

## Chapter 54

# Critical Analysis on Open Source LMSs Using FCA

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### ABSTRACT

*The objective of this paper is to apply Formal Concept Analysis (FCA) to identify the best open source Learning Management System (LMS) for an E-learning environment. FCA is a mathematical framework that represents knowledge derived from a formal context. In constructing the formal context, LMSs are treated as objects and their features as attributes. This context is analysed and classified into concepts based on the rules of FCA. The knowledge derived from the concepts and our analyses reveal that Moodle is exceptional, with more features when compared with other LMSs.*

### INTRODUCTION

E-learning is an activity that facilitates individual's learning process by exploiting the digital technologies. E-learning tools such as web based learning, computer based learning, virtual class room opportunities and digital collaborations support education by making it more flexible with respect to place and time constraints. Throughout the world the E-learning market is receiving a growth of almost 36% due to its potential advantages and it is estimated that this growth trend would further continue in future (Karl, M. K., n.d., Balasundaram, S. R., 2011). The E-learning products offer several features that include customization to the

user's requirements. Several interesting articles are available in the literature that describes E-learning process, advantages, platforms available etc (Alptekin, S. E., & Karsak E. E., 2011, and references therein). For more introductory information on E-learning, interested readers can refer (Holmes, B., & Gardner, J., 2006).

Learning Management System (LMS) is a technology emersion of E-learning tools. Also, it is a software tool designed to manage users' learning activities (Hippel, E. V., & Krogh, G. V., 2003, "Sakai," n.d.). An Opensource solution is easy for organizations to install and it involves no licensing cost. Extensive introductory information on open source LMSs can be found in ("Netcraft

DOI: 10.4018/978-1-4666-7230-7.ch054

Survey,” 2008, Glass, M. K., 2004). In 2010, Aydin & Tirkes made an analysis on open source LMS and it was found that E-learning technology reduces the learning time requirements. Based on both pedagogical and technical aspects comparisons were made on three most popular E-learning platforms (Claroline 1.5.3, CourseWork and WebCT 4.0) with the E-learning platform Virtual Classroom (VirtualCR), which was developed at the Polytechnical College in Subotica (Pinter, R., & Radosav, D., 2005). Pecheanu, E., Stefanescu, D., Dumitriu, L., and Segal, C. (2011) highlighted the strengths and limitations of the evaluated platforms in a comprehensive way. Extensive use of internet has brought several opportunities to different fields, and many improvements to instructional technologies. Statistics prove that among 1.1 billion populations in India, Internet has penetrated into 88 million people, which is about a total of 6.9% penetration rate (“Information Technology Annual Report,” 2010). Based on these new technologies learning environments provide a wide variety of alternatives for learners. There are plenty of open source LMSs available (“Trimeritus elearning solutions,” n.d.). Their effectiveness varies with different features. Some of these features produce potentially worthy results while some unwanted results. Hence, the users (learners, course instructors, higher academic organizations) encounter difficulty in choosing their application of technology in teaching-learning activities. In order to overcome such difficulties we have studied a FCA based approach model to identify the best LMS available among the others. This approach is best suitable and reliable in case of choice based problems as it fully dwells with mathematics based logical background. The requirements of an advanced E-learning system were studied by KIS, M. (2007) and Kritikou, Y., et al. (2008) and some of these requirements are used in our analysis.

Our approach in this paper is to contextualize the open source LMSs based on their features. We aimed at identifying the best LMS among the

chosen. To achieve our aim, firstly, we propose a formal approach of E-learning necessity; secondly, we analyze the four popular LMSs by its categories, their subcategories and their features; thirdly, a concept lattice of the contextualized LMS that has to be visualized by the user is built.

## **LMS AND POTENTIAL EDUCATIONAL BACKGROUND**

The most important concept in the field of education is the classroom interaction and learning through group discussions. Sometimes this component is not possible to all the learners in an educational setup. To handle such circumstances, an open source LMS seems to be a solution to the learners by which one can handle the above said difficulty. LMSs provide the following services:

- Manage courses and programme;
- Provide and administer course registration;
- Post instructional material and related documents;
- Discussion forum;
- Doubt clarification (by the teacher as well as students) etc.

With the use of LMSs, any lecture class can be made available to a large number of stations, which is beneficial to the remote students. Hence, anybody from any place can become a student to the course. Due to the vast features of the LMS, any educational setup requires them to be potential. Most of the popular educational institutions in the world use the LMSs. In India, premier institutions like Indian Institute of technology (IIT), Indian Institute of science (IISc) and Indian space research organization (ISRO) use the LMS based educational system (Kannan, M. M., Deepak, B. P., & Shevgaonkar, R. K., 2008). Taibah University located at Madinah from the Kingdom of Saudi Arabia uses a similar LMS based learning platforms (Menacer, M., Albinali, A., & Arbaoui, A., 2012).

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