

The Effect of Web-Based Learning Management System on Knowledge Acquisition of Information Technology Students at Jose Rizal University

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Abstract- One of the primary challenges faced by higher education institutions has been to discern the effect of the application of Learning Management Systems (LMS) on student learning outcomes. This paper maps the performance of Information Technology students enrolled in two sections at Jose Rizal University where the first section studied in the traditional learning environment while the second section studied in a blended or E-Learning environment. After applying qualitative analysis methods on assessment results from both sections, this paper concludes that the knowledge acquisition skills of the students improved through the intervention of LMS.

Keywords- E-Learning, Higher Education, Learning Management System, Knowledge Acquisition, Information Technology

I. INTRODUCTION

A great number of colleges and universities nationwide have ventured on e-learning as it delivers more training to students at its fast, convenient, and consistent advantages. It has also been very effective versus solely classroom-based models. The JRU College Division Computer Science Department has constantly been delivering traditional lectures through the use of technology as to software demonstrations and PowerPoint presentations. As always, a key to learning and to e-learning sites is its high quality content and instructional design that makes these courses effective.

A Learning Management System (LMS) is a software for delivering, tracking and managing learning instruction. An LMS aids numerous institutions in distributing courses over the Internet and offering features for online collaboration. But by definition, an LMS is intended to manage, not to train and develop. That is because the underlying architecture required for managing and administrating training is different from the framework needed to instruct and learn.

This study seeks to improve the learning curve of students with the aid of a learning management system through high quality content materials. Furthermore, the study seeks to identify measures to progress learning in the course of merging quality content delivery and instructional design and a substantial investment on the use of an LMS.

II. KNOWLEDGE ACQUISITION

Collaborative learning can achieve rigorous interaction among the students, break down the walls of classroom for learners as well as trainers, and thus can provide anytime, anywhere interaction among the teaching community, student community as well as among teacher and student. Roschelle and Teasley (1995) stress the role of shared knowledge and consider that collaboration is a “coordinated, synchronous activity that is the result of a continued attempt to construct and maintain a shared conception of the problem.”

Although the theories concerning mutual learning and knowledge construction have a number of points in common, there is also a variety of different perspectives that exist concerning the process of knowledge construction and the means of delivery and mediating its promotion. In this sense, we can distinguish three types of foci: learning as acquisition, as participation and as knowledge creation as presented in the table:

TABLE I - RELATIONSHIP BETWEEN DIFFERENT LEARNING PERSPECTIVES AND KNOWLEDGE CONSTRUCTION

	Acquisition	Participation	Knowledge Creation
Focus of education	Specific knowledge	Culturalization and development of identity	Construction of knowledge, extending learning, innovation
Theory	Theories of knowledge, outlines and structures	Situated and distributed cognition	Theories of knowledge construction and creation
Collaboration	Facilitation of individual cognition	Peripheral participation	Transformation of the activity
Technology	Artifacts of structuring	Social practice	Artifacts of mediation and transformation

The table shows an elaborative structure of learning activity diagram as proposed by Engeström (1999). The structure shows a transition from individual to community is needed from all aspects such as efforts, activities, methods and rules of learning etc.

III. LMS AND THE PHILIPPINE HIGHER EDUCATION

The increase in ICT usage in higher education in the past years led to several projects attempting to integrate LMS within the learning environment. These projects brought with them benefits for the academic stakeholders.

In his research, Flor (2008) mentioned a project undertaken by the Commission on Information and Communication Technology. The project involves the implementation of a training program on the use of an LMS called Web Board to selected computer laboratory managers and instructors on the use of technology. Web Board is an LMS that allows students to submit assessments such as assignments to their teachers through the use of individual boards. The system provides feedback to the students regarding their assessments. Another feature of this LMS is the chat feature that permits interactivity among the students and between the students and their teachers (Arvan, 2009).

Saint Louis University implemented a project called MySLU. The web portal is seamlessly integrated in the learning process of the university’s programs. The primary objectives of this project are: a) provide faster access for students to information and resources, b) promote interaction among the community users; c) provide collaboration between the students and teachers d) equip teachers with innovative tools for instruction e) encourage consistency through a uniform front end interface in the presentation of information resources (Mercado & Genove, 2006). Dokeos is an open source E-Learning platform with a strong community support. Within the systems, tools are available for

teachers and students such as course updates notification, CSS support, resource sharing and assessment modules (Rémy, 2005).

One of the most successful implementation of LMS locally is the University of the Philippines Open University. Considered by many as one of the pioneers of E-Learning in the Philippines, the project triggered curiosity among learners on the concept of distance education. The IVLE or Integrated Virtual Learning Environment was used as a platform to offer course materials to students allowing flexibility for the students and the teachers (Librero, 2004). Furthermore, the project provided a framework for other institutions to integrate LMS in their existing academic programs. Originating from Singapore, IVLE provides access to online resources, computer-based testing and incorporation of audio and multimedia files within the system (Lim et al., 2007).

In the southern part of the Philippines, Mindanao State University opted to use MOODLE or Modified Object-Oriented Design Learning Environment. MOODLE supplemented face-to-face course instruction through the deployment of online learning activities (Reyes, 2009). An open source technology, MOODLE is supported by a strong network of community developers. One of the major benefits of MOODLE is its ability to allow access to courses outside the campus. Courses can offer syllabi access, online notices, lecture resources, conferencing, forums and quizzes (Henderson, 2007).

IV. SELECTING LMS TOOL FOR JRU

Some organizations and researchers propose a preselecting activity before the evaluation and final selection of the LMS that would be used in the organization or the institution. Some pre-selection criteria have been considered by Soekartawi (2005) as shown in Figure 1 – LMS Constraints. There are four (4) constraints that need to be addressed by an educational institution before selecting the right LMS. These constraints are: (1) Connectivity, (2)

Technology Selection, (3) Software Tools and (4) Human Resources.

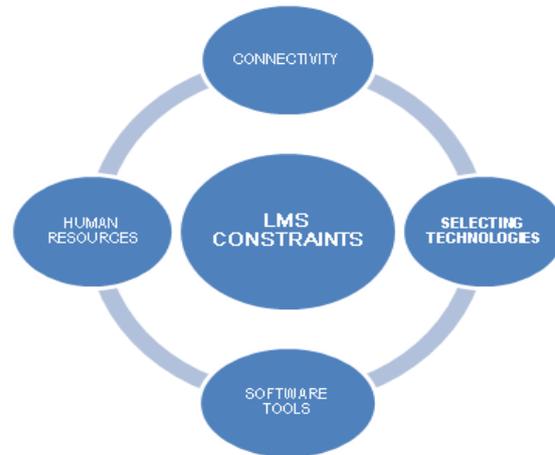


Fig. 1 – LMS Constraints

For the LMS to be utilized at JRU Computer Science Department, the researchers selected the use of MOODLE as it meets these four constraints. First, the recent upgrade of the computer laboratories, increase of Internet bandwidth and the launch of the campus WIFI established a foundation for the implementation of the LMS. Second, the hardware resources of the Information Technology Office more than meet the minimum requirements for the implementation of the LMS. Moreover, the existing network setup provides an easier deployment of the LMS within and outside JRU’s premises. Third, for many years, the CS Department of JRU has integrated open source technologies within its curriculum. Technologies such as PHP, MySQL, Linux and Open Office – all can easily integrate with MOODLE – are readily available. Lastly, the necessary skills to install, deploy and administer MOODLE co-exist within the skill sets of the faculty of the CS Department.

V. SUMMARY OF FINDINGS

In the context of this research, traditional approach is referred to as the conduct of instruction through the delivery of lecture sessions, manual administration of assessments and the usual physical interaction of the instructor and the students.

On the other hand, blended learning approach is referred to as the conduct of instruction with the aid of an LMS. During the 1st semester of Academic Year 2009-2010, the researchers established a Learning Management System using MOODLE was deployed online and accessible through www.csdeptjru.info. Two sections of the same course, Introduction to Programming (CSC/ITC25) were selected. Both sections were handled by the same instructor. The first section, the traditional sample, was conducted using traditional method of instruction. Lecture sessions were delivered inside the classroom and assessments were administered using the “pen and paper” method. Feedback for each assessment is given after 7 days. On the other hand, the second section, the blended approach sample, was provided with a hybrid method of instruction. The usual lecture sessions were still conducted but with the addition of an *online learning management system*. Course materials such as lecture slides and exercises were made available through the LMS. Assessments were administered inside Jose Rizal University and proctored by the instructor. Feedback is given immediately after sitting an assessment activity. A total of three assessments each were conducted by the instructor for the traditional and blended sections. Assessments for both the traditional and blended sections contained the same set of questions.

The researchers used the Test of Significance of Two Independent Sample Means to determine the effect of integrating LMS in a learning environment and developed the following hypotheses:

- 1) **Null hypothesis:** There is no significant difference in the passing rates of students enrolled in the traditional class and the blended learning class.

$$H_0 = \mu_1 \leq \mu_2$$

- 2) **Alternative hypothesis:** The passing rate of students enrolled in the blended learning class is higher than the traditional learning class.

$$H_1 = \mu_1 > \mu_2$$

The decision criteria to reject the null hypothesis and accept the alternative hypothesis is shown as follows:

Decision criteria: Reject H_0 if $t_c > t_{\alpha, df}$

Confidence level: $\alpha = 0.05$

At a confidence level of 95 %, the research will reject the null hypothesis if the computed value is greater than the tabular value.

$$s_{\bar{x}_1 - \bar{x}_2} = \sqrt{\frac{\sum (x_1 - \bar{x}_1)^2 + \sum (x_2 - \bar{x}_2)^2}{(n_1 - 1) + (n_2 - 1)} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}$$

where $SS_1 = \sum x_1^2 - \frac{(\sum x_1)^2}{n_1}$

Fig. 2 – Formula of t – Test

Using Figure 2 – Formula of *t – Test* above, the researchers identified the computed value which is $t = 4.61$. At degree of freedom equal to 79 and confidence level of $\alpha = 0.05$ (1 sided), the tabulated value is $t_{\alpha, df} = 1.664$. Because the computed value ($t = 4.61$) is higher than the tabular value ($t_{\alpha, df} = 1.664$) the

**TABLE II
SUMMARY OF RESEARCH DATA**

	ASSESSMENT PASSING RATES			Mean	SD	n
	1	2	3			
X ₁ (Traditional)	90.2	81.1	73.6	$\bar{x}_1=81.6$	$s_1=8.32$	43
X ₂ (Blended)	81.1	74.6	56.6	$\bar{x}_2=70.8$	$s_2=12.7$	38

researchers are constrained to reject the null hypothesis that there is no significant difference in the passing rates of students enrolled in the traditional class and students enrolled in the blended learning class. In addition, this research infers that the students enrolled in the blended learning class performed better in the assessments administered than students enrolled in the traditional class.

VI. CONCLUSION

The evaluation of this research in the assessment results of the students demonstrated that Information & Communications Technology, through the integration of a Learning Management System in the learning process, can increase the knowledge acquisition skills of BSIT students at Jose Rizal University as measured in their assessment results. The presence of features embedded in the LMS such as online interaction, resource materials availability and immediate assessment feedback contributed to the improvement of the assessment scores. The shift to the blended learning environment, one that benefits from the integration of the classroom and online delivery, acted as a catalyst for the learners to pursue further knowledge thereby increasing their learning outcomes. The borderless learning environment inherent to LMS allowed students to be present in their classes and further their knowledge without constraint from the four corners of their classrooms.

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