# Open Source Learning Management System: A Comparative Study

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**Abstract:** Many Open Source Software (OSS) Learning Management System (LMS) packages are available in the market and this has caused difficulty for users in choosing the best LMS. The aim of this study is to present a method to evaluate and compare OSS LMS packages to select the optimum platform based on the software functionality criteria for each system, in order to determine its strengths and limitations. The result find moodle has a better score of criteria comparing with other packages.

**Key words:** Comparative study between open source learning management systems, evaluation opens source learning management system, Open Source Software (OSS), Learning Management System (LMS), moodle

## INTRODUCTION

A Learning Management System (LMS) is a web-based software application used to organize, implement, and evaluate the education process. The LMS provides online learning materials, online evaluation and collaborative learning.

A number of LMS have been introduced as Open Source Software (OSS) license such as a tutor, claroline, moodle and etc. These LMS are very active for e-learning (Awang *et al.*, 2012). Open source software is a software free of license fees and delivered with its computer program source code. It is described as a way to address the rising costs of campus-wide software applications, while enabling the creation of learner-centred systems (Van Rooij, 2011, 2012; Abdullateef *et al.*, 2015).

The evaluation and selection of inappropriate OSS LMS packages adversely affect the business processes and functions of the organization. The task of OSS LMS selection has become increasingly complex because of the difficulties in the selection of appropriate OSS LMS for business needs given the large number of OSS LMS packages available on the market, the lack of experience and technical knowledge of the decision maker and the on-going development in the field of information technology (Zaidan *et al.*, 2015a; Jadhav and Sonar, 2011). We use Multi-Criteria Decision-Making (MCDM) way to evaluate and compare the OSS LMS packages. MCDM is defined as the collective method used to compare, rank and choose multiple platforms. Each platform has its own multiple criteria (features) that depend on a matrix which

has a several names the evaluation table matrix or the decision matrix (Whaiduzzaman *et al.*, 2014; Zaidan *et al.*, 2015b).

This study presents a way to help a decision maker to evaluate and compare OSS LMS packages and to choose the best ones based on the software functionality criteria.

## MATERIALS AND METHODS

The design of this study depends on three active OSS in the educational field. The purpose of this study is to provide a method to evaluate and compare OSS LMS packages to find the right one that meets the institution's requirements. The first phase of this study is determining how to collect the OSS LMS functionality criteria. The functionality criteria are collected from published papers that are related to LMS using a content analysis method. Table 1 shows the evaluation criteria that have been selected in this study. The second phase is determining how to evaluate and compare the OSS LMS packages. Depending on the selected criteria, we need to check the availability of LMS criteria to compare OSS LMS packages. Data are collected from the LMS's websites and its documentation. The last phase is analysis of the collected data using MS Excel.

**Description of OSS LMS packages:** Open source software garnered great success in a huge array of applications in different fields. This success was employed in the educational system as it has great potential for progression. In this study, we chose three

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Table 1: A comparison between OSS LMS packages

| Criteria | Sub-criterion | LRN 2.5 | Moodle 2.8 | Sakai 10 |
|---|---|---|---|---|
| Course development | Online editor for course organization | No | Yes | Yes |
| | Upload/download of resources packages | Yes | Yes | Yes |
| | Linking | Yes | Yes | Yes |
| | Course creation/deletion | Yes | Yes | Yes |
| | Course templates | No | Yes | Yes |
| | Course enrolments | Yes | Yes | Yes |
| Activity | Statistical reports of student progress | No | Yes | Yes |
| Tracking | Participant administration | No | Yes | No |
| | Login analysis | No | Yes | Yes |
| Assessment | Self-assessing of student | No | Yes | Yes |
| | Online grading | Yes | Yes | Yes |
| | Student transcript | No | Yes | No |
| | Online quiz editor | No | Yes | No |
| | Extensible quiz engine | No | Yes | Yes |
| | Quizzes import | No | Yes | Yes |
| Learner's communication | Real-time chat room | No | Yes | Yes |
| | Audio/video conferences | No | Yes | No |
| | Whiteboard | No | Yes | Yes |
| | Discussion forums | Yes | Yes | Yes |
| | File sharing | Yes | Yes | Yes |
| | Internal e-mail | Yes | Yes | Yes |
| | Online journal | No | Yes | Yes |
| Other features | News | Yes | Yes | Yes |
| | Calendar | Yes | Yes | Yes |
| Score | | 10 | 24 | 20 |

active OSS LMS for comparison. These systems are: dot LRN, Moodle and Sakai. These three systems are the most widely used according to Caminero *et al.* (2013). LRN (dot learn) is a community of tutors, designers as well as computer software builders who push for development in the education field. Corporations can easily help save their own dollars to enhance knowledge in addition to the curriculum, because it is a free of charge OSS license LRN is developed by LRN Consortium, a non-profit corporation invested in developing inventions within educational technology according to open resource ideas.

One of the most well-known open source LMS is Moodle. Moodle is an LMS designed to support educators, administrators as well as learners with a strong, secure and integrated system for the education field.

Sakai is an OSS LMS project that is flexible and comes with many features that support teaching, learning, research and other projects.

It was developed based on the needs of faculty staff, students and organizations. Sakai adopters consist of most of the world's top-ranked colleges and universities leading to this solution's perspective, roadmap and sustainable future.

**A comparison between OSS LMS packages based on functionality criteria:** In this section, we establish the functionality criteria that will be used to compare the OSS LMS packages. Functionality is the ability of the software to provide functions which meet the user's requirements and needs when using the software under specific conditions (Bevan, 1999). Functionality is also used to measure the level to which the LMS satisfies functional requirements for an organization (Jadhav and Sonar, 2011).

With this portion, we follow the four core functionalities groups adopted in (Arh and Blazic, 2007; Cavus, 2011) with the other features adopted in (Merino *et al.*, 2006). These groups are course development, activity tracking, assessment and other features with its sub-criteria as listed in the Table 1. Moreover, these criteria represent the core features of each LMS. The comparisons between three OSS LMS are summarized in Table 1.

In Table 1, we try to evaluate the OSS LMS and select the best one based on functionality criteria comparison. We chose three popular OSS LMS for comparison. These systems are: dot LRN, Moodle and Sakai. This comparison has two types of answers; Yes/No. Table 1 illustrates the comparison process based on functionality criteria.

## RESULTS AND DISCUSSION

Open source software has fantastic prospect in electronic education, particularly for resources-constrained environments.

The comparison between three OSS LMS packages is shown in Table 1. The comparison process was based on LMS functional criteria. Data was collected from the LMS's websites.

Through comparison, we found that the selected LMS systems shared most of the functional criteria. It was found that Moodle has a better score compared to the others with 24 score of criteria. Sakai has 20 score of criteria while dotLRN has 10 criteria. Figure 1 illustrates the comparison between the OSS LMS criteria.

According to Table 1, we observed in these LMS Packages strengths and weaknesses. Moodle has better features (criteria) compared to the other educational platforms while Sakai has some weaknesses in the assessment features as well as the communication process, as it does not provide audio and video conference features. Dot LRN also has many weaknesses compared to other LMS packages, where it does not support the "Online editor for course organization" and "Course templates" in the course development. It also does not support activity tracking and assessment as well as some weaknesses in learner's communication criteria.
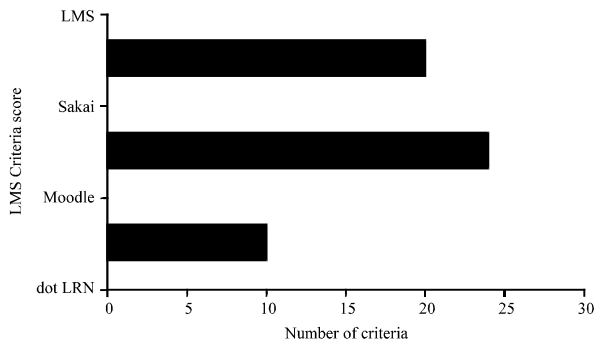
Fig. 1: Comparison between OSS LMS criteria

Thus Sakai needs to improve and develop the activity tracking, assessment and audio/video conference in communication while dot LRN needs to develop the course development, activity tracking, assessment and communication.

## CONCLUSION

This study presents a way to help a decision maker or administrators in the education environment to compare and evaluate the OSS LMS packages and select the best one based on the software functionality criteria. The comparative study between three OSS LMS packages, namely dot LRN, Moodle and Sakai are presented. This was based on LMS functional criteria. The three LMS platforms were described and the functionality criteria were classified based on literature review. Moodle has a better score of criteria compared to the others. Sakai obtained 20 score of criteria while dot LRN obtained 10 score of criteria. The limitation of study is two fold; the list of included software is not comprehensive as well as the comparative study is limited to the functionality criteria. From this study, we found that there is a need to provide a comprehensive list of LMS evaluation criteria framework and use recent MCDM method to select the best platform. As well as there is a need to compare all OSS LMS packages.

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