The Implementation of Wiley-Plus® in Vector Calculus

Noorhelyna Razali*, Norngainy Mohd Tawil, Azami Zaharim, Hafizah Bahaludin, Izamarlina Asshaari, Zulkifli Mohd Nopiah

Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia

Abstract

E-learning is a web-based training which resides on a server or host computer that is connected to the World Wide Web. E-learning has been implemented at the higher education level in Malaysia to help students in certain subjects. The difficulties in the learning of mathematics, as an instance, are well-known and the use of new technologies specifically by using e-learning is an important inducement for both lecturers and students in order to obtain an adequate, or more importantly, an effective transmission of the knowledge. The objective of this research is to identify the significance of implementing e-learning i.e. Wiley-Plus in Vector Calculus at the Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia. A set of questionnaire has been distributed to 193 respondents for all four departments and the results show that students are satisfied with the use of Wiley-Plus® in learning process.

Keywords: E-Learning; Wiley-Plus®; Vector Calculus;

1. Introduction

Malaysia has been implementing Information and Communication Technology or ICT in its educational system to increase the effectiveness of teaching and learning process. However, the traditional face-to-face learning process proves its dominance when it comes to transmitting the knowledge to the students. There are advantages to the students and also the lecturers who are applying this methodology in both the teaching and learning process. However, by bringing in the technology as another tool in teaching and learning, it will give enormous impacts towards students. Yao Lin(2008) states that the role of technology in teaching and learning progress is important in order to increase students’ motivation and achievement. E-Learning is one of the components of ICT that had been introduced in higher education to generate positive impact towards students. E-Learning can be defined as a term describing an educational setting in which teaching and learning take place within an internet-based environment (Berge & Collins, 1995). It is essentially a learning system that is supported by both electronic hardware and software either online i.e. synchronous or offline i.e. asynchronous. (Karim & Hashim, 2004). One of the advantages of the e-learning is that students can choose where and when they want to learn according to their convenience.

* Corresponding author. Tel.: +0-6-03-8921-6681; fax: +0-603-8921-6960.
E-mail address: helyna@eng.ukm.my

© 2011 Published by Elsevier Ltd.
Selection and/or peer-review under responsibility of Kongres Pengajaran & Pembelajaran UKM, 2010
Keywords: E-Learning; Wiley-Plus®; Vector Calculus;
use of new technologies, specifically by using e-learning is an important inducement for both the lecturers and the students in order to obtain an adequate transmission of the knowledge. Web-enhanced courses also prevent students from being passive recipients of knowledge to becoming more actively engaged in the construction of knowledge. Educational system does not depend on one component but it has to integrate all components to get the better impact. Thus, an integrated learning has been introduced so that it can increase the performance of the students and also lecturers. Simply put, such learning constitutes a mixture of e-learning and traditional types of learning. It is also mentioned as the integrated combination of traditional learning with web-based online approaches, the combination of media and tools deployed in an e-learning environment and the combination of a number of pedagogical approaches (Hisham, Che & Hassan, 2006). Singh and Reed (2001) define integrated learning as a mediator or instructor that uses many techniques to convey the knowledge in order to maximise the implication of a learning outcome.

Students experience difficulties in studying mathematics since they have to understand the theories and memorize the formulas. In certain cases, they need to visualize the picture when applying those theories and formulas. Studies by Yushau (2006) have shown that attitude is one of the reasons why learning mathematics is so difficult. Wong et al. (2001) point out that mathematics involves critical thinking therefore students should understand the concept rather than memorizing the formula to solve the problem. On the other hand, it should first be noted that the teaching of mathematics in engineering schools should allow students to acquire sufficient skills to be able to analyze and seek for the best solutions to a given problem, as a function of the context within which they will be consistently engaged in, later in their professional lives. Therefore, to warrant better grasp of the subject, new perspectives of mathematical concepts and theories should be developed among students in order for them to encounter and overcome the anxiety in understanding this particular subject. According to the National Council of Teachers of Mathematics (2000), “technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students’ learning”. In fact, nine out of ten pre-service teachers mentioned that technology and computers have prominent roles in teaching mathematics (Yao Lin, 2008). Singh and Reed (2001) also add that through the blended learning model, it encourages the students to perform analysis and synthesis of the problem given. In other words, it increases the cognitive dispositions of the students and makes the students more creative and uses their abilities at optimum level. Moreover, results from a research by Eng (2009) have indicated that students find greater enjoyment and fuller enthusiasm in learning mathematics through the blended learning mode.

In the Faculty of Engineering and Built Environment, (FKAB), UKM, we have been using e-learning through SPIN (Interactive Learning and Management System). It is an online learning system where teaching and learning is a one-to-one process. It is an interaction between students and a virtual lecturer. Students can download their notes and tutorial lectures from SPIN. Studies by Tawil et al. (2009) have revealed the necessity of using SPIN in mathematics. However, we find that there are some constraints in SPIN where the lecturer themselves have to create their own notes and questions to be published in SPIN. Therefore, in this paper, we attempt to implement a new system known as the Wiley-Plus®, this new system which integrates the entire digital textbook and simplifies and automates important tasks like making assignments, scoring student work, keeping grades, and more. Wyllie (2009) has found that most of the students agree that Wiley-Plus®, which is the medium for the instructor to communicate with students, is user-friendly. In addition, the learning outcome is higher for those who have the experience learning by integrating the traditional method and online learning as compared to those who have only been engaged in either one of the methods (Wiley, 2009).

Wiley-Plus® is a web-based application that assists instructors in preparing for classes and lectures and automates the process of assigning and grading homework. It allows students to complete their homework online and receive instant feedback on their work. There are three main components in Wiley-Plus® i.e. Read, Study & Practice, Assignments and Gradebook. Read, Study & Practice is the area for self-guided student activities. It contains a full online text and may also include other study materials to help students learn about the subject of the course. The Assignment tab is where students navigate to see all of their assignments, with their due dates included and can be noted. Assignments can either be in the form of scored questions or unscored tasks such as readings, animations or practice problems. Gradebook allows students to view all their scores from the assignments in their class. Students can sort the list of assignments using the arrows on the column headings.
The objective of this research is to investigate students’ perception and satisfaction levels on the use of Wiley-Plus® in Vector Calculus. We are also interested to investigate students’ styles of learning, whether the use of lecture notes or/and Wiley-Plus® do facilitate their ways of studying this particular subject.

2. Methodology

Questionnaires were given to the first-year students from the academics session of 2010/2011 at the Faculty of Engineering and Built Environment (FKAB), UKM. The scope of the questionnaire sheds light on the students’ perception and satisfaction on e-learning. A total number of 193 students were involved in this study with 38 students from the Civil & Structure Engineering (JKAS) course, 63 students from Mechanical & Material Engineering (JKMB), 45 students from Chemistry & Process Engineering (JKKP) and 47 students from Electric, Electronics & System Engineering (JKEES) course.

3. Data Analysis

Evaluation on the Wiley-Plus® components is based on the Mean Analysis. Mean analysis indicates the students’ perception and satisfaction towards the Wiley-Plus® components. The mean values obtained from students’ responses are based on the five-point Likert scale which is different for perception and satisfaction levels. For perception level, the scale means, 5 = very important, 4 = important, 3 = neutral, 2 = not important and 1 = extremely not important. On the other hand, for satisfaction level, 5 = extremely agree, 4 = agree, 3 = neutral, 2 = disagree and 1 = extremely disagree. If the mean values show between 4 and 5, this means that students perception on the Wiley-Plus® components are important/satisfactory. However, if the mean value is between 1 and 2, it would mean otherwise.

4. Result And Analysis

The percentages of demographic characteristics (gender, races, hometown) were calculated and represented as noted in Figure 1. The total students involved are 193 students which are 119 males (62%) and 74 females (38%). Among the students, the highest percentage of the students based on races is the Malay students, 61% which represents 118 students followed by Chinese students, 33% (63 students), Indians and others are 4% (7 students) and 2% (5 students) respectively. In this study, among the 193 students, 110 students (57%) are living at a city or town, 70 students (36.3%) residing in rural areas and other students living in suburban areas.

Figure 1 The percentage of the students based on their gender, races and hometown.
Experience using the computer was measured based on the five-point Likert scale which are, 5 = extremely agree, 4 = agree, 3 = neutral, 2 = not agree and 1 = extremely not agree. All of the students from all departments (JKAS, JKMB, JKKP, JKEES) by average had rated 4 points suggesting that students are familiar with computer as illustrated in Table 1. In essence, students are confident and comfortable enough working with the computer without any anxiety and they do not face any difficulties in handling the computer, so here we can well assume that the students are also capable of using online tools.

<table>
<thead>
<tr>
<th>DEPARTMENT</th>
<th>EXPERIENCE USING COMPUTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>JKAS</td>
<td>4.384</td>
</tr>
<tr>
<td>JKMB</td>
<td>4.066</td>
</tr>
<tr>
<td>JKKP</td>
<td>4.22</td>
</tr>
<tr>
<td>JKEES</td>
<td>4.264</td>
</tr>
</tbody>
</table>

The Wiley-Plus® components including Read, Study & Practice, Assignment and Gradebook have their own roles to enhance the understanding of the students about the courses. As a whole, the students moderately feel the importance of the Read, Study & Practice in their learning process. Based on Table 2, JKKP students give the highest mean (\(x = 3.91\)) followed by JKAS (\(x = 3.84\)), JKEES (\(x = 3.64\)) and finally JKMB (\(x = 3.51\)). The perception of the assignments from the students’ views can be shown based on the result that the mean is approximated or approaching 4 points. The JKKP students give the highest means (\(x = 4.43\)), JKAS student (\(x = 4.43\)), followed by the JKEES students (\(x = 3.99\)) and lastly the JKMB students (\(x = 3.68\)). Thus, the results indicate that students realize that assignments serve to be one of the important elements that helps them to clearly understand what they have learnt previously in class. Students also believe that the Gradebook component is important in order to achieve comprehensive learning as a student. It is proven that the mean of this component from all departments is nearly, or has achieved four points. The highest mean belongs to the JKAS and JKKP students (\(x = 4.16\)).

<table>
<thead>
<tr>
<th>Department</th>
<th>Read, Study&amp; Practice</th>
<th>Assignment</th>
<th>Gradebook</th>
</tr>
</thead>
<tbody>
<tr>
<td>JKAS</td>
<td>3.84</td>
<td>4.36</td>
<td>4.41</td>
</tr>
<tr>
<td>JKMB</td>
<td>3.51</td>
<td>3.92</td>
<td>3.96</td>
</tr>
<tr>
<td>JKKP</td>
<td>3.91</td>
<td>4.06</td>
<td>4.2</td>
</tr>
<tr>
<td>JKEES</td>
<td>3.64</td>
<td>3.87</td>
<td>4.1</td>
</tr>
</tbody>
</table>
Figure 2 Mean values of students’ perception towards WILEY-PLUS® components.

Figure 3 Mean Values of Students’ Satisfaction towards WILEY-PLUS® components.

Figure 3 above shows students’ satisfaction level based on departments regarding the Wiley-Plus® components. When comparing students’ perception and satisfaction levels, it can be seen that all departments are satisfied with the use of Read, Study & Practice component in Wiley-Plus®, except that the JKKP students find that their perception level in Figure 2 (3.91 point) is higher as compared to their satisfaction level in Figure 3 (3.84 point). For the Assignment component, both JKKP and JKEES students are satisfied with this component with 4.43 and 3.99 points respectively. On the other hand, JKAS and JKMB students’ satisfaction level has been decreasing as compared to their perception, with 4.14 and 3.68 points respectively. Finally, for the Gradebook component, all departments’ satisfaction levels are less compared to their perception level with 4.16, 3.8, 4.16 and 3.91 for JKAS, JKMB, JKKP and JKEES respectively. Although some of the satisfaction level for each component rated by all departments are decreasing when compared to their perception, the values are still above 3 which is above neutral and remain in the satisfactory range.

Significantly, students have been clearly satisfied, where they realize the importance of Read, Study & Practice components. The tutorial provided in Wiley-Plus is used as an example, to help them to be prepared for the examination. Meanwhile, the notes in Wiley-Plus® help the students to solve the task given. Besides, students are also satisfied in using multimedia as learning tools, as they can enhance further their learning process through the course. The important role of the Assignment component specially satisfies the students, when it help them get better understanding about the content of the course and this application allows the students to send their tasks more conveniently. Other than that, the numbers of questions are reasonable and relevant according to the lecture given to the students. The application of the Gradebook is very useful when the students are able to know the marks obtained
after they have completed the task given. Students feel that this component is important because it can demonstrate the students’ performance and the level of understanding about the course.

5. Discussion And Conclusion

This research has successfully revealed that students in the Faculty of Engineering and Built Environment have been contented with the idea of Blended Learning in the study of mathematics specifically in Vector Calculus. They have also shown positivity towards all components in Wiley-Plus such as Read, Study & Practice, Assignment and Gradebook. Since this is the first time that Wiley-Plus® has been added in mathematics as one of their offered courses, there are also some limitations that can be improved such as; adding tool for mathematical equations and symbols, including other information from other sources, upgrading number of examples, notes, and solutions for assignments and upgrading the question level and make it harder and rarer with different levels.

After all said and done, it can be concluded that students from all departments are satisfied with e-learning and we are looking forward to measure the students’ performance after implementing this modern method of learning in mathematics.

Acknowledgements

The research is supported by grants UKM-PTS-010-2010.

References


