Framework of Effective Learning Management System Controls of Technology Enabled Teaching and Learning in Higher Education Institutions

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Abstract
E-Learning is an important education tool in modern teaching and learning. Several eLearning tools are available for students to make the learning processes in an effective way. The use of eLearning tools should be in such a way that it does not affect the behavioral patterning that drawn up for the conventional learning. Plagiarism and lack of refereeing the text or reference book is one of the major hurdles which greatly affect the knowledge-domain of the student's arena. This paper discusses various IT based tools available for the learning community, efficiency from its usage and recommendations for the suitable framework that needs to be implemented at higher education institutions which makes the learners stronger in both theory as well as real-time knowledge of their studies that is going to be used in their future for the better world.

Keywords: eLearning, eLearning tools, Efficiency, Higher education, Teaching and learning, Learning Management System, LMS

Introduction

Higher Education plays vital role in the nation building process for a country and the rest of world. The higher education sector develops the change-agents for the various fields which will help the human-kind wheel to run further. Conventional and traditional class-room based learning and teaching was followed in many decades which is one-to-one and one-to-many. In a way, these are simplest form of learners to be assembled in a class room wherein the teacher used the blackboard to demonstrate the theory and laboratories used for practical.

As the technology evolved tremendously for the last 40 years, the teaching and learning environment changed slowly, wherein, the learning community will be anywhere in the world and teacher deliver the content through internet based tools such as video conferencing, web based conferencing tools or eLearning platforms such as Blackboard or Moodle. Present day, the mobile technologies play an important tool to deliver the teaching content on-the-go. Both PC based and mobile based learning technology brought the learning and teaching community together in various aspects. However, as the learning technology also brought various hurdles for learning processes such as plagiarism and not using the reference books entirely as most of the students wants the information instantaneously using internet without actually going to the library to take the notes from the millions of the books which were not available online as e-books which result lack of fundamental knowledge of the concepts of complex theories.

In today's world, the technology is inseparable in human life and almost every part of human life contains piece of information technology (IT) exists, right from personal computers to home appliances. To make use of the IT based learning and teaching at most efficiency, we should have a proper framework and recommendations to be laid to the learning community in order to derive the maximum efficiency from the IT based teaching and learning through Learning Management System (LMS)

E-Learning at Higher Educations

eLearning defined as "Instructional contents created and delivered through electronic medium or using Information technology [2]. In another term, eLearning refers to the use of learning models and/or frameworks that may be used when planning, designing and building work, in order to help define the process of work [7]. The term eLearning aka Electronic Learning provides the environment so that, the teaching community uses it to create and deliver for the group or individual. The Fig. 1 illustrates the typical eLearning environment at higher education institutions. eLearning become one of the primary mode of teaching and learning in most of the institutions of the modern world. eLearning implementation is very important for the institutions to enable the student to fetch the latest technologies using the technologies. It enhances the learning experiences and provides best suitable platforms for the teaching community to deliver the instructional contents in much more sophisticated way.

That higher education intuition wants to keep the reputation on par with national and international standards and ranking, they must initiate the eLearning mode of content delivery.

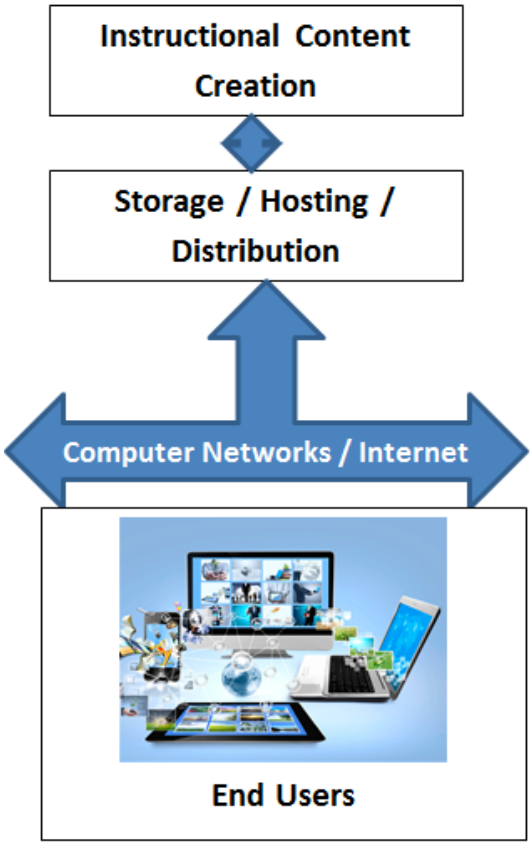

Fig. 1. Illustration of eLearning Environment

There are several direct and indirect benefits of using eLearning at institution level, and some are, but not limited to,

- **High Flexibility**
  - Learn from wherever you are, around the world
- **High availability**
  - The instructional content available for the students 24/7 and one-demand.
- **Faster Response**
  - Almost the response is immediate in an interactive contents and the student-teacher communications were effective
- **Sophisticated content (multimedia)**
  - eLearning provides the platform of hosting rich contents such as audio, video, multimedia, PowerPoint etc.,
- **Enhanced teaching and learning**
  - Teachers and students feel the easiness of using IT based learning and demonstration using rich contents makes them to have enhanced learning experience.
  - Interactive, self-paced and customized
  - Collaboration with other students, other universities and the rest of the world
- **On-the-go**
  - Thanks to the mobile technology, the eLearning contents can be assessed on-the-go
- **Accuracy**
  - The IT based design of instructional content provide more accurate information in less time
- **Cost Effective**
  - Less resources, future use and not involved complex logistics
- **Time Saving**
  - Since it is flexible and on –the-go, the end user need not spend more time in reaching the college
- **Repetitions of content view/paly**
  - If the student does not understand it first time, the teacher need to repeat the teaching once again. However, eLearning provide, any number of repetition at their convenience
- **Effective distance learning**
  - Using eLearning the contents will be delivered any part of the world using internet which makes the distance learning more effective

Every year, the institutions around the world joining for the eLearning race to provide the better content and better delivery mechanisms using the IT. In a survey [1], 72% of the higher education around the world is already using the eLearning technologies and the remaining 28% are ready to initiate the process.

Growth of eLearning

In the future of learning environment will be eLearning and failed to update their learning strategy will lose their place with their competitive education providers [3]. To attain the place such level the eLearning evolved around the world in 1954, BF Skinner, a Harvard professor invented first 'teaching Machine' used by school management to administrator the learning environment by programmed instruction [4]. At the year 1960, the first Computer Based Training was introduced, till today; this is the first initiative of eLearning environment, Table 1.

Year	eLearning Initiative
1924	The First Testing Machine
1954	The First Teaching Machine
1960	Computer Based Training
1966	CAI In Schools
1969	Arpanet, Heralds, Internet
1970	Computer Mouse & GUI
1980s	Pcs & First MAC
1990s	The First Digital Native Learning
2000s	Business Adaptive eLearning
2010s	Social, Online Learning

Table 1. A Brief History of eLearning Initiatives

The first eLearning system introduced to deliver the instructional content to the students at 1970 which is interactive with the teachers. During the period, 1980s, the introduction of PCs played vital role in expanding the eLearning content, with rich media which includes audio and video through interactive programming platforms through networking technologies. At, 1990's, several schools, colleges and universities started the online courses which is fully eLearning contents based which turns to be very effective and flexible compared to the conventional teaching methodologies adapted, so far. Now, at 21st century, the eLearning become boundary less, rich media, fun based, cost effective for the wider audience become one of the inseparable learning technology for the academic community [5].

The worldwide growth of self-paced eLearning products and services were estimated by US$ 27.1 billion in the year 2009 and expected to grow by US$ 49.6 billion in the year 2014, an independent survey conducted by Ambient Insight [6]. Fig. 2, provides the growth of eLearning products and services worldwide for the year 2009 to 2014. It is clear evident that, the eLearning is growing fast enough to handle most of the eLearning processes through electronically which needs higher attention in the implementation phase at higher education institutions.

Fig. 2. Growth of eLearning World-wide

eLearning Requirements

eLearning used in two modes of broadcasting. One is synchronous, real time, online or live learning broadcast wherein the students watch, interact with respective teacher eg Live streaming, live TV and Video Conferencing. The other one is offline mode, where in the instructional contents was created and deployed in broadcasting server and can be accessed by learning community, eg. Blackboard, Moodle etc. The most commonly used eLearning Environment, tools, hardware and interfaces given vide Table 2 [7] and Table 3. There were variety of tools used in various process of eLearning range from instructional content creation, storing, retrieval and delivery. Loads of hardware devices used for the same range from high-end servers, storage, network, PCs, mobile devices etc. Another important requirement of eLearning Management is people, who involved in design, distribute and end users, Fig 3. These software's, hardware's and people were interconnected in such a way that the learning management system designed to meet the requirements of learning and teaching community around the world.

eLearning Platforms/Tools	Description
Virtual & Personal learning Environment (VLEs/PLEs)	Blackboard/Moodle
Virtual/One-to-One/ Distance Learning/Blended Learning	Online/Offline mode of content delivery
Webinar/Podcast, Video, Streaming/ Audio	Live or Deployed
RSS/Forum/Blog	Notification/Alerts and Blended Learning
Web/Wiki/Web 2.0/Social Media	Web based instructional content delivery system
Netbook/EBook/ Mobile/Handheld	On-the-Go, mobile based, dynamic
Flash/software's	Software used for
PPT/Prezi/Java	Medium used for the preparation of instructional contents
Assessment/Quiz/Survey	Academic Assessment/Feedback system

Table 2. Most Commonly Used eLearning Platforms/Tools

eLearning Hardware's	Description
Servers	The host used for holding the contents for the distribution to one may users.
Client PCs, Mobile and Handheld Devices	The clients are connected with host/servers, to send and receive the information's
Networking Devices	Interface between the server and the client
High-end Storage Systems	Modern storage technology such as San and cloud based high end storage devices used to store large volume of digital data [8]
Internet/ISP/Bandwidth	Networking devices uses these services to interact with the world.
Audio/Video/Imaging Devices	Display, Sound recording and scanning devices to capture the multimedia contents.

Table 3. Hardware and Devices used for eLearning Management

As mentioned in Fig 3. various stakeholders of eLearning process make use of these hardware and software technologies to provide the technology based learning tools for the learners who seek dynamic learning processes. In this figure, the Standards and Accretion body is the combination of external agencies and internal quality audit system. Similarly, the content providers either can be internal departments comprising of academic staff and technical staff. The technology providers are the one who provides the platform for the hosting and make a way to deliver it to the end users from the internal IT department or external technical service Provider Company. Apart from that, the higher education management, teachers, students are from the implementing institution and one or two consultant may be included for the advisory.

Each of these 3 components *viz.*, Hardware, software and people are very important to have effective [9] Learning Management systems (LMS). However, the rationale behind the selection of these components depends upon the eLearning policy of individual organizations.

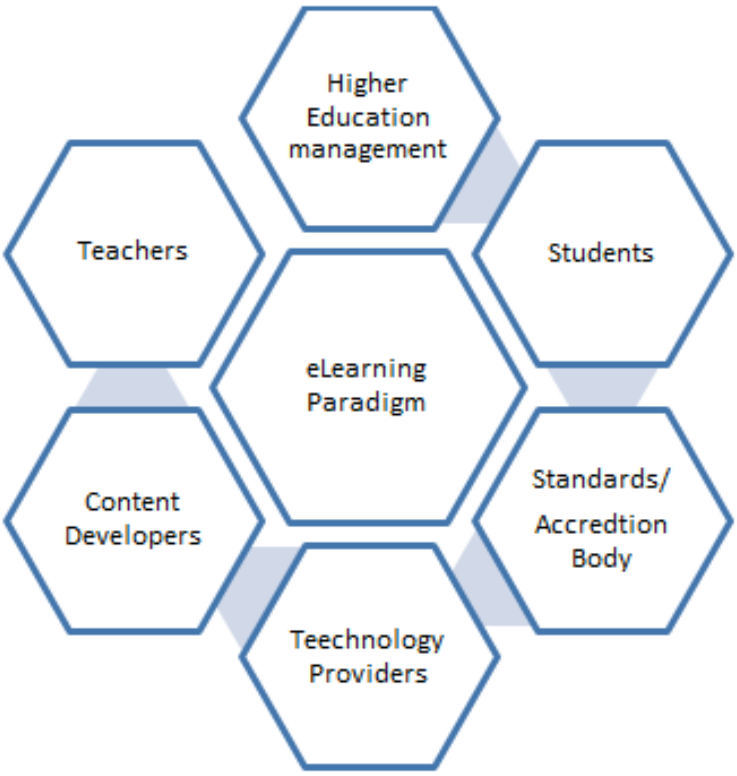

Fig. 3. Stakeholders of eLearning Paradigm

Framework of Effective Learning Management System Controls

The Learning Management system is a comprehensive platform wherein all the contributors and users join together in a place to achieve the learning process more sophisticated and convenient. Designing a customized LMS for the higher Institutions requirements or choosing and procuring third-party LMS is purely the decision of the content providers and users along with management's decisions. However, the effective LMS should be customized for institutions requirements either design in-house completely or get the LMS with customization agreement as per the requirements. In a process of designing or customizing the following are the important features needs to be evaluated and included, but not limited to, fig 4,

- ✓ LMS Host and Support systems
- ✓ Security Features
- ✓ Interface and Interactions
- ✓ Process flow and approval process
- ✓ User Management and Features
- ✓ Learning content Creation, Modification and Removal (Management)
- ✓ E-Commerce Capability
- ✓ Catalogs and Indexing Features
- ✓ Assessment Features
- ✓ Evaluation and Reporting Features
- ✓ LMS Users Communications and collaboration systems integration
- ✓ Feedback Systems

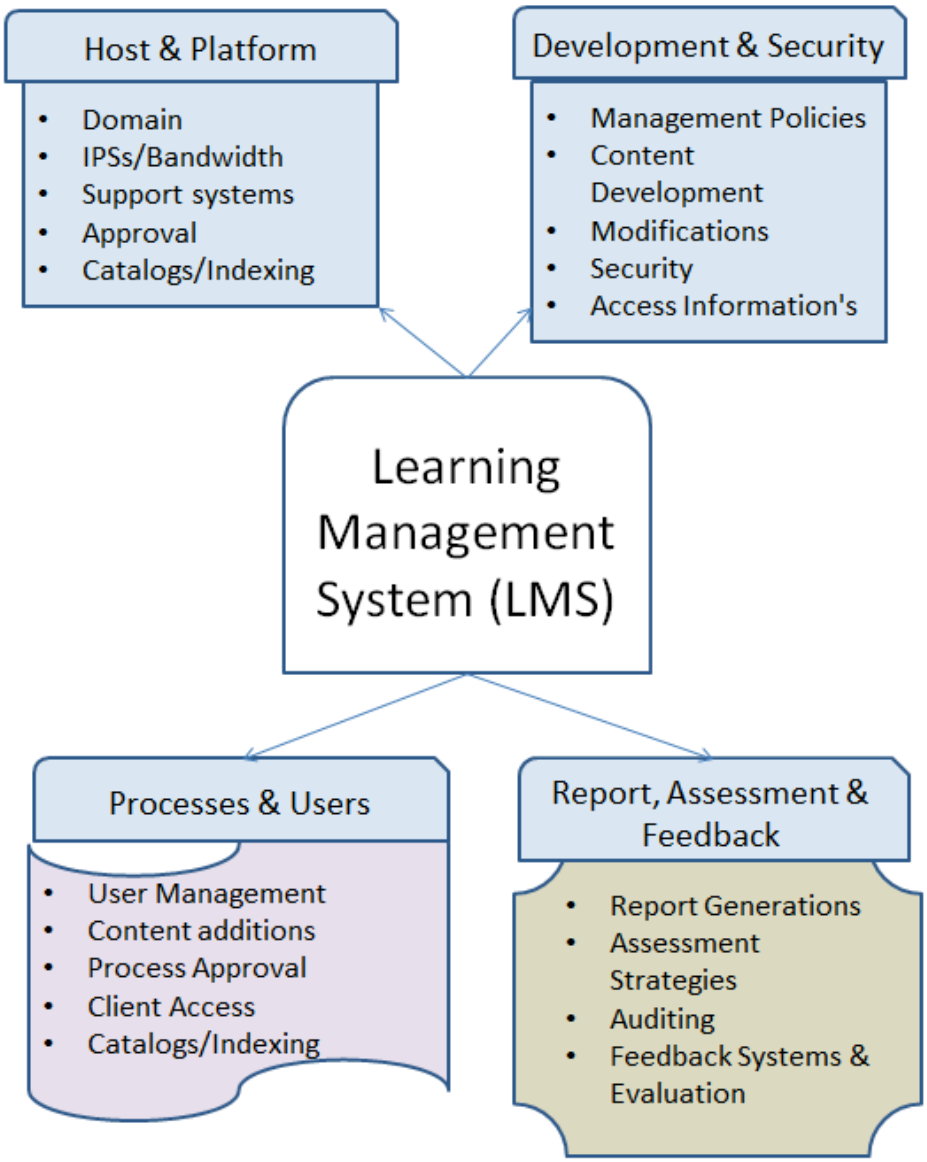

Fig. 4. Effective LMS Controls

The parameters discussed above are important factors to be considered and addressed meticulously to achieve the highest standard learning system for the higher education institutions.

Recommendations and Control Measures

Taking this framework, Fig 4., It is recommended that, the LMS implementation needs the following detailed analysis to take the system in to its reality.

A detailed requirement analysis should be conducted by including the user requirements, existing system available and the future plan of institutions learning processes. The requirement analysis should include, questionnaire, feedbacks user interviews etc.

The requirement analysis report should clearly indicate the institutions learning strategy, financial requirements, quality standards and people who involved.

It is important to study the initial requirements if IT infrastructure, existing IT equipment's and new assets requirements. Since the IT equipment's change rapidly of its features and versions, it is important to have change management policy document about replacement, upgradation and discarding the IT equipment's.

Deciding factors should be derived to develop the in-house LMS or customized LMS or third party LMS. Some organization would prefer to have entirely in-house developed system which will cater the requirements of end users. Some institutions will be product like Blackboard to use as per the features available. Some of other organizations will use product like Moodle and can be customized as per the requirements.

It is important to link the requirements with the chosen LMS and make a decision to have a system which is acceptable for all the stakeholders involved, Fig. 3.

People roles should be clearly indicated and appropriate policy document should be kept in place

Audit criteria should be set in order to evaluate the completed system as per the standards available for the region. Once the system in place, initial implementation should be conducted in parallel with manual learning process for a fixed period on an agreed terms

Coordination of peoples such as academic community, technology providers and end users should be derived and single point of contact should be made available

Content approval, modification and removal process should be defined in a policy document. Distribution and usage should be restricted within the organization level so as to maintain the proprietary.

Physical and logical security of the LMS should be in place and copyright policy should be developed within the institution and with external bodies

Change management, assessment, evaluation, reporting and feedback system documents to be created and maintained.

Conclusion

eLearning implementation at higher education institution is must for the present and future teaching and learning. As technology evolved and expanded and student's community is in the position to use all these technologies, the teaching community needs to gear up in producing the electronic based contents and delivery. Fruitful implementation of eLearning needs development of such system and its building blocks should be constructed in a systematic manner to achieve higher goals. The policy must be developed to support the implementation of eLearning process. Identifying right technology, content and teachers is the main factors for the success of eLearning initiatives at higher education institutions.

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