Review of E-Learning Tools in Education

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***Abstract*— There is great number of e-learning tools available to support teaching and learning in different kinds of educational institutions and vocational study centers. These tools are available to support and provide easy, affordable and convenient means of learning to different students of varying categories in different environment. Considering the economic and personal benefits of e-learning tool, there is still a great number of problems and challenges facing the implementation of e-learning in different institutions and the implementers of e-learning facility should appreciate the general and peculiar problems of adopting a suitable e-learning tool with a view to minimizing if not eliminating the problems and challenges. The paper reviewed some e-learning tools with a view to identifying advantages and disadvantages of each of the selected tools and the authors view on each was provided to guide the current and prospective users of e-learning tools. Suggestions and recommendations were made to guide the school administrators, e-learning users, policy makers and regulators in order to effectively achieve the efficient and effective use of the tools for desired learning outcome.**

***Keywords:* e-learning, education, learning management systems, Mooodle, Sakai, Brightspace, Blackboard**

I. INTRODUCTION

An evolving form of learning in educational institutions is e-learning which is more cost effective and offer efficient learning than traditional method of learning. Globally, it supports modern form of learning and teaching and cancel geographic challenges, reduce travelling and provide convenient access to training materials. "E-learning is formally defined as electronically mediated asynchronous and synchronous communication for the purpose of constructing and confirming knowledge" [3]. This definition suggests that E-learning includes all forms of electronically supported learning and teaching which can be delivered via the internet, intranet/extranet, audio or video media, satellite TV and CD-ROM. It can therefore be self-paced or instructor-led and may include media in the form of text, image, animation, streaming video and audio. E-learning or electronic learning, as a term' does not have universally accepted definition and there is therefore confusion in e-learning industry on whether a technology-enhanced system can be regarded as e-learning in a situation where there is no set pedagogy (the art, science, or profession of teaching) as it has been established that e-learning is "pedagogy empowered by digital technology" [7].

A number of other similar terms have been used to describe this form of learning and teaching and they include online learning, virtual learning, distributed learning, network and web-based learning. On a closer look, these labels refer to slightly different educational processes and as such cannot be used synonymously with the term e-learning. There is great number of e-learning tools each with its own strengths and weaknesses, opportunities and challenges. In this article the following e-learning tools were reviewed: MOODLES, SAKAI, BLACKBOARD and DESIRE TO LEARN(D2L) to guide educational management, policy makers and instructors.

II. E-LEARNING MODALITIES

Distance learning and computer-assisted instruction are two well- known e-learning modalities while distance learning takes place at locations remote from the point of instruction, computer-assisted instruction uses stand-alone multimedia software for learning and teaching. The e-learning include tutorials, case-based learning, simulations and game-based learning modules"[5].

Four Major Modalities Of E-Learning Were Identified:

Individualized self-paced e-learning online: This refers to situations where an individual learner is accessing learning resources such as a database or course content online via an intranet or internet. A typical example of this is a learner studying alone or conducting some researches on the internet or a local network.

Individualized self-paced e-learning offline: This refers to a situation where an individual learner is using learning resources such as a database or computer-assisted learning package offline (i.e. while not connected to an intranet or the internet).

Group-based e-learning synchronously: This refers to situations where groups of learner are working together in real time via an intranet or the internet. It may include text-based conferencing, and one or two-way audio and videoconferencing. Examples of this include learners engaged in a real-time chat or an audio-video conference.

Group-based e-learning asynchronously: This refers to situations where groups of learner are working over an intranet or the internet where exchanges among participants occur with a time delay (i.e. not in real time). Typical examples include

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online discussions via electronic mailing lists and text-based conferencing within learning management systems. [11]

Indeed, the rapid use of e-learning systems and technologies has been reported by several studies. [8]

III. LEARNING MANAGEMENT SYSTEMS

The LMS category includes applications that go by a variety of names, including virtual learning environments, course management systems, and collaborative learning environments. The different commercial and open-source platforms also vary in terms of capabilities and features. Nevertheless, according to the American Society for Training and Development (ASTD), a robust LMS should be able to at a minimum do the following:

Centralize and automate administration;

Offer self-service and self-guided services (such as learner self-registration for courses);

- Rapidly assemble and deliver learning content;
- Consolidate training initiatives on a scalable Web-based platform;
- Support portability and standards, such as SCORM; and
- Personalize content and enable knowledge reuse.

Common functionalities included in most enterprise-grade LMS solutions today also include:

- Content management features that provide control over the storage, aggregation, retrieval, and delivery of learning materials. LMS administrators can also create catalogs and match learners — or groups of learners — to courses;
- Rebranding and customization options;
- User management tools allowing administrators to categorize users and assign them to roles and groups;
- Assessment creation, grading, and tracking features;
- Collaboration tools, such as email, wikis, discussion boards, and chat;
- Reporting and analytics about system and course usage, learner progress, assessment results, and more; and
- Security features limiting access to authorized people and roles.

These lists are by no means comprehensive. Many organizations also need their LMS to integrate with other software systems, include ecommerce capabilities, manage competencies, or meet a variety of other requirements. The high-end learning management systems available — including several open-source offerings — offer toolsets to meet these requirements and more. Educational technology is the effective use of technological tools in learning. As a concept, it concerns an array of tools, such as media, machines and networking hardware, as well as considering underlying theoretical perspectives for their effective application. [6]

A. MOODLE

Moodle is currently one of the more popular open-source course management systems in online education. It is a free and open-source software learning management system written in PHP and distributed under the GNU General Public License. Developed on pedagogical principles, Moodle is used for blended learning, distance education, flipped classroom and other e-learning projects in schools, universities, workplaces and other sectors. [10]

With customizable management features, it is used to create private websites with online courses for educators and trainers to achieve learning goals. Moodle (acronym for Modular Object-Oriented Dynamic Learning Environment) allows for extending and tailoring learning environments using community sourced plugins.

Moodle's source code is written in PHP, a common, free scripting language that was originally developed for building dynamic Web pages. The Moodle Trust oversees the platform's core development, but the software is designed to be highly modular, and numerous developers and organizations have created plug-ins and other add-ons to increase functionality over the years.

Strengths

- Open-Source: It's free open source and easy to use for teachers
- Flexible Learning: Moodle's eLearning platform allows for 24/7 access to courses and content. Materials can be accessed from anywhere learners have Internet access, giving them the freedom to learn on their own time.
- Mobile Compatibility: Moodle offers mobile eLearning, making learning-on-the-go easier. Mobile eLearning is considered a complementary aspect of the learning process, providing greater flexibility for learners to access course materials on any mobile device.
- Multilingual: Moodle can be translated in over 100 languages, making it inclusive for learners across the globe. This allows you to offer your courses in as many languages as you choose.

Weaknesses

- Cannot embed things in certain web browsers and has limits on file upload
- No directions or help on how to use certain features
- The interface design doesn't offer enough options for rebranding and customizing its look and feel without extensive coding work.
- Moodle lacks a full-featured competency development and management toolset, which is required by many large corporate clients. Although there are workarounds that can allow some competency tracking and reporting, Moodle is hurt in certain markets where robust competency management is a requirement.

Despite the above limitations, Moodle is an ideal Learning Management System (LMS) solution. Its ease-of-use focus makes it ideal for lower resource organizations, such as schools, nonprofits, small businesses, and local government agencies. Moodle is also perfect for rapid deployment needs,

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where an organization requires an LMS to deliver and track a training or learning program on short notice or on a project basis. Moodle's core design is meant to be as simple and efficient as possible. This strategy has paid dividends in the form of high satisfaction ratings among Moodle users

B. *SAKAI*

In contrast to Moodle, Sakai was developed on a more centrally planned model. As a newer platform, Sakai has not yet achieved the large penetration outside the higher education marketplace that Moodle has gained. Its reputation for higher-end features, scalability, and security, however, have made it popular with large universities that need a robust solution, and it is beginning to make inroads in the government and public sector markets as well.

Sakai was conceived as a collaborative learning environment, and its collaboration tools do indeed cover the full gamut offered by most commercial solutions.

Strengths

- General collaboration features. These range from course announcements to Wikis to RSS feeds, covering most common Web-based collaboration and communications tools.
- Teaching and learning features. These course management and learning tools allow instructors to build and plan lessons, create and grade assignments, develop and offer tests and other assessments, and share files via a drop box.
- Portfolio tools. These feature offerings are designed to help users create, publish, share, and view portfolios of work. They include a variety of templates, matrices, and wizards to make portfolio building easy.
- Administrative management. Sakai's toolkits offer robust options for managing accounts, user roles and date, site setup and editing, and data integration and warehousing tasks. Analysts and users consistently rank Sakai at or near the top among open-source LMS platforms for its reporting features, the ease with which it can be customized and rebranded, and its collaboration tools.

Weaknesses

- On the negative side, Sakai's critics point out that it, like Moodle, lacks comprehensive competency profiling and management, which makes it unsuitable for some large enterprise environments.
- It also can be challenging to integrate Sakai with other enterprise software systems, such as talent management, other HR software suites, and ERP solutions.
- Sakai's greater complexity also makes it more challenging to install and set up than Moodle. This makes it less suitable for simple, rapid deployment projects that require an LMS.

Sakai is highly secured suitable for complex or robust learning in educational institutions, public and private organisations offering training. Its collaborative feature encourages collaborative learning.

C.*BLACKBOARD*

The blackboard is considered a hybrid teaching tool [2]. The blackboard can be used by lecturers throughout the lecture to discuss ideas or identify main points. It is suggested that only main points or ideas be written instead of long drawn out pieces of information. The blackboard can be a useful tool to help students visualize key aspects of the lesson but may make things hard if lecturers attempt to teach a large group.

Blackboard assessment tools include: Tests; Surveys; Assignments; Grading can be automatic and/or manual; Control over quiz/test features and functionality; Availability, grading, reporting, and others; Important technical/software considerations; Alternative forms of assessment;

Blackboard has a number of advantages:

- Integrate assessment with teaching materials
- Available on demand
- Randomised question selection
- Automatic grading with immediate feedback
- Reporting and analysis

However, blackboard has a number of disadvantages:

- Not suitable for testing of all skills and activities
- Needs for IT skills
- Time required to design and input questions
- Security
- Plagiarism

Strengths

Students learned some of the material independently and helped them to apply the learning in a more facilitated learning environment. They found that Blackboard provided engaged the students more and that facilitated a more interactive classroom environment. The students opined that the length of the actual classroom time was reduced, thus reducing exhaustion, at the same time, classroom interactions were more productive through pre-work. The blended format encouraged them to use the out-of-classroom time in meaningful activities. Online quizzes helped students identify those areas that they need to review; questions, which gave immediate feedback on student answers, were helpful.

Submitting homework, viewing course material, course objectives and reading material online was convenient. Use of multimedia and external links was useful to understand the subject. Posting class materials (PowerPoint presentations), assignments for formative and summative assessments and instructions for presentations and external links for reference, tutorials and self-directed learning topics saved classroom time.

Online objective tests for self-assessment were graded automatically and instantly. Students' grades in the online grade-book gave them convenient access. Creating online surveys for class sessions evaluation was instant. Blackboard created a dialogue outside of the classroom among students and teachers, by discussions and forums provided in the software.

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Weaknesses

Blackboard depends upon concretization, coordination, collaboration and communication across the organization, the reason why it is not so easy to do. Other weaknesses include poor Internet connectivity and speed, which is a must when time-limited online assignments are given. Both software and hardware are expensive in Indian settings. Certain configurations on the laptops/desktops had to be enabled to access BLS. Time limit on certain assignments made it stressful. The process of conducting online tests is entirely dependent on expensive technology that may or may not be available to all students staying outside the campus. [1]

Despite the weaknesses, Blackboard offers flexibility in adapting learning instructional methods to meet the needs of students who respond to repetition of subject matter provided in different modes of delivery. This accommodates different learning styles and different speeds of cognitive learning. Subject material can be presented in a variety of formats, each reinforcing another and can utilize subject experts for sections of the delivery.

D. *DESIRE TO LEARN (D2L)*

D2L (now called "Brightspace by D2L") is a powerful and secure personalized learning platform. The D2L learning environment now has a new name -"Brightspace by D2L". It is the same great integrated learning platform with a clear vision for the future. The following is the information they provided to us around this change.

D2L believes that progress is about people. It is about equipping the next generation of inventors, dreamers, and creators to tackle the great challenges and opportunities that we have yet to imagine.

Strengths

- Homepage: D2L's Course Home Page is a series of widgets that are already-made customizable templates. With widgets you can easily change the information available on the homepage to reflect news, announcements, instructor information as well as add links to other course content.
- Web Conferencing: The D2L's Web Conferencing tool that Wright State uses BB Collaborate, which is easily set-up by going to the Communicate Tab, Pilot Live, and then clicking "new room." capability is located under the Communications tab. BB Collaborate is a robust web conferencing tool in which students can interact with the instructor and other student and the sessions can be recorded for viewing at a later date, which is excellent for when students miss class or if a student needs to review information that was discussed during the session.
- Course Content Creation: Creating course content within D2L is a very simple process that provides access to all different sorts of content all within one tab. Once you create a new module by going to Content, "New Module," within the module you can add dropbox, discussion boards, quizzes/exams, as well as materials that can be uploaded from Managed Files.
- Embedding a YouTube Video: Embedding a YouTube video in D2l is a simple process in D2L with a few easy steps to create to make available an excellent video without advertising or extra distractions going on while the video is playing.

Weaknesses:

- Customizing Homepage: In D2L you must first make a copy of the current Homepage in order to customize the page. Once you create copy, rename it, and customize it, you must designate the copy as the "Active Homepage.?
- Creating a Quiz : Creating a Quiz in D2L can be quite time consuming with many tedious steps and the questions all have the same name except for Q1, Q2, etc. The importing process from the questions library is very difficult, tedious and confusing.
- Widget Creation: Creation of Widgets in D2L, while great for adding announcements and news, etc., the HTML editor is difficult to work with. It was easier to create my Instructor Information in Word and then transport it into the Widget than uploading an image and trying to add information. Also, I never did figure out how to move the Widgets into different places on the Homepage.
- Modifying Quiz with Differentiated Release: You had to go to go to the quiz and then click modify the quiz on the right hand side, which took you to an entirely different screen, picked the student, clicked to modify, then you only had three options for changes. It wasn't difficult in Canvas, but I would say that the amount of steps compared to D2L is a weakness.

Brightspace by D2L is secured and has robust web conferencing tool that affords students and instructors interaction which are recorded for future viewing. Brightspace has widgets that can easily change the information available on the homepage to reflect news, announcements, instructor information as well as add links to other course content.

IV. DISCUSSION

Moodle, Sakai, Blackboard and D2L are four popular web-based learning management systems that are very famous in education and other organisations. Moodle provides customizable management features flexible to create private websites with online courses for educators and trainers to achieve desired learning goals. Moodle focused on user-friendliness, cost-effectiveness, easy implementation and tracking of learning. Sakai is a secured course management and learning tools that allow instructors to build and plan lessons, create and grade assignments, develop and offer tests, other assessments, and share files via a drop box.

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Sakai is not as popular as MOODLE outside education sector. Sakai is highly secured suitable for complex or robust learning in educational institutions and promotes collaborative learning. Blackboard is far better than MOODLE when considered in terms of functionality as it offers greater flexibility in designing course curriculum, time table and active participation among participants (lecturers, trainers and students).

Blackboard allows flexibility in adapting learning instructional methods to meet the needs of students who respond to repetition of subject matter provided in different modes of delivery. This accommodates different learning styles and different speeds of cognitive learning. Subject material can be presented in a variety of formats, each reinforcing another and can utilize subject experts for sections of the delivery. A well-designed blended method can make use of physical and virtual classrooms using technology ranging from primitive to state-of-the-art.

The variety in delivery methods, ranging from experiential to instructional and structured to unstructured, can re-vitalize subjects that have lost their appeal. The variety in methods increases the interest, resulting in more effective learning. It is imperative that the delivery methods are matched to the subject matter and the audience [9].

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Although, MOODLE and Blackboard have grown in adoption, popularity and use than D2L but Sakai and D2L are providing good alternatives in robust and complex learning features. Moodle and Sakai are free open-source LMS but Blackboard and D2L are not and are for customers who pay fees. Although Coursesites are free of charge, they are not open-source because there is no access to the code or access to modify anything. You are merely a receiver of a service that is free. When target groups are considered, Moodle and Sakai have no specific target group. It could be used by individuals, institutions, companies, or any organization especially with the code available so anyone can add features to satisfy his/her needs. Both D2L and Blackboard have the same target group of learning institutions.

V. CONCLUSION

Different course management platforms have their strengths and weaknesses. As good and affordable as open-source LMS is, it is not suitable for every situation, organization or customer. However, for education, any of Sakai, Moodle, Blackboard or D2L can be a great solution. All have the scalability and capacity to handle large-scale installations for high number of users. No matter the affordability and user friendliness of any LMS tool, security in e-learning is of utmost importance. Built-in security in e-learning tools is not sufficient to protect students and lecturers resources. As MOODLE is open so the developers can add extra level of security and enhance the protection method in MOODLE. Therefore, choosing a suitable learning solution comes down to the affected needs of affected education institution. In a situation where customization, reporting and analytics, and collaboration are high priorities for e-Learning initiative, Sakai is probably best option. When looking for ease of use, extensibility, and a wide base of other customers — as well as support and service vendors — Moodle may be ideal.

Therefore, for education institutions, there are needs to determine the learning and development objectives, consider the skills of the Learning and Development team, assess any technical considerations or limitations of a particular LMS integration with current or available technologies, review the experience, background and support service of the LMS vendors and more importantly test the suitability and security of the proposed LMS before adoption.

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