RESEARCH ANALYSIS OF MOODLE REPORTS TO GAUGE THE LEVEL OF INTERACTIVITY IN ELEARNING COURSES AT ASSUMPTION UNIVERSITY, THAILAND

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Abstract- Moodle is a license free software platform. All those involved in the business of eLearning also call it as a Learning Management System (LMS), or Virtual Learning Environment (VLE)). Moodle is designed to help educators create online courseware with opportunities for rich interaction. Interactivity is becoming a key facet of eLearning. Moodle logs all activities including views and posts for all learning objects hosted in the system and provides “Reports” and statistics to help the content experts to improve the quality of eLearning courseware. This paper describes the use of automated, scalable real-time “Reports” containing data of all activity (views and posts) for four major ICT courses offered as a part of the Master Degree eLearning program at Assumption University of Thailand. The data examined in this study includes a purposive sample of “views” and “posts” captured in the Moodle “Reports.” This innovative tool is embedded into the Moodle and can be used by the educators to evaluate students’ activities and identify online behaviors and interaction pattern in the networked learning environment. Information provided by the “Reports” can be used for evaluating the quality of courseware and student interaction with the system.

Keywords: eLearning, Interactivity, Learning Objects (LO), Moodle, “Reports”, VLE, Views and Posts

1. INTRODUCTION
The word Moodle is an acronym for Modular Object-Oriented Dynamic Learning Environment; Moodle is a license free open-source software platform. Those involved with eLearning also call it as Learning Management System (LMS), or Virtual Learning Environment (VLE)). Moodle is designed to help educators and content experts to create online courseware with opportunities for rich interaction. Its open source license and modular design allows content experts to develop additional functionality. Development of this eLearning platform is undertaken by a globally diffused network of commercial and non-commercial users, spearheaded by the company based in Perth, Western Australia.

Moodle is modular in its design and can readily be extended by creating plug-ins for new functionalities. Moodle's infrastructure supports many types of plug-ins such as Activities, Resource types, Question types, Data field types (for the database activity), Graphical themes, Authentication methods, Enrollment methods, Content Filters and “Reports.”

Many third-party solutions are also available for making use of its open infrastructure. Moodle's development has also been assisted by the work of open source programmer community. This has contributed towards its rapid growth and development. The stated philosophy of Moodle includes a social constructionist approach to education, emphasizing that both students and teachers can contribute to the educational experience in many ways. Moodle is also useful in an outcomes-based interactive classroom environment that could be continuously improved by analyzing the captured data of all activities such as ‘views’ and ‘posts’ for all the learning objects or components of a courseware hosted on a system.

2. VIRTUAL LEARNING ENVIRONMENT (VLE) AND LEARNING OBJECTS
Virtual learning environment (VLE) is an integrated software system designed to enable teachers and students in the management and administration of educational content. The system can track the learners' progress, which can be monitored by both teachers and learners and can be used for eLearning, or to supplement the traditional face-to-face (F2F) classroom as well as blended learning. VLEs are defined as computer-based environments that are relatively open systems, allowing interactions and knowledge sharing with other participants and teachers and providing access to a wide range of resources hosted on the system [1]. The value of a VLE is to fully enable "learning anywhere at any time" by providing an array of resources, opportunities for active participation, mastering content and self learning [2].

In a VLE a learning object (LO) is usually defined as any entity, digital or non-digital that may be used for learning, education or training. It is also called as web-based interactive chunks or parts of eLearning courseware designed to explain a stand-alone learning objective. In an eLearning environment a digitized entity can be used, reused or referenced many times during the learning process. These entities can be a self-contained, digital and reusable entity with clear objectives that

1 In Moodle “Reports” is a tool provided in its menu that could be very useful in gauging the level of interactivity between the instructor and students during the delivery of a courseware
In the eLearning environment, "Reports" are innovative tools that can be used to understand the level of interactions in a course. The data for this research was collected from September 16 to December 16, 2007. Interactivity in a VLE is the act of instigating interactions and facilitating communication between learners. In order to investigate the level of interactions all on-line activities after the log on are recorded into the Moodle database.

This paper describes the use of an automated, scalable, multi-browser, real-time visualization tool called "Reports", which depicts the pattern of the interaction between the students and various learning objects of an eLearning courseware in an asynchronous conference. It captures all the conference data that can be used to understand the level of interactions in a learning environment. "Reports" are an innovative tool or objects embedded into the Moodle environment and can be used by educators to evaluate students' activities and identify online behaviors and interaction patterns in the eLearning environment. Information provided by these "Reports" can be used for motivating the students and building more robust and interactive content in a courseware.

3.1 Courses Included in the Research

For this study I used the "Reports" generated by the Moodle for the four courses to analyze the "views-posts" data to examine the level of interactivity. The details of the four eLearning courses and number of students enrolled in each course are given in Table-1.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th># of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICT-5001</td>
<td>Computer Concepts &amp; Programming</td>
<td>4</td>
</tr>
<tr>
<td>ICT-6000</td>
<td>Computer System Organization</td>
<td>10</td>
</tr>
<tr>
<td>ICT-6001</td>
<td>Information System Development</td>
<td>9</td>
</tr>
<tr>
<td>ICT-6002</td>
<td>Internet Technologies</td>
<td>10</td>
</tr>
</tbody>
</table>

The four courses included a total of 33 students who used the Moodle, the Virtual Learning Environment (VLE) to access the courseware material during the second semester of their study for their Masters Degree in ICT. These four courses were offered in the semester ending on December 23, 2007. The collection of data ended on December 16, 2007, just before the Final Examination.

3.2 Typical Components of Moodle "Reports"

Following is a list of some of the common types of information that is included in a statistical "Reports" generated by the Moodle: General Course Descriptive Data, Course identifiers, Language of content (English, Thai, Content area (Math, ICT, etc.), Descriptive text, Descriptive keywords, Life Cycle, Version, Status, Instructional Content, Text, HTML web pages, Images, Audio, Video, Glossary of Terms, Definition, Acronyms, Forums, Quizzes, Assessments, Questions, Answers, Rights, Cost, Surveys, Copyrights and Restrictions on usage of a courseware.

3.3 Data Analysis for gauging the level of interactivity

For the purpose this study only "All activity (views and posts)-Students" is considered. In the database context it means that both data sets (views and posts) for students only are graphed. For "views and posts", the 'views' means that the data about access to an object doesn't get saved into the database. An example of "view" is that a student logs on to a course and watches an online video for a particular chapter or just views the power-point slides for a chapter. Whereas all data about the 'posts' means anything new that is created and uploaded does (forum posts, assessment uploads, etc.) get saved in the database. An example of "post" will be that a student submitted or uploaded an assignment or a quiz.

The main objective of this study is to track how many times the students logged on to the system to view or post a particular object of a course. The data in the Table-2 indicates the total number of views for all the objects for the four courses accessed on-line was 9155 and the total number of views was 621.

<table>
<thead>
<tr>
<th>Courses</th>
<th>Views</th>
<th>Posts</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICT-5001</td>
<td>858</td>
<td>56</td>
<td>15</td>
</tr>
<tr>
<td>ICT-6000</td>
<td>2364</td>
<td>138</td>
<td>17</td>
</tr>
<tr>
<td>ICT-6001</td>
<td>3117</td>
<td>241</td>
<td>13</td>
</tr>
<tr>
<td>ICT-6002</td>
<td>2816</td>
<td>186</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>9155</td>
<td>621</td>
<td>15</td>
</tr>
</tbody>
</table>

4. BASIC ARCHITECTURE OF THE VIRTUAL INTERACTION MAPPING SYSTEM (VIMS)

The Fig-2 given below illustrates basic structure of a Virtual Interaction Mapping System (VIMS) and its relationship with the VLE (for example Moodle). VIMS is composed of four distinct modules: (i) A Control module that handles all web-
based user interactions including thread specification, thread and message content and prepares these data for rendering in graphical format, (iii) a Rendering component that uses radial tree layout and convex hull algorithms to generate the Interaction Visualization in Scalable Vector Graphic (SVG), a common format and (iv) an API suite that facilitates deployment within different VLE systems. It is necessary to provide a different API implementation to use VIMS with another VLE [3]. For Moodle the open source community of programmer regularly adds new Application Programming Interfaces (API)s for new functionalities. The student as well as the instructor (user) can access the “Reports.”

Fig-1 Architecture of VIMS

The Moodle VLE provides a set of objects to evaluate the progress of an eLearning course. The browser interface shown in Fig-2 shows the “Reports” option. Clicking on the “Reports” takes the instructor to a menu with “Under the Reports Type” drop-down menu provides five options given below:

All activity (All roles)
All activity (views and posts) Students
All activity (views and posts) Teacher
Views (all roles)
Posts (all roles)

After selecting “All activity (views and posts) Students” an instructor is taken to the next page where he or she can access all the data about “views and posts” including graphs in a SVG format in the browser. For each course the “Reports” provides statistics using three fields-Course, “Reports” Type and Time Period-last.

5. DOES LEARNING OCCURES THROUGH INTERCATION?

Pedagogical studies in eLearning have revealed that a meaningful and effective interaction with courseware objects in a VLE system enhances the learning experiences. During interaction the learner analyses, describes and evaluates the objects and at the same time clarifies and inquires if the content contained in the object is understandable [4]. Research has also shown that more of knowledge sharing, collaboration and community building occurs in learner-to-learner communication rather than instructor centered communication [5]. The “Reports” tool lets the instructor view, at a glance, important elements that could help to encourage the learners to engage more effectively in the VLE to master the content and succeed in their studies.

5.1 Analysis of Views & Posts Data

A well designed eLearning course can provide ample opportunities for collaborative work, dialogue and study which can increase the flexibility of learning while keeping the participants engaged. Structuring of the courseware objects and the facility of online access to these objects vary according to the nature of specific disciplines [5]. The Moodle “Reports” containing data of “views and posts” can help visualization of the activities in a way to assists the instructor to understand at a glance, several important indicators without any further investigation or research. Such indicators include:

1. Quality of interaction among the students and role played by students in the online discussions through “posts”
2. Their development of skills in the course and their ability to engage in higher level thinking
3. Their ability to extract information from the VLE as well as their peers
4. Provide instructors with a tool to evaluate the progress of students in a course

The “Reports” tool discussed in this paper uses a similar framework as proposed by Schrire and shown in Fig-1 to graphically represent the student’s access to VLE and evaluate the communication patterns of the learners. It enables assessment of the triangular relationship between courseware content, online participation and learning [5].
The details are extracted and displayed in SVG format in a browser. The data collected over four month period indicates significant differences in the number of “views and posts” for each course. Bi-weekly record shown in Fig-4 indicates that all four courses started with significant “views and posts” and continued that way till December 16, 2007. On the whole ICT-5001 had the least number of “view and post.” Other three courses, ICT-6000, ICT-6001 and ICT-6002 showed a consistent activity in terms of posts.

5. CONCLUSION
On the basis of the data given in the tables and depicted in figures included in this paper we can derive the following conclusion:

1. Each course differs in terms of total number of views and posts as depicted by Bi-Weekly data graphed in Fig-4.
2. The ratio of views and posts remains within a close range of 13-17 as given in Table-2
3. The average ratio of 15 as shown in Table-2 for “views and posts” indicates almost proportional interactions for all the four courses.
4. Fig-5 depicting the ratio of “views and posts” does not show any significant variance in the four courses.
5. However, when examined individually as a data set (Fig-3) ICT-5001 shows lowest number of “views and posts” followed by ICT-6000.

Hence we can derive a conclusion that the two courses ICT-5001 and ICT-6000 should be revaluated in terms of their components, delivery systems and overall student participation.

REFERENCES


