the main indicators and check elements of the Account.

TABLE VI
INDICATORS AND CHECK ELEMENTS OF THE ACCOUNTS DIMENSION

Indicators	Checklist
users	Browse list of users blocking user actions Add a new user Upload users Upload user pictures User profile fields Tags

G. Configuration

System configuration is an important issue in every system. In eLMS the quality of this dimension is classified into four indicators along with their check elements. Table summarized the main indicators and check elements of the configuration dimension.

TABLE VI
INDICATORS AND CHECK ELEMENTS OF THE CONFIGURATION DIMENSION

Indicators	Checklist
Setting	Files Front page Courses Lectures Departments
Network	Peers Access Control Hosts
Server	System Paths Email Session Handling RSS Debugging Maintenance Cleanup Environment Performance
Installation & configuration	Easy installation
	Easy configuration

H. Security and Privacy

Security & Privacy dimension address pressing and pervasive strategic information and technology risks, such as Permissions, Authentication, Policies, Notifications, Secured sign-in with the goal of enabling ongoing, secure, and reliable operations across the system. The quality feature of Security and Privacy is classified into five indicators along with their check element. Table IV summarizes the main indicators and check elements of the Security and Privacy.

TABLE VIII
INDICATORS AND CHECK ELEMENTS OF THE SECURITY AND PRIVACY DIMENSION

Indicators	Checklist
Permissions	Define roles Assign system roles User policies
Authentication	
Policies	
Notifications	
Secured sign-in	

I. General Feature

In General feature we arise some important indicator in eLMS. The quality feature of this dimension is classified into ten indicators. Table IV summarizes the main indicators and check elements of the general feature.

TABLE VIII
INDICATORS AND CHECK ELEMENTS OF THE GENERAL FEATURE DIMENSION

Indicators	Checklist
Upload Content Assessment	Supporting upload content
Surveys	Supporting survey
Group Features	Supporting group
Calendar	Provide calendar
Scalability	Support Scalability
History	Support history
Selective overriding	Support Selective overriding
Integration with other software	Help in integrated with other system
Monitoring	Support monitoring
contact	Provide contact

III. CONCLUSIONS AND FUTURE WORK

The use of advancement in information and communication technologies created a new environment in e-technology especially in educational aspect. Content management systems are becoming essential tools of our higher education institutes to enhance the quality of their academic processes. The e-learning systems has shown a rapid growth which led to a new educational process and systems. Several e-learning system has been developed for helping the educational process. This make it important to have criteria to evaluate and measure the aspects related to the quality of e-learning applications. E-learning systems used by academic institutes and universities are essential in assessing the quality of universities in scientific education, which makes it a must to deploy web-based content management systems in their processes to enhance their quality.

This paper reviewed the most recent evaluation methods, which were used in evaluating the quality of current existing web-based eLMS, and proposes a comprehensive framework for assessing the quality of such systems. The dimensions of the framework along with their indicators and checklist, after being given certain weights, could be easily converted into a questionnaire. Results from the analysis of the questionnaire will help in evaluating and enhancing the quality of existing eLMS.

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