Improving student engagement through a blended teaching method using Moodle

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Abstract: Web-based learning system commonly known as Learning Management System (LMS) which makes use of internet technologies has been widely used by many education institutions around the globe. LMS forms a part of their campus-based and distance teaching. With the wide uses of LMS nowadays, university teaching is often conducted in blended mode: partly through face-to-face teaching and partly through LMS. To date, little research has been carried out to investigate to what extent the uses of LMS contribute to student learning, particularly student engagement. In this paper, we present a blended teaching method for promoting better student engagement and their willingness to participate in the learning activities through better uses of LMS (Moodle in our case), the design of our assessments, and the ways we lead them to learn. To demonstrate the usefulness of our method, we also present in this paper the results of applying it to teaching a third year computer science subject, CSE3MQR.

Keywords: Student Engagement, Blended Teaching, Moodles, Constructive Alignment, Constructive Progressive Alignment

1. Introduction

The history of the application of computers to education has started since 1950s. Learning systems have progressed from in-house built systems to commercial ones. The progress is inherently tied up to the use of computer networked technologies and applications in supporting the distance learning or in the classrooms. The applications of computers evolved and give new ways of delivering educational programs. Many scholars have adopted the integration of computer application for teaching and learning as "e-Learning system" which is used interchangeably with different acronyms such as "learning management system (LMS)". E-learning systems are used to describe educational computer applications that handle all aspects of the learning process, allowing students' to managing learning material content and also providing educators to find ways with flexible teaching and learning environment for campus-based students and fully online courses institutions (Coates et al 2005; Govindasamy et al, 2002). LMS such as BlackBoard, WebCT, Moodle etc. are not only tools to support e-learning in teaching and learning but also provided opportunities for self-regulated learning and supporting collaborative learning (Paechter et al 2010). Higher education institutions have responded by offering LMS as a part of everyday experience in campus-based and distance learning of teaching and learning. Despite the acceptance of LMS amongst students in higher institutions, it does not always deliver on its promise that they will receive the maximum benefit from their learning.

Research into the use of LMS mainly investigates students' perceptions of their learning regarding e-learning system's effectiveness. Several new technologies such as mobile computing, ubiquitous computing, ontology engineering, semantic web, grid computing, XML services have offered a kind of flexible educational platform for e-learning systems. However, highly used of teaching technologies may not lead to a significant effect of understanding in students' learning although it does support learning in an innovative ways as teaching technologies make a vast difference in traditional teaching method and led to enhance students' experience of learning. Neither technology-centered nor methodology-centered

approaches can guarantee the success and the practical applicability of learning environments. Prior studies have shown that student's learning experience is an indicator of attitudes satisfaction towards the integration of e-learning systems in learning (Dawson et al 2010; Liaw 2008].

A study focus on student's perceptions with online delivery using a constructivist approach to learning is conducted by Hughes et al (2002). In their study, 220 students participated in an evaluation of online delivery. A qualitative techniques of analysis resulted that learning with web-based environment swept the students' ICT anxiety and improve their interest in learning. They conclude that the study did not successfully developed the constructivist approach but online method can be proven to be a very useful tool in improving the student's ability in learning.

LMS has been widely used by many education institutions around the globe. LMS forms a part of their campus-based and distance teaching. With the wide uses of LMS nowadays, university teaching is often conducted in blended mode (Garrison et al 2004): partly through face-to-face teaching and partly through LMS. To date, little research has been carried out to investigate to what extent the uses of LMS contribute to student learning, particularly student engagement. In this paper, we present a blended teaching method for promoting better student engagement and their willingness to participate in the learning activities through better uses of LMS (Moodle in our case), the design of our assessments, and the ways we lead them to learn. To demonstrate the usefulness of our method, we also present in this paper the results of applying it to teaching a third year computer science subject, CSE3MQR (Metrics, Quality and Reliability).

2. Moodle

La Trobe has been using Moodle as the LMS for teaching and learning since 2011. Moodle (Modular Object-Oriented Dynamic Learning Environment) is an Open Source Course Management System (CMS), also known as a Learning Management System (LMS) (http://moodle.org). It has become very popular among educators around the world as a tool for creating online dynamic web sites for their students. Moodle aims to give educators good tools to manage and promote learning, but there are many ways to use it. For instances, it has features that allow it to scale to very large deployments and hundreds of thousands of students, yet it can also be used for a primary school or an education hobbyist. Many institutions use it as their platform to conduct fully online courses, while some use it simply to augment face-to-face courses (known as blended learning). Many users love to use the activity modules (such as forums, databases and wikis) to build richly collaborative communities of learning around their subject matter (in the social constructionist tradition), while others prefer to use Moodle as a way to deliver content to students and assess learning using assignments or quizzes.

3. The Blended teaching method

Constructive Alignment (CA) (Biggs 1996, 1999, 2003) forms is a popular pedagogy adopted in many universities in the world. "Constructive" refers to the principle of constructivism in learning which states that meaning is personal, it depends on motives, intentions, prior knowledge, etc., and learning is a way of interacting with the world; and "Alignment" refers to what a lecturer does to support the appropriate learning activities in order to achieve the intended learning outcomes. Lecturers are responsible to facilitate the learning activities of the students and design the assessment tasks which assess students' Intended Learning Outcomes (ILOs).

CA is largely a technique for teaching planning; and its focus is on how the teaching activities enable students achieve the Intended Learning Outcomes (ILO) of a subject. However, CA does not pay much attention to the progressive learning behaviours of students, which influence what they would do for learning. With CA, ILOs could be measured towards the end of the teaching period, typically by examination and a big assignment; and students might view them as urgent and resort to outside help. We have developed a new pedagogy called Constructive Progressive Alignment (CPA) (Lai and Sanusi 2013), an extension to the CA system, which also considers students' progressive learning behaviours when planning the teaching activities. The meaning of "Constructive" and "Alignment" remain the same as in the CA context. "Progressive Alignment" means that a lecturer designs teaching activities that support students' progressive learning behaviours as well as their abilities to achieve the ILOs. With CPA, the ILOs

are specified using the SOLO taxonomy (Biggs and Collis 1982) and the strategy for achieving students' progression in learning is based on Shulman's table of learning (2002).
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Shulman's table of learning (2002) defines a six-stage learning process. Which consists of: (1) Engagement and Motivation; (2) Knowledge and Understanding; (3) Performance and Action; (4) Reflection and Critique; (5) Judgment and Design; and (6) Commitment and Identity. However, stages 5 and 6 refer to students' longer and life-long learning. We are of the opinion that we could improve higher education student learning if we just focus on the first four stages of Shulman's table of learning, given the fact that there are only a limited number of weeks in one semester for teaching a subject. At La Trobe University, there are 12 weeks of teaching in one semester. We use a blended teaching method with the use of Moodle. The designs of the teaching and learning activities are centred around Shulman's first four stages of learning so that we have confidence that students are learning from stage to stage; and consequently, they will increase their learning.

4. Teaching activities for enhancing student engagement

Learning begins with student engagement, without which subsequent stages of learning will not succeed well. We find out students' learning preferences so that we could align our ways of teaching with students' learning styles. To obtain such information from the students, we conduct a Moodle online survey amongst them at the start of a semester. The survey was entitled "Approach to Studying XXX" (where XXX is the name of the subject) and used a five-point Likert-type scale (with 5 being the most true and 1 being the least true), which indicate the degrees to which the students agree with a certain study style or behaviour. It is aimed at gaining some ideas about what made the students engage in learning and what motivated them to study, based on their past experiences in learning activities.

The survey consists of 15 questionnaires; some examples are: (i) I prefer a personalized approach to learning and want to have peer learning with my classmates; (ii) I am able to do the best when learning the practical aspects of subject; and (iii) I like a clearly defined schedule and standards so I know what to do rather than taking independent action. Students indicated their level of agreement by selecting a number within the range from one to five, with five meaning the highest level of agreement. The results are published on Moodle and discussions are held with the students to arrive at joint decisions on the breakdown of assessment and styles of learning and teaching etc.

To obtain further feedbacks from them at the start of the semester, we briefly explain the topics of the subject to be taught. We also conduct a Moodle survey which enables them to indicate their levels of interest in each of these topics. Further, the survey also consisted of the following two questions: (i) I like to have as many topics as possible to be covered in this course, with the understanding that each of the topics will not be taught in depth; and (ii) I like to have a lesser number of topics to be covered but at a greater depth. Students indicate their level of interest/agreement by selecting a number within the range from one to five, with five meaning the highest level of interest/agreement. To promote student engagement, we concentrate our teaching more on their preferred topics.

At La Trobe, examination usually constitutes between 70% to 80% and assignment 20% to 30% of the assessment marks. For the CSE3MQR, it is 60% for examination and 40% for course work. The bigger percentage for course work is to encourage students to be more engaged in learning and to perform more learning activities themselves. All assessment tasks were conducted 100% on Moodle; that is there is absolutely no pen and paper submission. In this way, students are more engaged in their learning as the young people today are living and "sleeping" with the laptops and smart phones. The e-Assessment tasks are of smaller sizes and distributed weekly. Typically, students were given one or two weeks to complete a task; for instance, quiz is due at 9am on each Monday; tutorial is at 9am on each Tuesday; laboratory at 9am on a Wednesday, and problem solving question is due at 9am on Thursday. The regularity get them into the habit of reviewing the teaching materials, thus engaging them in learning.

The e-Assessment tasks are of different types and aim to enhance their engagement in learning as it is in general human beings like varieties and tend to get bored with just one thing quickly. The assessment tasks were to be of different varieties, eg, quizzes, problem solving tasks, essay, tutorial questions, laboratory

questions, assignment requiring researching into commercial/industrial issues. The marking guidelines are made explicitly to students; they are marked according to two main criteria: (a) evidence of effort; and (b) correctness; students will get full marks for a question which demonstrates these two criteria. Each e-Assessment task is designed for students to learning a particular aspect of the subject.

We sent out weekly Moodle announcements reminding them about e-Assessment deadline, marking criteria, the availability of assessment results, general feedbacks on the assessment tasks, seminars and talks on topics that are relevant to them, what would be taught in the next lecture, and what would be done in the next laboratory/tutorial class.

Practitioners from the computer industry are invited to give a guest lecture. The aim is to bring the real world into the class room. To increase student learning and engagement, it is essential that they see how things are put into perspective with the industry and they are able to see the relationship between their career, the industry and currently what they are learning.

5. Implementing the method

We have applied our method to teaching a few computer science subjects since 2011. One of them was CSE3MQR (Metrics, Quality and reliability). In this paper, we limit our discussions on our experiences in using the method to teach CSE3MQR in 2012. CSE3MQR is a subject of the Bachelor of Software Engineering (BSE) course. A third year students has to complete the studies of subjects totaling 120 credit points. CSE3MQR is worth 15 credit points. This subject examines the different attributes of the quality of a piece of software and their meanings. The topics covered include the use of metrics to improve software quality, different types of metrics, software complexity, size estimation, Goal Question and Metrics (GQM), software reliability concepts, reliability model, reliability estimation, testing issues in the real world, test suite design, testing techniques, management issues in testing, and software release policies. In 2012, there were 35 students who enrolled in CSE3MQR. Teaching consisted of two one-hour lectures and one two-hour laboratory/tutorial.

6. Student Engagement Experience Questionnaires and results

We have received an approval from the Ethics committee of La Trobe University to conduct a survey amongst the CSE3MQR students about their learning experiences. The approval number is FHEC11/R49. A survey form was constructed to find out the learning experiences of the 2012 MQR students. The survey form was handed out to the CSE3MQR students during the laboratory/tutorial class of the last week of the semester. Students were asked to select one of the following against each of the questions: (i) SA- Strongly Agree (represented by a score of 5); (ii) A - Agree (represented by a score of 4); (iii) N - Neutral (represented by a score of 3); (iv) D - Disagree (represented by a score of 2); and (v) SD - Strongly Disagree (represented by a score of 1)

In order to preserve the integrity of the data and the data collection process, the forms were collected by another academic staff (suppose Joe was his name) rather than the lecturer. Joe collected all the forms and put them in an envelope in his office. He then stamped on each of the survey forms a departmental chop with his signature and the date of the signature. When we were ready to do the analysis, we worked only on the signed and stamped survey forms. There were 35 students who enrolled in CSE3MQR in 2012; and there were 27 students who participated in the survey. The statistical data were used to examine the students' opinions on the effectiveness of the teaching method with the aim of improving their learning. The summary can be found in Table 1, with AS meaning Average Score. After the end of the semester, the CSE3MQR students were interviewed. Some student interview sample data appear in Table 2

Table 1: Summary of Students' responses to the questionnaires on "Engagement and Motivation"

Engagement and Motivation questionnaire	SA	A	N	D	SD	AS
1. I think doing a variety of the smaller e-Assessment tasks has motivated me to learn the subject materials better, as compared to doing one big assignment.	14	11	1	1	0	4.4

2. I think doing the e-Assessment tasks has helped me engage more on this subject, as compared to using pen and paper.	10	13	3	1	0	4.2
3. Suppose I miss the deadline of an e-Assessment submission and know that a late submission will attract a deduction in marks. I still like to submit it because the e-Assessment tasks of this subject in general motivate me to learn the materials better.	13	9	3	1	1	4.2
4. The fact that the lecturer of this subject gave weekly online announcements about assessment, tutorial/laboratory, marking criteria, seminar and talk, assessment results, etc., has helped me organize my studies better.	16	5	4	1	1	4.3
5. The fact that the lecturer considered our opinions on the breakdown of the marks of the e-Assessment tasks has motivated me to learn and engage more in this subject.	9	14	4	0	0	4.3
6. The fact that the lecturer taught and concentrated on the topics of our preferences has motivated me to learn and engage more in this subject.	12	8	6	1	0	4.0
7. The fact that the lecturer invited his past students to give guest lectures on their work experiences and knowledge and how this subject has helped them in their career has motivated to learn more about the subject material.	11	8	5	3	0	4.0
8. The fact that the course work of this subject constitutes a bigger percentage (40% as compared to the normal 20% or 30%) of the total assessment has motivated me to engage more in the subject.	17	7	2	1	0	4.5

Table 2: Students' Learning experiences in "Engagement and Motivation"

Sample answer to each of the above 8 questionnaires on Engagement and Motivation
1. Smaller and regular e-assessment tasks motivated me to learn because it is easier to learn by doing a smaller assignment as compared to one big assignment.
2. E-assessment motivated me to learn more because I found it easier to do my assignment using my computer. I am attached to my computer.
3. I still want to submit the tasks after deadlines because I do not miss my marks even though I know there is a penalty for it. But still I want to submit because I want to learn.
4. Weekly online announcements motivated me to learn because it helped me organize things and it served as a good reminder for me to learn the subject.
5. The fact that the lecturer took into account students' opinion on the breakdown of the marks had motivated me because I felt involved in the learning process.
6. The fact that the lecturer taught the topics of my preferences motivated me to learn because the interesting topics made me want to come to the class.
7. Guest lectures are good. Because it motivates me and helped me to get the direction for my career.
8. The percentage of 60% and 40% is good because I know I can get better marks in the assignment and I feel secured.

7. Conclusions

Sheard et al [2010] reported that poor student attendance in the Australian university classrooms is a norm, and that it is perceived that there is a lack of engagement in learning by students. The new kind of students have thus created a need for universities to think of new ways of engaging students in learning. With the wide uses of Learning Management Systems (LMS) nowadays, university teaching is often conducted in blended mode: partly through face-to-face teaching and partly through LMS. We are of the opinion that the problem of poor class attendance will persist due to the facts that students are busy with their lives. In this paper, we have presented some strategies as to how we can promote better student engagement and their willingness to participate in the learning activities through better uses of LMS (Moodle in our case) , the

design of our assessments, and the ways we lead them to learn. We have applied these strategies to teaching a few computer science subjects; and in this paper we have presented the learning experience in student engagement of the 2012 CSE3MQR class; and the results are encouraging.

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Laurillard (2002) stated that instructional designers should drive eLearning, not technologists and those who are innovative educators will be those who maximise eLearning and ensure its further development. Ravenscroft (2001) argues that "we cannot truly transform educational practice for the better through using new technologies unless we examine the roles the computer can play in truly stimulating, supporting and favouring innovative learning interactions that are linked to conceptual development and improvements in understanding." Future progress in eLearning will come from a better understanding of the dynamics of teaching and learning and not from more improved or functional technology, though as mentioned the latter does provide opportunities for new, innovative pedagogies to develop. It is concluded that our work is based in innovative teaching practices rather than breakthrough in technologies which provides opportunities for the former and that we have presented results that support the arguments of the above researchers.

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