Evaluation of Course Management Systems for Improved Learning

A Thesis Proposal

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Submitted to

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Objective

- Use appropriate data collection techniques to evaluate several popular course management systems based on certain factors especially as regards student learning improvement
- Test my data using reliable statistical tests
- Make a conclusion with some level of confidence
- Propose some recommendations to existing systems
Thesis

- Course Management Systems maximizes student learning.
Abstract

- Technology has had a global impact on almost every aspect of human lives
- Of particular relevance is its impact on education
- Many universities now offer several courses and degrees online
- There are several course management systems used for online learning
- These systems have varying features that directly or indirectly affect the teaching and student learning of these courses
- Despite the numerous delivery of online courses using these systems, the effectiveness of online learning is still being questioned
- Hence, the evaluation of these course management systems is necessary to maximize learning.
- The different course management systems and their features shall be studied
- An evaluation and analysis of these systems and their effectiveness on learning, shall be done using appropriate statistical techniques
- Possible alternatives / improvements shall be recommended.
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Introduction

- These forms of learning exist: Traditional or Synchronous, Distance Learning, Blended Learning, and Online or Asynchronous Learning.
- Traditional Learning is the learning that typically takes place in the classroom environment or brick-and-mortar schools.
- Distance Learning is the learning provided to students who are located at a reasonable distance from the traditional classroom. The instructional delivery included an instructor who was physically located in a different place from the learner, as well as possibly providing the instruction at disparate times. Dede (1996, p. 1)
- Blended Learning is a mix of Traditional Learning and Online Learning.
- Blended learning as meaning "to combine any form of instructional technology (e.g., videotape, CD-ROM, Web-based training, film) with face-to-face instructor-led training." (Driscoll, 2002)
Online learning is the learning that occur via an online or asynchronous medium. The use of technology and the internet are usually required.

Online learning is described by most authors as access to learning experiences via the use of some technology. (Benson, 2002; Carliner, 2004; Conrad, 2002)

Online Learning is becoming more popular locally and globally

It is sometimes used interchangeably with eLearning

Sometimes, online learning takes place when both the students and the instructor are online at the same time

Most times, online learning takes place irrespective of whether the instructor and the students are online at the same time

Online Learning uses chat, voice, video conferencing, web conferencing, virtual worlds, internet podcasts, among others
Course Management Systems (CMS)

- Modern online learning systems occur via a course management system.
- It is sometimes referred to as a Learning Management System (LMS), Virtual Learning Environment (VLE), or a Knowledge Management System (KMS).
- It is a collection of software tools providing an online environment for course interactions.
- Gagné, Wager, Golas, and Keller (2005) define a CMS as having tools associated with the development and delivery of courses which are placed onto the Internet, further defined as a Collaborative Learning Environment (2005, p. 219), but the authors define an LMS as more of management system for the delivery of online learning. (2005, p. 339).
CMS versus LMS

- Though a Course Management System is sometimes referred to as a Learning Management System, there is a key difference.
- Briefly, course management systems are designed to support academic classroom course while learning management systems are designed to support corporate training.
Examples of Course Management Systems

- Several course management systems exist today to meet the needs of online learners. They include:
  - Angel Learning Management Suite
  - Blackboard Academic Suite (formerly known as WebCT)
  - Desire2Learn Learning Environment
  - eTEA Learning Management System
  - LON-CAPA
  - Moodle
  - Pearson LearningStudio Campus
  - Sakai
  - Edutes
  - OLAT (Online Learning and Training) and the list continues…

- We shall discuss several features of the popular course management systems
History of Online Learning

- Online Education started with the corporate world.
- Companies started using computer-based programs to train new employees in the 1980s.
- In 1994, the distance learning organization, CALCampus (Computer Assisted Learning Center) for adults, located in Rhode Island introduced its first entirely online curriculum, and integrated the World Wide Web into its mission.
- The earliest form of online education was not as efficient when compared to today’s online learning.
- The online materials were mainly text; few images that existed had poor quality; and students were still required to print their assignments and mail them to the instructor.
Features of Course Management Systems

- The features of course management systems typically comprise:
  - Learner Tools
  - Support Tools and
  - Technical Specifications
Typical Learner Tools in CMS

- Typical Learner Tools include:
  - Communication Tools
  - Discussion Forum
  - Email feature
  - Assessment features
  - Grade book
  - Student Chat/Lounge
  - Individual Forum
  - Group / Team activities
  - among others
Data Methodology

- The main method of data collection is by Simple Random Sampling.
- This is the process of using chance to select individuals from a population to be included in the sample.
- I shall obtain this sample random sample by using technology.
- I shall use Microsoft Excel to obtain a simple random sample of about 60 users (3 simple random samples where each sample consists of about 20 users) from each of 3 populations using the random generator function.
- The sampling shall be without replacement to avoid getting the same user two times.
The Sample Survey

- Questions on the sample survey shall include the type of course management system used by the user; the functions of those systems that they like; the functions they would have wanted; their thoughts on online learning; rating the effectiveness of online learning on a Likert scale; rating the effectiveness of their course management system on a Likert scale; among others.

- The data thus collected, shall be organized using a frequency table. It shall then be presented on a pie chart, as well as a bar graph.

- Some descriptive statistics shall be discussed.
An Example of One of the Surveys

<table>
<thead>
<tr>
<th>CMS / Features</th>
<th>Moodle</th>
<th>Blackboard</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>Accessing Course Notes</td>
<td>30%</td>
<td>20%</td>
</tr>
<tr>
<td>Accessing Assignment Requirements</td>
<td>80%</td>
<td>10%</td>
</tr>
<tr>
<td>Site Navigation</td>
<td>85%</td>
<td>12%</td>
</tr>
<tr>
<td>Ease of Use</td>
<td>82%</td>
<td>10%</td>
</tr>
<tr>
<td>Cost</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Class Communication</td>
<td>95%</td>
<td>3%</td>
</tr>
<tr>
<td>Accessing Grades</td>
<td>98%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Key: 100% of the respondents agree that Moodle is free; 10% of the respondents disagree that Moodle has the simplicity of accessing assignments requirements; 7% of the respondents neither agree nor disagree that the site navigation in Blackboard is easy; and so on.
An Example of the Total Sample Survey

- The following shows the total responses from 3 different samples of 20 users of Blackboard, Moodle, and Pearson course management systems on the overall effectiveness of maximizing learning, and meeting the diverse needs of learners.
An Example of the Total Sample Survey

<table>
<thead>
<tr>
<th>Blackboard</th>
<th>Moodle</th>
<th>Pearson</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>75</td>
<td>78</td>
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<tr>
<td>88</td>
<td>70</td>
<td>73</td>
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</tbody>
</table>
### An Example of the Total Sample Survey

<table>
<thead>
<tr>
<th>Blackboard</th>
<th>Moodle</th>
<th>Pearson</th>
</tr>
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<tbody>
<tr>
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<td>79</td>
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</tbody>
</table>
**Statistical Test to be used**

- Based on the survey responses, we shall:
- Find and interpret the descriptive statistics
- Construct and interpret a 95% confidence interval from the samples
- Estimate the value of a parameter using confidence intervals from inferential statistics
- Explain the role of the margin of error when constructing the confidence interval
- Form and Test the hypothesis (thesis) on whether the different CMS maximizes student learning
- Test the hypothesis by using One-Way Analysis of Variance (ANOVA) in comparing three or more means
- Make conclusions
Key Points on Hypothesis Testing

- We use sample data to determine whether to accept or reject the statement in the null hypothesis. The four possible outcomes are shown in the table below:
- The null hypothesis is $H_0$
- The alternative hypothesis is $H_1$

<table>
<thead>
<tr>
<th>Conclusion</th>
<th>Reality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do Not Reject $H_0$</td>
<td>$H_0$ is True</td>
</tr>
<tr>
<td></td>
<td>$H_1$ is True</td>
</tr>
<tr>
<td>Correct Conclusion</td>
<td>Type II Error</td>
</tr>
<tr>
<td>Reject $H_0$</td>
<td>Type I Error</td>
</tr>
<tr>
<td></td>
<td>Correct Conclusion</td>
</tr>
</tbody>
</table>
Overview of the Four Outcomes to Hypothesis Testing

- If the alternative hypothesis is true, and you reject the null hypothesis, a correct decision is made.
- If the null hypothesis is true, and you accept the null hypothesis, a correct decision is made.
- If the null hypothesis is true, and you reject the null hypothesis, a Type I error is made.
- If the alternative hypothesis is true, and you accept the null hypothesis, a Type II error is made.
Key Points on Analysis of Variance (ANOVA)

- ANOVA is an inferential method used to test the equality of three or more population means.
- The requirements of a One-way ANOVA Test is satisfied in this survey. These requirements are:
  - There are 3 simple random samples; given to 20 users each; one sample from each of 3 populations.
  - The 3 samples are independent of each other.
  - The users in one sample group are not related in any way to the users in the other two groups.
  - The populations are normally distributed.
  - The sample size is the same.
  - The largest sample standard deviation is no more than twice the smallest sample standard deviation.
The basic idea in my using the one-way ANOVA is to determine the effectiveness of the responses of these 3 different samples from 3 different populations by comparing their means. This way, I want to see if the sample data could come from populations with the same mean, $\mu$, or if the sample evidence suggests that at least one sample comes from a population whose mean is different from the others.

We shall be discussing:

- Between-sample variability: this is the variability among sample means
- Within-sample variability: this is the variability of each sample
ANOVA (contd.)

- ANOVA F-Test Statistic: the ratio of between-sample variability to within-sample variability
- The computation of the F-test statistic is based on mean squares.
- A mean square is a sum of ratio of two mean squares divided by the corresponding degrees of freedom.
- Therefore, the F-test statistic is seen as a ratio of two estimates of the variance or two mean squares.
- The within-sample variability is a weighted average of the sample variances from each sample, where the weights are based on the size of each sample. It is also referred to as “Mean Square due to Error” (MSE)
The between-sample variability is based on the fact that any differences in the sample means could be attributed to the different levels of the treatment or sample. It is also known as the “Mean Square due to Treatment” (MST).

Therefore, the F-test statistic could be seen as the ratio of the mean square due to treatment to the mean square due to error.

Since the F-test statistic is the ratio of MST to MSE, the analysis of variance tests are always right-tailed tests.
ANOVA By Hand

- Form the null hypothesis
- Form the alternative hypothesis
- Determine the MST
- Determine the MSE
- Compute the F-test statistic
- Find the critical F-value (based on the F-Distribution Critical Values Table)
- Compare the F-test statistic with the critical F-value
  - If the F-test statistic is > critical F-value, then reject $H_0$
  - If the F-test statistic is < critical F-value, then reject $H_1$
One-Way ANOVA can be performed by Technology by using Microsoft Excel, TI-84 Plus Graphing Calculator, MINITAB, IBM SPSS, among others.

In this case, we shall use the P-value and the level of significance, $\alpha$

Form the null hypothesis, $H_0$

Form the alternative hypothesis, $H_1$

Use the technology specified to run the test

If the P-value is $<$ the level of significance, reject $H_0$

If the P-value is $>$ the level of significance, reject $H_1$
Recommendations / Additions

- Despite the many important features of the three course management systems discussed, these additions are recommended:
- Module and Pearson should have Wimba tools or tools that encourage Voice Email, Voice Direct, among others
- Module and Pearson should have some functionality similar to “Tegrity” recording. Instructors should be able to record videos easily in the course environment for their students. This will improve learning.
- There should be easy and full accessibility of Module, Blackboard and other course management systems across all platforms and across all operating systems
Conclusion

- From the results shown so far,
- We can conclude that the three course management systems discussed, are good tools for maximizing learning, and for meeting the diverse needs of learners.
- Blackboard, Moodle, Pearson, and other course management systems could be improved.
References

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