ATTITUDE TOWARDS ONLINE ASSESSMENT IN PROBABILITY AND STATISTICS COURSE AT UNIVERSITI TEKNOLOGI PETRONAS

Afza Shafie¹, Josefina Barnachea Janier²

Department of Fundamental and Applied Sciences
Universiti Teknologi PETRONAS
Bandar Sri Iskandar
31500 Tronoh, Perak., MALAYSIA.

¹afza@petronas.com.my, ²josefinajanier@petronas.com.my

Abstract

Probability and Statistics is a course offered to all engineering students in their second year second semester at Universiti Teknologi PETRONAS (UTP). The typical number of students enrolled in this course is between 500 – 600 students each semester and a team of instructors with one course coordinator is assigned to teach and manage this course. The students attend 3 hours of lectures and 1 hour of tutorial every alternate week. Among the issues faced in managing this course are: difficulties to find a common time for all students to conduct test and quizzes; marking and provide feedback to the students within a short period of time; and monitoring their progress throughout the course. Wiley plus, an online suite of resources, was introduced in this course for the past semester. Although there are several components in this system, only the Assignment and Gradebook were adopted. A survey using the Likert scale on the attitude of 150 students towards this type of assessment was conducted. It is found that students were receptive towards the online assessment carried out in the course and the system is able to assist the instructors in managing the assessment for the course.

Keywords: Attitude, Online assessment, Large class.

1. INTRODUCTION

University Technology Petronas (UTP) is a private university in Malaysia that offers six engineering programs and two programs in the area of information technology. The engineering programs are chemical, mechanical, electrical, civil, petroleum and geoscience. The university follows a two-semester per academic year format and the student intake is twice per year (every semester). Each semester there are about 500 – 600 students from the five engineering programs enrolled in the Probability and Statistics for Engineers (EAB2123) course which is offered in their second year second semester of the 4 - year program. The students are grouped according to their program hence there are five classes of 100-150 students and each with its own timetable. A team of three instructors including a course coordinator is allocated to teach the course. A few Graduate Assistants also helped out with grading some of the quizzes.

Managing the course in this setting is cumbersome. The common problems experienced by the team includes: handing out (distributing) course materials, student-instructor communication across the five classes, registering for tutorial sessions, scheduling and conducting common quizzes/tests. The manual grading adds the burden to the instructors as well as to the graduate assistants and it is almost impossible to provide immediate feedback and results.

Nowadays many higher education institutions use course management system (CMS), as a tool to assist in delivering content to students, either as supplement to courses delivered traditionally or as an entire course offered online (Green 2006). A CMS is an alternative to reduce problems of managing large classes. Moodle, an open source CMS, was implemented as an e-learning platform in UTP in the first semester 2007, as part of the development in the teaching and learning process and has been used as a tool to manage the EAB2123 course (Herdiana and Afza 2008).

Initiative to implement Wiley plus, an online assessment platform in UTP began in the second semester 2008, as a complement to Moodle. Although there are several components in this system, only the Assignment and Gradebook components were adopted. This paper looks at the early stage of using Wiley plus and also describes the experience in managing the assessment component of the course. A survey was given to 150 students. The survey consists of 3 parts; Attitudes, Skills developed and open ended questions asking for their feedback. The focus of the paper is on the students’ attitude towards using this form of assessment and the results are discussed.

The paper is organized as follows: Firstly, a brief background description of the Probability and Statistics course will be given in the next section. How Moodle and Wiley plus were used as a tool to help manage the assessment will be described in Section 3. Section 4 discusses the results of the survey. Finally, the conclusions and recommendations are given in Section 5.

2. BACKGROUND

The Probability and Statistics is a 3-credit course with 3 one-hour lectures and 1-hour tutorial session per week. One semester consists of 14 weeks of lecture. The course is a one-semester course compulsory for all fourth semester engineering students. Although it is a one-semester course the content is rather heavy and consists of topics from probability and descriptive analysis concepts, through to topics in multiple regression and experimental design. The
assessments for EAB2123 are the coursework (40%) which consists of 2 quizzes, 1 assignment and 2 mid-semester tests; and the final exam which carries 60% of the total mark. The number of quizzes is kept at minimum due to limitation on resource allocation. The five engineering classes have around 100 – 150 students each, this is due to capacity of the lecture halls in UTP besides the requirement of the university which adopts outcome based education. In addition, it would be difficult, if not impossible, to set timetable for a common lecture across the five programs, thus each engineering program has its own timetable for this course. One instructor may teach one or two of these classes.

Announcements on confirmation of tests schedules and venues, tutorials sessions and assignments due date were traditionally given in the class and need to be repeated from time to time to remind the students. Since there are five different groups, sometimes, this information has to be conveyed to all the students thus giving rise to a delay in response. In addition, significant time is spent by the coordinators in addressing other trivial student matters and recording of student grades.

Prior to Moodle and Wiley plus, the quizzes were conducted in each individual class on different times set by the respective instructor. However, the feedback from students was on the different level of difficulties of questions between instructors, different format of quiz and also inconsistency in grading and feedback, or results were not given at the same time. As for the mid - semester tests, they are set on fixed dates performed in a common venue, and usually conducted in the evening (after office hours) where all five programs are free from classes.

The above issues are typical in teaching large class as reported in (University of Queensland 2003); the following has been identified as the major challenges in managing large classes:

- Distribution/ organization of information.
- Communication.
- Assessment.
- Feedback opportunities.
- Group work.

Some of the problems related to teaching and assessing students in large classes also mentioned in Jungic et.al (2006) and Tan (2004) are listed below:
- inability to get to know students,
- inability to reduce students feeling of anonymity,
- how to create interest and interaction in class,
- managing marking loads and maintaining consistency,
- recording grades,
- how to effectively communicate the subject material.

3. USE OF MOODLE AND WILEY PLUS

The purpose of CMS is to assist instructors in getting resources up on the web for students and to facilitate the management of typical course activities (Tan 2004). Some of the popular commercial systems available are: WebBoard, WebCT, and Blackboard; from the open source there are: Moodle, and Sakai (Knorr 2004). Study by the University of Queensland (2003) shows that one of the most common successful strategies in teaching large classes is the use of web-based course material (course website, online resources, discussion boards etc.) and use of mixed media in lectures (power point, overhead, etc.). The use of electronic course management systems is now widespread in education (Rosato et al 2004). Some advantages of web-based course management systems are: accessibility of course resources to students, timely communication between instructor and students and reduce paper usage.

Moodle 1.6 was first installed in January 2007 as an e-learning platform in UTP and currently, is used to manage the registration of tutorials, broadcasting of important announcement or reminders and posting of course materials such as lecture notes, tutorial questions and their solutions for the EAB2123 course. Online assessment was also carried out on Moodle, but setting up and maintaining an online assessment can be a very time-consuming and cumbersome process for the instructor (coordinator) whom already loaded with large workload. This was especially experienced when developing questions with different level of difficulties and at the same time that can be randomized in order to reduce possibilities of cheating since instructors are required to create and manage the ‘test bank’ in the system. An alternative method that was applied to prevent cheating was by conducting a controlled online test in a common venue in this case the computer laboratories were used. The drawback was the capacity of the venue (60 at one time), so the test was carried out in 10 different sessions (groups). A password was given to each set of question so that students outside the lab cannot access the online test. Furthermore, Moodle does not support the Microsoft Equation Editor, hence the difficulties in developing questions that require extensive usage of mathematical symbols and notations.

One problem encountered was when it involves questions which require short answers which the student has to type in the box provided. The typed answer has to be exactly the same as the solution given by the instructor; otherwise the system will mark it as zero. In this case the instructor/coordinator has to remark the answer. Due to these constraints, it is not possible for the instructors to give as many assignments or quizzes as they liked even though a study carried out by Herdiana and Afza (2008) had shown that the students prefer to have at least one online assessment for each chapter.
Wiley plus, an online system, was introduced in this course during the January 2009 semester as a complement to Moodle. Although there are several components to the system, only the Assignment and Gradebook were adopted. Wiley plus is a free software package provided together with the adopted text for the course. It is designed to help educators as a tool to support in creation of quality teaching and has been widely used by educational institution. Each student is given an access key to access the Wiley plus site. Once logged in, students have access to the assignment and their individual gradebook. Instructors teaching the subject are registered as users that can edit the course’s site, including changing the activities and grading students by using simple interface as shown in Figure 1.

3.1 How Wiley plus is used as a tool to manage the assessment of the EAB 2123 course.

1. Online Assessments

The activity ‘assignment’ was used for online assessment. Four steps are involved in creating the online assessment; describe assignment, select questions, organize and score questions and finally set the questions policies. In the first two stages, the assignment can be created using pre loaded questions, which include multi-step problems, multiple choice questions (MCQ), True/False, matching, numerical, short answers, descriptive, calculated and essay as shown in Fig. 2. In addition, it is also possible for instructors to add questions to the database. These preloaded problems are categorized according to their chapters, sources, and types of questions and level of difficulty. Furthermore, assignments can include non scoring tasks such as reading assignment. Also there are guided online problems that feature step by step, interactive problem – solving guidance based on some sample problems from the text. These types of problems are well suited for self-learning.

In designing the assignment instructors have choices whether to randomize the questions (and choices in an MCQ), set the number of attempts allowed, the time given to complete the work and also the type of extra help provided. The types of extra help available include link to the appropriate chapters in the text and also the solution to the problem as shown in Figure 3. Besides this, instructors may also choose algorithmic questions which allow students to work on the same problem with different values, thus avoiding sharing of answers.
Once the questions are selected and scores are assigned, the instructor may allow the student to access the hints, link to text or solutions before assigning the assignment. In addition, penalties may also be imposed in cases if students attempt the assignment after the due date. Due to the large number of enrolment for the course, most of the assignments are opened for some period of time, normally 5 to 7 days. This is to reduce the number of students attempting at the same time that may cause congestion and slow connection.

2. Grading
Once a student completed an online assignment, grades are immediately given. Students can also view their personal logbook for their grades on all the assignments attempted and also feedback or comments from the instructors. This component allows the instructor to easily check on each student’s logbook, track on the overall class results and monitor the progress of each student.

4. RESULTS AND DISCUSSIONS
Assessment using Wiley plus was fully implemented in January 2009 semester with a course enrollment of 520 students. Each of the students enrolled for the course was required to purchase the text together with the access code for the system. Four graded assignment were given throughout the semester, one of which is a timed assignment. Students were allowed one attempt for each of these assignments and each of these sessions was opened for five days. Results obtained from these assignments contributed to 8 percent of the overall coursework marks.

Survey findings
A survey was given to these groups of students and 150 responses of the students participate in the survey. The percentage of response to the questions asked in the survey on the attitudes towards using the Wiley plus is recorded in Table 1. The Likert scale used is: 1 – Strongly disagree, 2 – Disagree, 3 – Agree, 4 – Strongly Agree.

<table>
<thead>
<tr>
<th>Question</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. It helps in understanding problems in probability and statistics</td>
<td>5%</td>
<td>16%</td>
<td>58%</td>
<td>21%</td>
</tr>
<tr>
<td>2. The links provides guides in determining what formulas to use</td>
<td>6%</td>
<td>26%</td>
<td>52%</td>
<td>18%</td>
</tr>
<tr>
<td>3. The links provided help in solving problems</td>
<td>8%</td>
<td>14%</td>
<td>61%</td>
<td>17%</td>
</tr>
<tr>
<td>4. It gives more motivation to study and learn probability and statistics</td>
<td>11%</td>
<td>27%</td>
<td>45%</td>
<td>14%</td>
</tr>
<tr>
<td>5. It can reinforce student’s learning.</td>
<td>6%</td>
<td>18%</td>
<td>17%</td>
<td>55%</td>
</tr>
<tr>
<td>6. It encourages me to learn and understand better difficult problems</td>
<td>4%</td>
<td>22%</td>
<td>53%</td>
<td>18%</td>
</tr>
<tr>
<td>7. I find probability and statistics more interesting</td>
<td>9%</td>
<td>21%</td>
<td>51%</td>
<td>19%</td>
</tr>
<tr>
<td>8. It enhances my learning the course.</td>
<td>4%</td>
<td>17%</td>
<td>19%</td>
<td>59%</td>
</tr>
<tr>
<td>9. It is effective and beneficial</td>
<td>5%</td>
<td>21%</td>
<td>22%</td>
<td>51%</td>
</tr>
<tr>
<td>10. I find this e-learning platform useful to do online quizzes or tests.</td>
<td>15%</td>
<td>10%</td>
<td>40%</td>
<td>35%</td>
</tr>
<tr>
<td>11. I find the Wiley plus gradebook useful to view my quizzes and tests marks/grades online</td>
<td>0%</td>
<td>5.5%</td>
<td>16.7%</td>
<td>77.8%</td>
</tr>
<tr>
<td>12. I find Wiley plus useful if it has additional online self test with automatic feedback for students to do independent learning.</td>
<td>0%</td>
<td>10%</td>
<td>60%</td>
<td>30%</td>
</tr>
</tbody>
</table>

Table 1. Response to Wiley plus
On the whole, more than 70% of the students are receptive towards using this new form of assessment and agree that it is useful (in some ways) in doing the course. Among the positive comments obtained are; online assessment allows immediate feedback on their results, links should be allowed for all the problems in the assignment and suggestions that online assignment will only be MCQ type and be more frequent as it will encourage students to study or do more exercises.

Some of the frustrations expressed by the students that disagree with online assessments (Response on question N0.10) that would discourage them in using this feature were:

- slow connection,
- some mathematical symbols were not recognize by some PCs,
- for short answer questions, the numeric value or text need to be in precise format.

As for the coordinator and instructors, Wiley plus has helped a lot with managing the assessment for the course. Since these assignments are automatically graded, this has significantly reduced the amount of time spent for marking which in turn allows for quicker feedback to the students on their performance. As a supplement to the text, Wiley plus provides a variety of questions at various levels of difficulties. In addition, the instructors are also given the options of including their own sets of questions. Wiley plus also has a feature that allows for different values being assigned to different students for the same question. These features had saved the instructors a lot of time since there is a need to have a considerable amount of questions in order to ensure that the chances of students having the same set of questions are minimal due to the large student enrolment for the course. Furthermore, a number of assignments (either graded or non graded) could be assigned to the students. This in turn would help the students to understand the course materials better and be independent learners.

5. CONCLUSIONS AND RECOMMENDATIONS

Managing a course and practicing common assessment for a large group of over 500 students divided into 5 classes is certainly a demanding job. Although it is only at its initial stage, the use of CMS (Moodle) together with Wiley plus has greatly reduced the huge task of managing the Probability and Statistics course especially in dealing with problems of registration for tutorial sessions, delivering the course materials and communications and common assessment. The system eases the burden on managing the assessment in some ways, however, it also introduces (imposes) new sources of complexity to the instructors such as, effective implementation of the online assessment and its effectiveness in helping students learn the course. Meanwhile, these two systems are adopted for the July 2009 semester. Even though it is found that this online learning platform has been beneficial to the instructors, further studies need to be carried out to determine the effectiveness of Moodle and Wiley plus in helping students understand the course.

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REFERENCES