

A Study of Comparison between Moodle and Blackboard based on Case Studies for Better LMS

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Abstract — This paper discusses the successful online learning of Learning Management Systems (LMS) including the effects of interactive and learning structures enabled by different LMS on satisfaction and learner engagement in online courses. This study discusses how the Learning Management System (LMS) harnesses student ability to take actions in an online course. The use of teaching strategies such as learning partnership for students through online learning can motivate student participation in activities leading to enhanced learning and understanding. Moreover, the flood of technological innovations can be overwhelming and necessitates the careful consideration of which technologies are the most effective and provide the highest cost or benefit ratio to the organizations using them. Currently the most popular open source learning management systems are Moodle and Blackboard(WebCT). For that the main purpose of this study is to compare between the leading proprietary solution, Blackboard, and the leading open source solution, Moodle is based on previous three case studies. First case study is "A Study of Virtual Learning Environments". The second case study is entitled "A Comparative Study of MOODLE with other e-Learning Systems" and final case study is "Comparison of Blackboard 9.1 and Moodle 2.0". Therefore, depending on the results of these studies, we will compare the features of the basic functionality of each system such as communication tools, productivity tools, and student involvement tools. Finding of this study will present the effectiveness of using Moodle and Blackboard in Learning Management Systems (LMS) on students and learner to enhance their learning and understanding.

Keywords- LMS; Open Source; Blackboard; Moodle

1. INTRODUCTION

This paper discusses the successful online learning including the effects of interactive and learning structures enabled by different Learning Management Systems (LMS) on satisfaction and learner engagement in online courses [5]. Learning tools using information and communication technologies (ICT) offer flexible, interactive learning environments which educational institutions are using to provide high quality education customized to the learner requirements. The needs of the student in the global environment include the fast exchange of information, which can facilitate more rapid learning. In online courses, all instructions are mediated by technology; in most cases this is a Learning Management System (LMS) such as Blackboard or Moodle.

Blackboard and Moodle are two Learning Management Systems with a lot in common, but there are some key differences which make each one special in its own way [6]. The Blackboard Learning System allows instructors to post course information and course materials, readings and assignments and provides functionality for basic discussion and other collaborative tools from Blackboard [6]. Moodle system is a course management system (CMS) a free Open Source software package designed using sound pedagogical principles, to help educators create effective online learning communities [6].

The technology used to support an online course may affect the frequency and manner in which students and faculty interact with one another, provide and receive feedback, and interact with course materials. Therefore, this paper explains how students perceive the LMS used to host an online course, and whether those perceptions affect the success of online instruction. This study will present the effectiveness of using Moodle and Blackboard in Learning Management Systems (LMS) on students and learner to enhance their learning and understanding by trying to answer this question:

What are the differences on Moodle and Blackboard features in term of success in implementing the LMS?

The purpose of this study is to compare between the leading proprietary solution, Blackboard, and the leading open source solution, Moodle based on some previous studies. This study begins with section (1) which gives an introduction about two different Learning Management Systems (LMS), Blackboard and Moodle. This is followed by section (2) describes the (LMS) and compares the features between Blackboard and Moodle. After that, section (3) shows the result of the comparison. Within section (4), contain the discussion of the result. Finally, the conclusion is given in section (5).

2. BACKGROUND AND MODEL

The World Wide Web has opened new feature for computer-based teaching and learning in the last 10 years. One of the major stream of Web-based Education systems is the Learning Management Systems (LMS), which focus on the management of learning contents and on the administrative support (lectures, chat rooms, task management and so on). For example Web CT, Blackboard Course Info and Lotus Learning Space are now used by thousands of educational institutions.

While there are several versions of definition on what is learning management system (LMS) both in academy and practical field. There are some consensuses on the core of LMS. Based on ASTD's definition [7], the basic description is a software application that automates the administration, tracking, and reporting of training events. However, it's not that simple. A LMS should be able to do the following:

- Centralize and automate administration
- Use self-service and self-guided services
- Assemble and deliver learning content rapidly
- Consolidate training initiatives on a scalable web-based platform
- Support portability and standards
- Personalize content and enable knowledge reuse

Szabo & Flesher defined LMS as the framework that handles all aspects of the learning process. An LMS is the infrastructure that delivers and manages instructional content, identifies and assesses individual and organizational learning or training goals, tracks the progress towards meeting those goals, and collects and presents data for supervising the learning process of an organization as a whole [23]. The other definition describes LMS as "an information system that administers instructor-led and e-learning courses and keeps track of student progress. Used internally by large enterprises for their employees, an LMS can be used to monitor the effectiveness of the organization's education and training. It is also beneficial in ensuring state-and federal-mandated courses are delivered in a timely manner.

LMSs are frameworks that support teaching and learning and are usually used to support classroom education. Typically they provide management, distribution and sharing of learning contents, student tracking, assignment management, and online peer collaboration. They aim at providing flexibility, accessibility and convenience to their users. The concept of LMS is still relatively new. As historical data becomes available, some authors have studied the pros and cons of LMS and, in general, online education. In an Information Age model of education, an LMS will assess learners' current knowledge and skill level, work with teachers and learners to identify appropriate learning goals, identify and sequence instruction appropriate for the individual learner, assess learner performance products, store evidence of attainments, support collaboration and generate reports to provide information to maximize the effectiveness of the entire learning organization. In addition, like many information technology innovations from the past few decades, LMS software is able to add a level of efficiency to companies' learning systems, with a number of other benefits emerging as well, such as:

- Easily adapting and reusing materials over time.
- More choices for creators of curriculum, such as method of delivery, design of materials, and techniques for evaluation.
- Creating economies of scale that make it less costly for organizations to develop and maintain content for which they used to rely on third parties.

Improvements in professional development and evaluation allow companies to get more values from human resources while empowering individuals with additional tools for self-improvement. Whilst they have recognized advantages, they can also bring a lot of user frustration [8, 9]. Some of the problems identified in the literature are the student's frustration of

feeling lost in the mass, of not receiving appropriate and timely feedback on their work and of feeling isolated. On the teachers' side, time consuming tasks, poor visibility of students' progress and problems seem to be dominant.

Briefly current trends in technology and business are favoring the increase of collaborative, web-based applications, user-oriented design, and other features that are often grouped together under the term "Web 2.0." By further inverting the traditional forms of interaction between instructors and pupils, and enabling a great amount of content to be created and managed more easily, the future of LMS appears to be a dynamic one.

2.1 Blackboard Learning System

The Blackboard Learning System is an industry-leading software application used to power virtual learning environments. Blackboard is a Web-based learning management system designed for students and faculty to allow them to participate in classes delivered online. On the other hand, the Blackboard Learning System is a comprehensive and flexible e-Learning software platform that delivers a complete course management system. Following are the features that we are using in this system:

- Creating courses: through easy workflow. Instructors can use the wizard to complete the initial setup of a Course in one easy-to-follow process.
- Course management: allows teachers to update any feature of the course.
- Course content: allows teachers to post article, materials, assignments, videos etc.
- Calendar: can be used to post due dates for assignments and tests.
- Assessments and Surveys: allows instructors to deliver online, automatically-scored assessments and surveys.
- Assignments: can be posted and for students to be able to submit assignments online.
- Availability Control: Instructors can create custom learning paths by determining when students can access content items, discussions, assessments, assignments or other learning activities.
- Grade center: Stores student performance results, including support for custom grading scales, grade weighting, item analysis and multiple grade center views.

2.2 WebCT and Blackboard

WebCT was originally developed at the University of British Columbia by a faculty member computer science, Murray W. Goldberg. In 1997 Goldberg created a company, WebCT Educational Technologies Corporation, a spinoff company of UBC. Since foundation of WebCT, use of online learning management software by higher education institutions and other organizations has increased rapidly. During the early 2000s WebCT and rival company Blackboard held the majority share of the education software market and were leaders in the move by colleges to wider use of online learning applications. [10, 11]. The services and products offered by learning technology companies diversified, and Blackboard and WebCT began to offer technology packages that provided administrative functions, in addition to online course management[11]. On the other hand the first version of Moodle was released on 20 August 2002 which was developed by Martin Dougiamas to help educators create online courses with a focus on interaction and collaborative construction of content and is in continual evolution.

In February 2006, WebCT was acquired by Blackboard Inc. As part of the merger terms with Blackboard, the WebCT name will be phased out over time in favor of the Blackboard brand. Moodle has continued to evolve and nowadays its major improvements are in accessibility and display flexibility was developed in 1.5. In July 2012, Moodle developed Moodle Mobile on HTML5 and PhoneGap while Blackboard acquired a company which had developed an iPhone application for students at Stanford University In 2009, and made the application available for other campuses and mobile devices. by 2013, Moodle has been translated into 82 different languages. For example the Open University of the UK currently uses a Moodle installation for their 200,000 users. Nevertheless as of 2009, this is Blackboard Company which had 60 percent of the market [12]. As of December 2013, Blackboard's Learning Management System had over 20,000 organizations signed up with more than 20 million users which show the popularity of this company compared with its famous rival, Moodle.

2.3 Moodle

Moodle is a course management system (CMS); a free package designed using known pedagogical principles to help the educators to create effective online learning communities. Moodle is provided freely as Open Source software under the GNU Public License. This means Moodle is copyrighted, but you are allowed to copy, use and modify Moodle provided that you agree to: provide the source to others; not modify or remove the original license and copyrights, and apply this same license to any derivative work.

In the following section, we will describe the architecture of Moodle and how the Moodle works at a technical level: A Moodle installation comprises the Moodle code executing in a PHP-capable web server; a database managed by MySQL, PostgreSQL, Microsoft SQL Server, or Oracle; and a file store for uploaded and generated files (the moodledata folder). All three parts can run on a single server; or they can be separated with many load-balanced web-servers, a database cluster, and a file-server; or anywhere between those extremes. On the other hand, Moodle core provides the entire infrastructure necessary to build a Learning Management System. It implements the key concepts that all the different plugins will need to work with.

A. Blackboard vs. Moodle Architecture

A blackboard-system application consists of three major components:

- i. The software specialist modules, which are called knowledge sources (KSs). Like the human experts at a blackboard, each knowledge source provides specific expertise needed by the application.
- ii. The blackboard, a shared repository of problems, partial solutions, suggestions, and contributed information. The blackboard can be thought of as a dynamic "library" of contributions to the current problem that have been recently "published" by other knowledge sources.
- iii. The control shell controls the flow of problem-solving activity in the system. Just as the eager human specialists need a moderator to prevent them from trampling each other in a mad dash to grab the chalk, KSs need a mechanism to organize their use in the most effective and coherent fashion. In a blackboard system, this is provided by the control shell

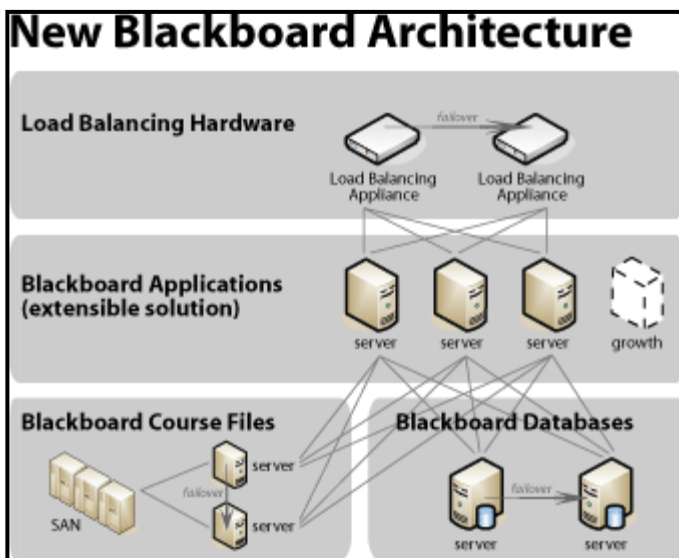


FIGURE 1: Blackboard Architecture

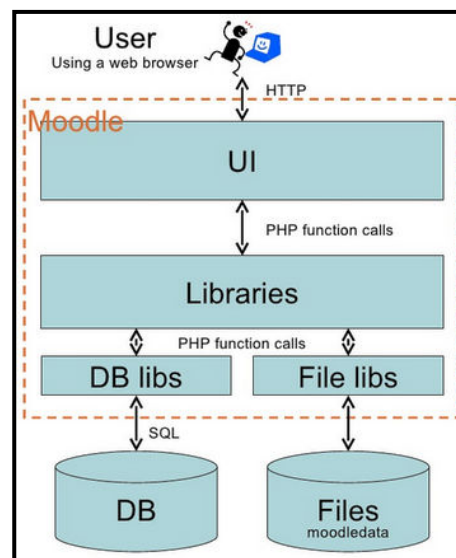


FIGURE 2: Moodle Follows Fairly Classic Three-Layer Architecture

B. Blackboard vs. Moodle Interface Student View

The following Figure 3 and 4 show the comparison of the interface in student view for both Blackboard and Moodle model:

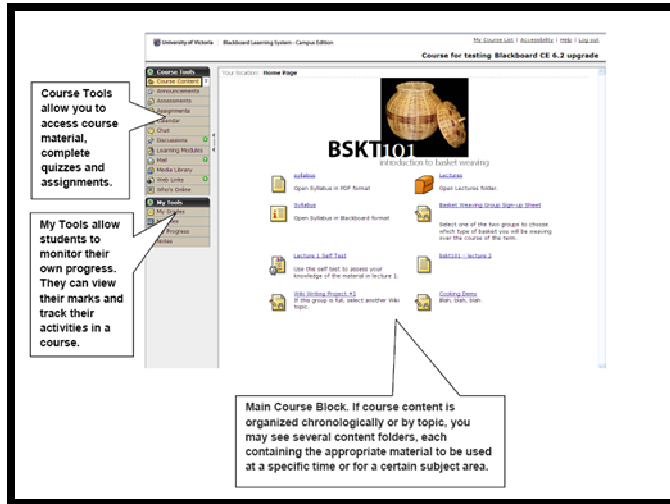


FIGURE 3: Blackboard Interface Student View

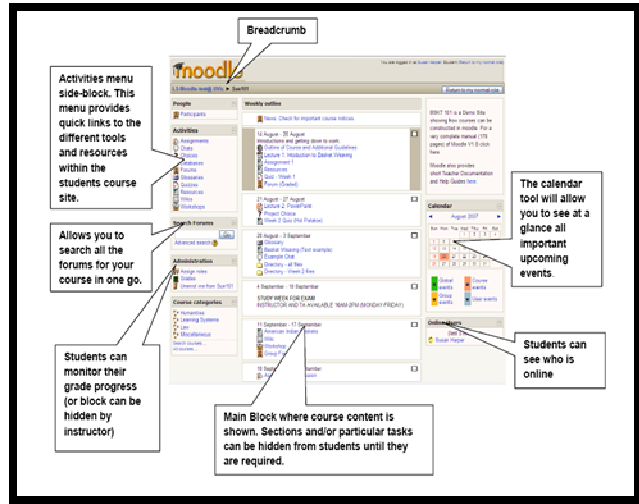


FIGURE 4: Moodle Interface Student View

3. RESULTS

We have compared the features in 3 phases, in terms of: Communication Tools, Productivity Tools and Student Involvement tools. The following comparison is based on comparison of Blackboard (version 9.1) and Moodle 2.0.

A. Communication Tool

The communication tools in LMSs can encourage active engagement in classes by students and promote constructivist rather than instructivist styles of learning [4]. The various communication tools can help manage the sharing of information and promote interactions between members. LMS and its communications and collaboration tools also allow them to have a discourse with students and teachers through discussion forums. Students can receive accurate alert/notification in a timely way about the classes, subjects, exams and other issues.

TABLE 1: Features Comparison Based on Communication Tools

	Blackboard Learn(Release 9.1)	Moodle 2.0
Discussion Forum [2 , 3]	Students can enable or disable posts to be sent to their email. Students can receive posts by email as daily digests of subject lines or whole posts. A spell-checker is available for student and instructor responses	Students can enable or disable posts to be sent to their email. Students can receive posts by email as a daily digests of subject lines or whole posts. Students can subscribe to forum RSS feeds. A spell-checker is available for student and Instructor responses.
File Exchange [2 , 3]	Students can submit assignments using drop boxes. Students can share the contents of their personal folders with other students. Administrators can define disk space limitations for each user.	Students can submit assignments using drop Boxes
Email notification	Not available	Users can receive email notification of any course
Notifications dashboard	NEW (from v 9.0)- New content that's been added to the course and	A current feature that is improved in Moodle 2.0 the Recent Activity block [unit within a page]

[3]	information for all courses in which a student is enrolled or the instructor is teaching are funneled to this page	providing information about recent events, and links to more detailed reports. Majority of content tagged with time and user who last changed it.
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B. Productivity Tools

Productivity tools help learners stay on top of their studies. Student productivity tools in a comprehensive and secure online learning solution allow educators to create dynamic interactive courses and content for their students, and facilitate collaboration, resource access, instruction, assignments, grades and much more.

TABLE 2: Features Comparison Based on Productivity Tools

	Blackboard Learn(Release 9.1)	Moodle 2.0
Calendar/ Progress Review [3]	Instructors and students can post events in the online course calendar. Instructors can post announcements to a course announcement page. Students have a personal home page that lists all courses in which the student is enrolled, new email and all course and system-wide events from their personal calendar. Students can view their grades on completed assignments, total points possible, course grade, and compare their grades against the class performance.	Instructors and students can post events in the online course calendar. Instructors can post announcements to a course announcement page. Students have a personal home page that lists all courses in which the student is enrolled, new email and all course and system-wide events from their personal calendar. Students can view their grades on completed assignments, total points possible, course grade, and compare their grades against the class performance. <i>Students can subscribe to RSS feeds to be notified of changes to materials.</i>
Searching Within Course [3]	Students can search all discussion threads	Students can search all discussion threads. Students can search chat or virtual classroom session recordings.
Module Page [2,3]	Similar to dashboard notifications on the Blackboard home page. Modules contain information for instructors and students about new content and due dates for the current course.	Modules Upcoming events and recent activity both displayed left hand side of the course material. Can be docked as a tab to the left of the page.

C. Student Involvement Tools

Student involvement tools are to help the students see, understand, contribute to, and appreciate their own journey of achievement success. Students can use student involvement in the assessment, record-keeping, and communication processes to teach these lessons.

TABLE 3: Feature Comparison Based on Student Involvement Tools

	Blackboard Learn(Release 9.1)	Moodle 2.0
Group Organizing [3]	Group created first and then modified manually later to add users. Instructor can allow students to create their own self-enrolled groups and edit their student-created groups.	Groups created first then group members selected from list on same page. Automatic allocation available. Students can also self-select groups.

Community Networking [3]	If allowed, at system level, students can create online clubs, interest, and study groups. These groups can have their own catalog, templates, discussion boards and more.	Major focus of Moodle 2.0 allowing different Moodle installations to network. Idea is for instructors to be able to access a location where they can share with peers - in their own topic - best practice, ideas and resources. Also allow users to join in with communities of practice that might be hosted by other sites. The functional aspect is to allow anyone to turn their Moodle site into a Moodle Community Hub, with seamless log-in between Moodles, but also with the login secure and fully controlled by site administrators
Course Menu [3]	Click '+' icon to access the choice list	Menu is automatically updated with links to new
Assignments [2, 3]	New 9.0 – Multiple attempts for submission (example revisions) New 9.0 – Assignment submission for groups by an individual.	Assignments can be completed online or offline (file uploads). Moodle allows for multiple file uploads. Also assignments are treated as 'draft' until the "send for submission" button pressed
Custom grading view and grading preferences [2, 3]	Smart view can be used and in turn made a favourite making it available from the front page example showing on instructor's front page students who are falling under a certain grade.	Enhanced Gradebook in Moodle 2.0, with functionality such as assignment of personal grade letters to percentages. Can also edit directly in spreadsheet view

4. DISCUSSION

As a result from this review, we can see the important criteria in choosing Blackboard or Moodle as a learning management system. Our review has been based on three papers and comparison in terms of Blackboard (Version 9.1) and Moodle 2.0 communication tools, productivity tools and student's involvement tools. This comparison has been made to answer our research question, "What are the differences on Moodle and Blackboard features in term of success implementing the LMS?" From the first case study, "A Study of Virtual Learning Environments " most of the Spanish Universities migrated from WebCT to Moodle platform because it is an open source while WebCT is a commercial platform. [1] For the second case study, entitled "A Comparative Study of MOODLE with other e-Learning Systems ", the author has choose Moodle as the optimal elearning platform based on architecture and technical aspect compared with other e-learning system.[2].

Our final case study is " Comparison of Blackboard 9.1 and Moodle 2.0" based on the user feedback at the Institute of Education, London. The tutors commented that multi level structure of Blackboard means that courses need to be carefully constructed and managed so that students and other tutors are aware on what materials are within each branch or folder. While for Moodle 2.0, was reported as smaller in size compared to Moodle 1.9.8. For another case study, at Kingston College who are in process to change from Blackboard to Moodle, they felt that Moodle is much cheaper in term of cost, more flexibility and it is an open source software. [3] There are pros and cons when choosing Blackboard or Moodle as Learning Management System in higher education. Its all depends on how the users use it, what they need most and how the IT department arrange the Learning Management System for more user friendly interface.

5. CONCLUSION

Virtual learning environments are the future in the academic field, not only for higher education but also for secondary education where they are being introduced. They are used by all universities around the world and every day, new applications are added to the virtual learning platforms. The objective is to improve the efficiency and the interaction between the students. This paper has made a comparative study between Moodle and Blackboard, and it was based on 3 kinds of comparison. The first was based on communication tool, and second was productivity tools and third was based on student involvement tools. From this paper we aimed to discover the best and most suitable e-learning system. The virtual

learning environment that gets better results has been Moodle. Although both have different features, it still depends on each individual preference. Moodle system is basic tools that transform and update present educational system. Nonetheless, they should continue improving existing applications and creating new for them.

REFERENCES

- [1] Diana Bri, Miguel Garcia, Hugo Coll, Jaime Lloret (2007). A Study of Virtual Learning Environments.
- [2] Sheo Kumar, Anil Kumar Gankotiya, Dr Kamlesh Dutta (2011). A Comparative Study of MOODLE with other e-Learning Systems.
- [3] Kit Logan, Tim Neumann (August 2010). Comparison of Blackboard 9.1 and Moodle 2.0
- [4] Chris Leeder, Steven Lonn (April 2013). Faculty Usage of Library Tools in a Learning Management System
- [5] Rubin, B., Fernandes, R., Avgerinou, M. D., & Moore, J. (2010). The effect of learning management systems on student and faculty outcomes. *The Internet and Higher Education*, 13(1), 82-83.
- [6] EduTools. (2006). CMS: Product Comparison System.
- [7] Ellis, Ryann K. (2009). *Field Guide to Learning Management Systems*, ASTD Learning Circuits
- [8] Pittinsky, M.S., *The Wired Tower: Perspectives on the Impact of the Internet on Higher Education*, Englewood Cliffs Prentice Hall (2003).
- [9] Hara, N. and R. Kling, "Students' Frustrations with a Web-Based Distance Education Course". *First Monday*, 4(12) (1999)
- [10] McCarthy, Ellen (2004). "Blackboard Set to Go Public Today". *The Washington Post*. p. E04
- [11] Daniels, Alex (2001). "Big company on campus: Blackboard hopes an IPO will help it dominate the Internet education market". *Washington Techway*. p. 26.
- [12] Beth Kowitt (2009). "Blackboard software rules the schools". *CNNMoney.com*. Retrieved 13 June 2013.
- [13] Blackboard vs. Moodle, Dr. Kathy Munoz and Joan Van Duze
- [14] Damnjanovic, V., Jednak, S., & Mijatovic, I. (2013). Factors affecting the effectiveness and use of Moodle: Students perception. *Interactive Learning Environments*, 1-19. doi: 10.1080/10494820.2013.789062
- [15] M. Michael, T. E. (2007). Blackboard vs. Moodle: Comparing User Experience of Learning Management Systems.
- [16] Machado, M., & Tao, E. (2007, October). Blackboard vs. Moodle: Comparing user experience of learning management systems.
- [17] McCarthy, Ellen (2004). "Blackboard Set to Go Public Today". *The Washington Post*. p. E04.
- [18] Rubin, B., Fernandes, R., Avgerinou, M. D., & Moore, J. (2010). The effect of learning management systems on student and faculty outcomes. *The Internet and Higher Education*, 13(1), 82-83.
- [19] S. Campanella, G. Dimauro, A. Ferrante, D. Impedovo, S. Impedovo, M. G. Lucchese, R. Modugno, G. Pirlo, L. Sarcinella, E. Stasolla, C.A. Trullo, E-learning platforms in the Italian Universities: the technological solutions at the University of Bari, *WSEAS Transactions on Advances in Engineering Education*. Volume 5 Issue 1. January 2008
- [20] Sánchez, R. A., Hueros, A. D., & Ordaz, M. G. (2013). E-learning and the University of Huelva: a study of WebCT and the technological acceptance model. *Campus-Wide Information Systems*, 30(2), 135-160.
- [21] Szabo, Micheal; Flesher, K. (2002). "CMI Theory and Practice: Historical Roots of Learning Management Systems". *Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2002 (White Paper)* (Montreal, Canada: In M. Driscoll & T. Reeves