The need, use and best practices for the implementation of Learning Management Systems in organizations and Higher Education institutions

Johnson Dehinbo
Dehinbooj@tut.ac.za
Department of Web & Multimedia Applications

Solomon Odunaike
OdunaikeSA@tut.ac.za
Department of Systems Development,

Tshwane University of Technology,
Pretoria, 0001, South Africa

Abstract

The shortage of skills in the academic sector is a reality. This has led to the excessive work overload for the few academic staff available, leaving them less time to pursue further training and develop their carrier. Furthermore, the excessive work overload means academic staff have less time to learn and use educational technologies that could assist teaching, learning and knowledge sharing, and to seek best practices for the implementation of such educational technologies. Efforts towards alleviating skills shortage and encouraging knowledge sharing as well as the need for e-learning and Learning Management systems can not be over-emphasized. This realization prompts the need for this study and subsequent detailed report for higher education institutions to adopt and use Learning Management Systems while implementing best practices for such systems. The benefits of Learning Management Systems are highlighted, the various Learning Management Systems available and the comparison between the different available systems as well as best practices for implementing and using a learning management system are presented. The possible under-utilization and limitations of Learning Management Systems are also discussed. A discussion of on-line learning materials is given, highlighting what on-line materials are available and emphasizing the impact of the Open-content initiative. Also presented are general best practices in choosing existing on-line learning materials and developing learning contents. This report will enable the organization to limit cost of training, maximize time for training and to improve staff development through knowledge sharing and collaboration through the use of Learning Management systems.

Keywords: Learning Management Systems, LMS, Best practices, organizations

1. INTRODUCTION

The academic activities such as teaching, learning, research and knowledge sharing in higher education institutions (especially in developing countries) are in crisis due to the reality of the shortage of skills in the academic sector. This has led to the excessive work overload for the few academic staff available, leaving them less time to pursue further training and develop their carrier.

Furthermore, the excessive work overload means academic staff have less time to learn and use educational technologies that could assist teaching, learning and knowledge sharing, and to seek best practices for the implementation of such educational technologies to avoid their possible under-utilization and limitations.

Also, the management of many academic institutions in South Africa for example have indicated the need for many academicians to further their studies, improve their qualifications and produce more research outputs, else some academicians would be at the risk of loosing promotion opportunities and sometimes retrenchment. The resulting effect of the above situation in the midst of work overload is that many of the few academicians left especially in the Information Technology field are resigning voluntarily and pursuing career in the industry where it is assumed that experience rather than further qualifications are needed for promotion opportunities.

However, most organizations to which such former Information Technology academicians have gone to are software development and web site development companies with many employees and great success. In order to maintain and improve on their success, the management of such organization usually decides that their employees must improve their skills in light of the current ICT skills shortage. But again, possibly because the required hard work leading to such huge success for the organizations, and the current ICT skills shortage that reduce the availability of trained potential personnel, the employees are usually so busy that they find it difficult to attend week long training courses. The management therefore also realizes the need to implement Learning Management Systems that will ensure that employees get access to the appropriate courses for their job on-line and that they successfully complete the courses within a specific time frame. Courses could vary from language courses for editors, computer literacy for administrative personnel, web publishing courses for web developers, network server courses, etc.

Therefore, efforts towards alleviating skills shortage, encouraging knowledge sharing, advocating the need for e-learning and Learning Management Systems and estab-lishing best practices for their implementation can not be over-emphasized. This realization prompts the need for this study and subsequent detailed report for organizations and higher education institutions to adopt and use Learning Management Systems while implementing best practices for such systems.

The research question
The research question then is: How can we stimulate the adoption and use of educational technologies such as e-learning and Learning Management Systems that could assist teaching, learning, research and knowledge sharing? An important sub-question is: How can we seek to establish best practices for the implementation of such educational technologies to avoid their possible under-utilization and limitations?

The objectives of the study

Towards answering the research questions, the objectives of the study are:

1.) Review the literature about Learning management systems highlighting their availability, benefits, utilization and underu-tilization, as well as their limitations.

2.) Compare some of the various Learning Management Systems available.

3.) Establish best practices for implementt-ing and using Learning Management Systems.

The importance of the study

The study is aimed at contributing to the body of knowledge that could be of relevance and importance to the management of organizations and institutions of higher education on the implementation and effective use of the Learning Management Systems.

Outline of the rest of the paper

With the background in section 1, Section 2 presents details of Learning Management Systems highlighting the benefits of Learning Management Systems, and the possible underutilization and limitations of Learning Management Systems. Section 3 compares some of the different available LMSs. Section 4 present best practices for implementing and using a Learning Management System. Section 5 discuses on-line learning materials highlighting what on-line material is available for the company's need or if they would

have to develop their own materials. Section 6 gives general best practices in choosing existing on-line learning material and developing own learning contents. Given the need to limit cost and to improve staff development (especially taking the fact that most organizations and institutions of higher education contain programmers and Web application developers into consideration), section 6 further considers the impact of open content and proposes the need for the organization to look into the adoption of open content and in-house development of the learning management system. Section 7 concludes the study.

2. LEARNING MANAGEMENT SYSTEMS

Learning Management Systems (LMS) is defined by Coronado & Zampunieris (2008) as "dedicated software tools intended to offer a virtual educational and/or training environment online". A similar terminology, Course Management Systems (CMS) is defined by Vovides et al (2007) as "a software program or integrated platform that contains a series of web-based tools to support a number of activities and course management procedures". Examples include Blackboard, WebCT, eCollege, Moodle, Desire2Learn, Angel etc.

The adoption of Learning Management Systems (LMS) for web-based learning and instruction continues to increase both in organizations and in higher education. The phenomenal growth in the use of the Internet and the World Wide Web has contributed to this increased adoption of LMSs. Even before the widespread use of the Internet and World Wide Web, Romanov and Nevgi (2006) highlight the increased use of Computer Assisted Instruction (CAI) to deliver educational materials making Web-based instruction a natural evolution of CAI.

The networked technology (Intranet, Internet) now extends the benefits of CAI with flexibility in terms of time (synchronization and a-synchronization), space and pace. Romanov and Nevgi (2006) give types of electronic learning (e-learning) resulting from the current technologies. One particular type of resulting web-based learning environment is the distributed passive learning (DPL) in which the Web was mainly used to deliver the learning material used in traditional teaching and learning environments in

the form of Word processing files, text files, PDF files or power point presentation files. The other type of web-based learning environment is the distributed interactive learning (DIL) in which learning materials were organized in hypertext-designed forms that could afford the opportunity to the learners to explore the learning materials freely at their own time and pace and to be able to interact with the instructor and other learners (Romanov & Nevgi, 2006)".

A definition of a Web-based learning is given by Ngai et al (2007) according to the definition of the IEEE Learning Technology Standards Committee as: "A learning technology system that uses Web-browsers as the primary means of interaction with learners, and the Internet or an intranet as the primary means of communication among its subsystems and with other systems".

The communication backbone of the Internet or an intranet coupled with the electronic format of the educational materials enabled certain benefits

The benefits of the Learning Management Systems

Various studies have discussed the numerous benefits of e-learning and learning management systems. Bouhnik and Marcus in Liaw (2008) give four advantages of e-learning. These are the freedom to decide when components of the online lesson will be learnt; the lack of dependence on the pace or the time constraints of the instructor; the freedom of the learners to express thoughts or to ask questions without being mindful of what other learners might think; and the accessibility of the course's online materials at any time the learner might choose. Capper (2001) in Liaw (20008) lists the benefits of e-learning as being devoid of time and space constraints with the added advantage of interactions and group collaboration leading to new educational approaches.

The utilization and underutilization of Learning Management Systems

The utilization of learning management systems in education is evolving. Vovides et al (2007) notes that learning management systems are being used in three different situations. Some use LMS to supplement the traditional classroom curriculum by using the

LMS as an electronic repository of course materials in which hardcopy of course materials are "teleported" onto the LMS to make it electronically accessible. A second alternative is a "blended" approach in which the courses (called hybrid courses) are a mixture of traditional teaching environment with some elements of e-learning thereby supplementing the "instructor-centeredness" of traditional teaching environment with a more "learner-centered" approach of e-learning.

However, Vovides et al (2007) notes that the utilization of e-learning in most situations is not focused or based on the interactivity of the learning management systems but on the content creation and management features. In such situations, most instructors claim, think or hope their use of the LMS will meet pedagogical needs, but it usually seems the actual use of the system was mainly meeting class management needs instead. In some cases, Vovides et al (2007) note that the integrated features and functionalities, such as the capabilities to present the learning material content in multimedia ways are often underutilized. Also, Abitt (2005) in Vovides et al (2007) observes that the use of LMS is problematic when systems features such as compatibility, reuse, intelligent analysis, high availability and security do not function properly. Furthermore, Nelson (2003) in Vovides et al (2007) notes that web-based communication tools embedded in LMS such as discussion forums, chat and email are often underutilized by instructors and learners.

The limitations of Learning Management Systems

Despite the benefits of the learning management systems, limitations abound. These according to Liu (2004) in Vovides et al (2007) include browser compatibility issues as well as template-driven structures. Also, Brusilovsky (2004) in Vovides et al (2007) observes that most LMSs are used usually as a 'one-size-fits-all' service irrespective of the knowledge level, goals and interests of learners. In such situation, all learners receive same exercises irrespective of their varying pre-existing knowledge and experience.

The various Learning Management Systems available

In addition to the various learning management systems in the market, various organizations contract technology and courseware providers to specially design the infrastructure for customizing their own online learning systems. Standard learning management systems in the market today include Web Course Tools (WebCT), Web Course Home-Page (WebCH) system, Blackboard Learning system (BLS) and the System for Multimedia Integrated Learning (SMILE) (Ngai et al, (2007). Others include eCollege, eClassroom, Moodle, Desire2Learn, Angel, etc. (Vovides et al, 2007). Obviously, there is a host of other LMSs that space would not allow us to mention here. It is however important to note that while majority of them are commercial products, few open source LMSs are emerging in the market today. A good example is Moodle which is available freely and open to enhancement.

3. THE COMPARISON OF THE VARIOUS LEARNING MANAGEMENT SYSTEMS AVAILABLE

The underutilization and the limitations of some LMSs suggest the need for adequate comparisons of the various LMSs available. This section presents such comparisons of major LMSs as an exhaustive comparison would be outside the scope of this study and due to space constraints. A starting point for such comparison is given in table 1 below (adapted from IQity, 2008).

Blackboard is combined with WebCT due to their acquisition/merger. A key feature of Blackboard is that towards allowing the instructors to customize and personalize the learning experience to a certain degree, Vovides et al (2007) note that the Blackboard Learning System includes an 'adaptive release' function. This allows the instructor to cause content delivery to the learner upon mastery of pre-requite tasks. While all the Learning Management Systems compared support the powerful whiteboard function that enables sharing of sketched material, Clack (2002) notes that contrary to other whiteboard systems, Blackboard "treats each entity on the whiteboard as a separate object" thus allowing modification or manipulation of each object including external uploaded pictures.

While all the Learning Management Systems compared perform student tracking, ANGEL

and Blackboard have extended the implementation of this feature in the form of an early proactive triggering (Coronado & Zampunieris, 2008). It is of particular importance to note that ANGEL accomplishes tracking with elegance.

According to Angel learning (2008), ANGEL is the first LMS to deliver powerful pattern recognition of online student activity – and to allow faculty to easily automate appropriate actions. ANGEL's Agent Technology: Monitors students on your behalf; Executes predefined actions on a scheduled or event-driven basis; Automates personalized communication at-scale based on performance or activity; Dynamically releases appropriate content based on student actions; Allows faculty to develop customized learning paths. ANGEL's Agent Technology automation is summarized by Angel learning (2008) in figure 1 above.

4. BEST PRACTICES FOR IMPLEMENTING AND USING LEARNING MANAGEMENT SYSTEMS

The underutilization of LMSs results in terrible waste of resources and may result in the use of the tools in a manner entirely contrary to pedagogical principles (governing good teaching practice) which could in turn hamper learning (Govindasamy, 2002). Therefore, the following best practices for implementing and using a learning management system are proposed:

- Develop an e-learning of LMS strategy that will address: the common vision and the linkage of the LMS to the organization's business need; organization-wide support policies; content creation to make learning compelling, engaging and relevant; support for varying individual learner profiles that suits job-based competencies, learner's interests and evolving career goals; and technical architecture linking existing systems assessable efficiently (Ismail, 2002).
- Evaluate LMS usage using reliable model such as the one given in Janossy and Hover (2008).
- A Learning design system (LDS) should be used to "produce a storyboard and flowchart of the complete structure of the final product (Ismail, 2002)".

- Learner analysis should first be conducted to identify learners' characteristics such as minimum required academic qualifications, experience as well as personal and social characteristics (Govindasamy, 2002).
- "Configure, customize, display and share course reports via a single, easy-to-learn console (Angel learning, 2008)".
- Monitor performance and patterns of activity in real-time and easily pinpoint at-risk behavior and intervene proactively (Angel learning, 2008).
- "Securely share learner performance reports with mentors and other stakeholders (Angel learning, 2008)".
- "Create online tests including questions, answers, explanations, optional video and setting grading, logging and timing policies (FlexTraining, 2008)".
- "Build and save custom progress and analysis reports (FlexTraining, 2008)".
- "Pre-register your online learners, and optionally, establish a curriculum for each, based on the skills which need to be acquired and tracked (FlexTraining, 2008)".
- Manage the development project for the LMS to "insure your courses and learning environment are ready when needed (FlexTraining, 2008)".
- Provide interactivity and multimedia to make learning more effective and interesting. Support multimedia files like Flash, streaming video and audio narrations. These can be valuable and entertaining when demonstrating a procedure or concept. To hold learner interest, and save bandwidth, multimedia should be brief and targeted (FlexTraining, 2008).
- Retain logged records and monitor learners' progress to allow one to measure returns on training investment (FlexTraining, 2008).
- Seek properly-maintained LMS that will cost very little to operate, after the initial licensing fees (FlexTraining, 2008).
- Ensure the LMS can "leverage the expertise of a few individuals and distribute it efficiently to a large number of employees, customers, or

business partners (FlexTraining, 2008)".

- Ensure a "web native LMS, using open standards like HTML, SQL, and HTTP (FlexTraining, 2008)".
- Give priority to LMS that comes with open source code, in case you need to make modifications at some point (FlexTraining, 2008).
- Seek Learning Management System that have everything needed in one package, and avoid the need to buy third party authoring or reporting tools (FlexTraining, 2008).
- Ensure LMS easily supports Skill Groups or certifications, so that you can track learners' progress toward a defined goal (FlexTraining, 2008)".
- Evaluate LMSs in terms of availability, usability, scalability, interoperability, stability and security (Hall, 2003)
- Ensure LMS "can pull together content from various sources and formats to create a seamless, consistent learning environment (FlexTraining, 2008)".
- Use technology that could best communicate the purpose of your content. Select a particular LMS technology or design format that is the best way to accomplish your goal. Given that subject matter should normally dictate the choice of design and media, when teaching software procedures, a screen capture or recording of mouse movements might effectively communicate the concept. Use static images where necessary but incorporate "hot points" that could open multimedia objects in a pop up window (FlexTraining, 2008).
- Use LMS that would really help to reduce and control training costs (FlexTraining, 2008).
- First look within the organization for the staff and system requirements to provide online training and support a robust LMS (FlexTraining, 2008).
- Determine who will develop the LMS-based courses and provide the content (FlexTraining, 2008).
- Ensure that the LMS would be "100 percent Web-deployable, requiring no additional client applications (Hall, 2003)".

- Choose an LMS built on an open architecture that supports emerging learning standards (Hall, 2003).
- Ensure the LMS integrates with your enterprise e-business applications. Avoid creating "islands" of data or duplicate data across the enterprise (Hall, 2003).
- Ensure flexible permission model which enables multiple levels of access, learning modes and self-service tools for a range of system users (learners, content developers, instructors and site administrators) without compromising security (Hall, 2003).
- Use time limits for self-administered tests, limit the number of allowable attempts and impose time delay between attempts. Tracking the learning process enables learning officers and management to evaluate the effectiveness of the courses and accurately measure or gauge the knowledge, experience and skill levels of their workforce (Hall, 2003).

5. ONLINE LEARNING MATERIALS

Online Learning Materials available

A good advice on the availability of e-learning and LMS content is given by FlexTraining (2008) which emphasizes the need to "research into possible sources of learning content". This is because there is usually no need to re-invent the wheel and there is the need to build on what already exists and improve on it.

Educational institutions are used to the adoption of "closed" learning environments that protect learning materials with "copyright" and hide learning materials in password-protected areas. While this may be a reasonable and logical solution to a range of problems such as plagiarism, much human efforts are lost in this way of course delivery. Although there are genuine and logical reasons for moving towards closed environments, it is possible that we may be erring too far on the side of caution. Therefore, educators and administrators are encouraged in the interest of the advancement of learning, to consider the advantages of alternative models that regard and respect the need for privacy and copyright while opening

learning opportunities to a wider population "hungry" for knowledge (Mentor, 2008).

While, the emergence of the Internet has altered the need, understanding and importance of privacy, copyright, intellectual property, it has also open avenues to share knowledge and learning resources among students, faculty, and institutions. The latter idea has led to the "open source initiatives". Reilly and Williams (2006) note that the open-content model is a natural outgrowth of the Open Source Software (OSS) model.

Building Open Access Learning Environments: It is noted by Mentor (2008) that educators seeking to build open access learning environments often adopt a "do it yourself" mentality that could allow them to regain control over online learning environments. The process can be as simple as putting a course outline online as well as encouraging students and staff to create publicly accessible websites or blogs. Other educators seem to have taken the process much further, adopting open source software to create documents in which the GNU requirements propagate further, but given the incremental nature of change, educators are advised to experiment with options towards increasing the percentage of 'open' relative to 'closed' content (Mentor, 2008).

In essence, the approach of open access learning environment encourages the reuse of existing contents available worldwide and the improvement of such content through collaborations and knowledge sharing. This approach has the potential to enhance capacity development. Towards this goal, a previous study, Dehinbo (2007) highlight the need for higher institutions in developing countries to join in "dancing to the tune of Web applications development" by eliminating the phobia attached to in-house development of Web applications. This is based on the premise that even institutions that could not afford "on-the-shelf" LMS can still benefit by having an in-house portable version which is Web-enabled and thus available to the society.

Knowledge sharing resulting from Open Access Learning Environments: The sharing of knowledge presents potential to contribute to learning and to organizational enhancement of competitive advantage. Liaw et al (2008) note that tasks that require a high level of collaboration enables the learners to participate more actively in the learning process. This would lead to organizational enhancement of competitive advantage when staff of an organization imbibes such collaborative and knowledge sharing culture. Also, Liaw et al (2008) note that collaborative learning shifts responsibility of learning from instructors to the learners. In a Web development company where technology changes rapidly, staff need to take responsibility for learning and improving their skills.

6. BEST PRACTICES FOR CHOOSING AND DEVELOPING LEARNING CONTENTS

The proposed set of best practices in choosing and developing learning contents for implementing and using Learning Management Systems are given below:

- "Define a custom lesson plan, outlining how many course sections, course guide chapters, pre and post-assessments and searchable library documents to implement in order to create the most effective learning experience (FlexTraining, 2008)".
- Task analysis should also be conducted to determine the level of details as well as depth of contents (Govindasamy, 2002).
- Create and utilize multimedia content objects such as video and audio files, flash movies, streaming multimedia and/or pop-up alert messages (FlexTraining, 2008).
- E-learning and LMS materials should preferably be designed and developed in small manageable chunks referred to as learning objects which would have increased share-ability and reusability (Govindasamy, 2002).
- Learning objects should have a shelf life according to their category (Govindasamy, 2002).
- "Build interactive, multimedia lessons using the template-based learning content authoring tools (FlexTraining, 2008).
- Use evidence and materials from lecturers, teachers, students and other stakeholders in the design and development of the curriculum (Bowers, 2006).

- Transit from creating and delivering large inflexible learning materials into the production of database-driven reusable learning objects that are searchable and modifiable irrespective of their delivery media (Ismail, 2002).
- Seek content already existing in many different forms, how to use them, and who the Subject Matter Experts are within the organization. Seek the staffing to implement beginning and even more in-depth courses (FlexTraining, 2008).
- Content needs to be customizable "to the language and cultural requirements of an organization (Ismail, 2002)".
- For flexible assessment design, "configure display, access and review options to meet pedagogical preferences and assessment objectives (Angel learning, 2008)".
- For optimized assessment creation, "easily create questions, use questions stored in a departmental Question Bank or import questions from publisher content cartridges (Angel learning, 2008)".
- For "At-a-Glance Insight into Assessment Performance", ensure "real-time visibility into assessment results and all assessment settings (Angel learning, 2008)".
- For Question Bank efficiency, "share Question Banks and assessments across your department or campus. Deliver standardized assessments (Angel learning, 2008)".
- Use an introductory course to lead to more advanced courses. Make sure courses are not overwhelming in size. Even within the course, make manageable sections, and possibly even break up the course into multiple courses. Group courses to effectively cover a specific competency or certification. Structure course offerings according to job requirements, experience levels, and the diversity of your learning audience (FlexTraining, 2008).
- Properly-implemented LMS should facilitate, not dictate how your content is structured to produce the online course. Needs and environments could change but the avenues of-fered by the LMS to create and adjust training content should remain vital (FlexTraining, 2008).
- Seek materials that are online. Materials that would make better 'support materials' can be organized as 'support documentation'. Use hyperlinks to access document libraries, or simple reference information. Differentiating training material and reference material would depend upon frequency of use, immediate and critical needs (FlexTraining, 2008).
- Research into possible sources of learning contents (FlexTraining, 2008).
- Contents should be reviewed by content experts to gather information about any weakness of the materials.
- Re-use learning materials like procedure manuals, charts, diagrams, forms, web pages, PowerPoint presentations, movies, and audio files. When necessary, adapt your content to a faster and more interactive format (FlexTraining, 2008).
- Faculty (staff) should be encouraged to undergo immediate training and transformation to become e-learning and LMS content developers and they should be rewarded for taking extra responsibilities as content expert and designer, programmer, media producers etc. (Govindasamy, 2002).
- Minimum standard should be stipulated and all LMS and e-learning contents should be required to meet the minimum standard established (Govindasamy, 2002).

7. CONCLUSIONS

Towards alleviating skills shortage and encouraging knowledge sharing, the need for e-learning and Learning Management systems can not be over-emphasized. This assertion contributes to need for this study for the management of organizations and institutions of higher education to implement and effectively use Learning Management Systems.

The benefits of Learning Management Systems are highlighted, the various Learning Management Systems available and the

comparison between the different available systems as well as best practices for implementing and using a learning management system are presented. On-line learning materials highlighting what on-line material is available and the impact of the open-content initiative are emphasized. Also presented are general best practices in choosing existing on-line learning material and developing learning contents.

This study aims to enable organizations to limit cost of training, limit the underutilization of Learning Management systems, maximize the time for training and to improve staff development through knowledge sharing and collaboration with the use of Learning Management Systems.

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APPENDIX

Table 1. Comparisons of major Learning Management Systems (adapted from IQity, 2008).

	IQ-ity	Blackboard/ WebCT	Desire2Learn	eClassroom	Moodle	Angel
Discussion Forum	X	X	X	X	X	X
Internal email	X	X	X			X
Video services	X			X		X
White board	X	X	X	X		X
Orientation/help	X		X	X	X	X
Registration / integration	X	X	X	X	X	X
Online grading tools	X	X	X	X	X	X
Student tracking	X	X	X	X	X	
Linux support	X	X			X	X
Access log (tracking steps)	X					X
Open Source / non commercial					X	
Educator/technical Help desk	X	X	X	X	X	X

Figure 1. ANGEL's Agent Technology's automation (source: www.angellearning.com).