

Importance – Satisfaction Analysis For Wiley Plus in Vector Calculus: Students' Perspectives.

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Abstract:- Online teaching tools is widely used to facilitate the incorporation of self-learning methods. An initiative to apply online teaching tools within the classes of Vector Calculus is part of the faculty effort to improve achievement of engineering students. The aim of this study is to evaluate the level of importance and satisfaction of the components in WILEY PLUS, an elearning approach that offered in Vector Calculus course in UKM. The study employed mean analysis to measure the importance and satisfaction level. The differences between this mean show the gap values. T-test assists the gap value analysis in explaining the difference, if any. Questionnaires distributed to 193 students of four departments in the Faculty of Engineering and Built Environment. The finding shows that the students agree on the importance and satisfaction towards WILEY PLUS components. However, the students' importance is higher than the satisfaction towards WILEY PLUS components.

Key- Words: - WILEY-PLUS, Level of importance, Level of satisfaction, Vector Calculus, elearning

1 Introduction

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 [10]. Differences in teaching styles across disciplines in higher education courses are common in delivering the knowledge. Technological change will progressively require life-long learning and continuous training. The establishment of a fruitful collaborative and cooperative atmosphere is an essential part of learning. Research has shown that social collaboration can boost student achievement, provided that the kinds of interactions that are encouraged contribute to learning [9].

It is important for Universities to develop comprehensive and forward-looking education strategies. Students should be enabled to acquire the necessary skills in order to actively participate in and understand the information Society and fully benefit from the possibilities it offers [8]. The

convergence of technology and traditional practice in the education system will allow the better impact towards teaching and learning development. Web-based instruction becomes one of the methods used nowadays.

Technology in the form of calculators and computers has been used widely in mathematics education has vast research literacy [12]. Studied by Yao Lin (2008) mentioned that technology has a vital role to enhance the student's enthusiasm and achieve their goal [1]. According to Dirk (2011) the learning technologies have the potential to enhance educational innovation [6]. Lately, there are increasing interest in the dynamics of institutional change and e-learning in higher education providers. Some institutions had accepted the e-learning as part of everyday activity, while in others it still struggled to gain traction. It clearly identified the institutions that had appeared to have successfully engaged with e-learning across their teaching and learning functions [7].

Nowadays, faculty members and students of higher education are familiar with the application of e-learning. In RMIT it shows that technology are

increasingly used in mathematics and mathematics learning are enhanced by technology [12]. The E-learning has become an imperative for further survival on the market [11]. The e-learning is a method of teaching and learning progress occurs within an Internet-based environment (Berge & Collins, 1995). The e-learning has been implemented in various subjects such as mathematics, Sciences and engineering courses. Mathematics is one of the difficult subjects to understand by students. According Brandusa (2010b) a key goal of the formal education system can consist in more information easily accessible through a simple Internet search than could ever be imparted by a teacher, providing context that allows students to decipher relevance and meaning. That helps students turn information into knowledge [9]. According to the National Council of Teachers Mathematics, (2000), "technology is essential in teaching and learning mathematics; its influence the mathematics that is taught and enhances students' learning". Most of the students are facing difficulties in understanding the subject's contents and remembering the formulas .

Wong and et al (2001) revealed that in order to solve the problem in mathematics, students should know the concept comprehensively rather than remember the formula blindly [3]. Learning and teaching are two mutually dependent elements of a teaching process. From traditional up to the present forms of teaching where ICT technology plays an important role, the focus on the process of teaching has changed. Since teaching has its definite goals it should also be specially tailored to meet the needs of a student. Different forms of teaching have taken into consideration the above mentioned facts in a different way. The tendency of individual approach to a student is constant, but the real level of individualization depends on actual situation and specific circumstances in which the teaching process is carried out [11]. Thus, Faculty of Engineering and Built Environment, FKAB, UKM, take an initiative to introduce the application of e-learning in Mathematics.

2 Implementation of Wiley Plus in Vector Calculus.

Faculty of Engineering and Built Environment, FKAB, UKM, take an initiative to introduce the application of e-learning known as WILEY-PLUS in Vector Calculus. FKAB, UKM, has four different causes. There are Ordinary Differentiae Equation,

Calculus Vector, Linear algebra and Statistical for Engineering.

As we live in a time of fast and big changes, accelerated communication and information exchange, which is inevitably reflected in the educational system and so often called "the era of informatics and communication" [11] adapting technology in university has become one of the agenda. WILEY-PLUS is an extension alternative after implementing the SPIN (Sistem Pengurusan dan Pembelajaran Interaktif-Interactive Learning and Management System) system. Tawil et al (2010) found out the students believed that, by employing the e-learning system (SPIN) in mathematics subject, it has a positive impact in teaching and learning progress [4]. Application of WILEY PLUS is an extension to the application of SPIN within FKAB, UKM.

WILEY-PLUS is the system that integrates the entire digital textbook. The system simplifies and automates assignments, scoring student work, keeping grades, and more. WILEY PLUS contains three main components. The components are Read, Study & Practice, Assignments and Gradebook. Read, Study & Practice is the area for self-guided student activity. It contains online text and includes other study materials to help the student to learn about the subject of the course. The Assignment tab is a navigation tab for students to see all of their assignments. Assignments can be either scored questions or tasks without score 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. Study conducted by Wyllie (2009) found that the students' agreed that WILEY-PLUS is a system to enable instructor and students to communicate each other [5].

Therefore, the purpose of this research is to investigate and analyze the students' level of importance and satisfaction towards WILEY-PLUS in vector calculus subject.

3 Methodology

Questionnaires were distributed to the first year students of Faculty of Engineering and Built Environment (FKAB), UKM from academics session 2010/2011. The scope of the questionnaire was students' perception and satisfaction on e-learning. A total of 193 students from four departments were involved in this study. The distribution of students illustrated in Figure 1.

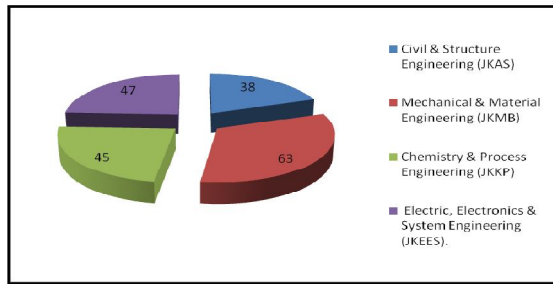


Fig. 1 The Distribution Of Students Involved In The Study.

4 Data Analysis

Evaluation on the WILEY-PLUS components is based on:-

4.1 Mean Analysis

The mean analysis indicates the students' importance and satisfaction toward the WILEY-PLUS components. The mean values obtained from students' responses are based on the five Likert scale which is different for importance and satisfaction level. For importance 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 between 4 and 5, this means that students feel that WILEY PLUS components are important/satisfactory. However, if the mean value is between 1 and 2, it means otherwise.

4.2 ANOVA

ANOVA test is applied to determine the significant difference between the mean of importance and the mean of satisfaction among the department. The hypothesis for ANOVA test as following:

$$H_0: \mu_{JKAS} = \mu_{JKMB} = \mu_{JKKP} = \mu_{JKEES}$$

H_1 : At least one mean is different from others

If the F-statistics computed in the ANOVA table is less than the F-table statistics or the P-value is greater than the level of significance (α), then there is no reason to reject the null hypothesis that all the means are the same and otherwise.

4.2 Gap Analysis

The gap analysis of all Wiley Plus components in this study will be discusses. The difference in value

between mean of perception and mean of satisfaction indicates mean gap.

$$\text{Mean Gap}_p = \frac{\sum_{i=1}^n [(perception) - (satisfaction)]}{n}$$

where

i = refer to the i th student

p = refers to the p th attribute

n = refers to the total number of students

A higher mean gap value depicts a bigger discrepancy between level of importance and level of satisfaction among the students towards WILEY PLUS's components. In the event the gap is positive, it means that the importance more than their satisfaction, but if otherwise, the gap value is negative.

4.3 Paired t-test

In this study, the paired t-test is employed in order to determine as to whether the gap (difference in mean values) is significant or otherwise. The hypothesis for t-test as following:

H_0 : Non-existence of difference between importance and satisfaction towards WILEY-PLUS components.

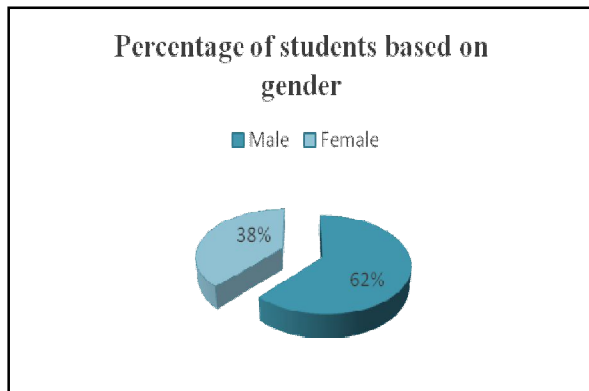
H_1 : Existence of difference between importance and satisfaction towards WILEY-PLUS components.

In the event of non-existence of difference in importance and satisfaction level, this means that the students' perception (importance) and satisfaction is the same. Then, there is a failure to reject the null hypothesis. Fail to reject the null hypothesis if the p-value is more than α , and otherwise. However, if there is existence of difference between the means, the gap analysis will be referred in order to determine as to whether the said difference is positive or negative. If there is no difference in the analysis, it shows that the students get what they are expected from the WILEY PLUS components. However, if there is the existence of the difference, it means students satisfy their expectation or otherwise.

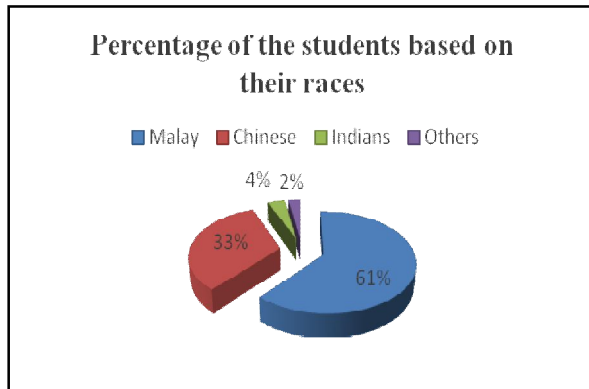
5 Result and Analysis

5.1 Demographic Characteristic

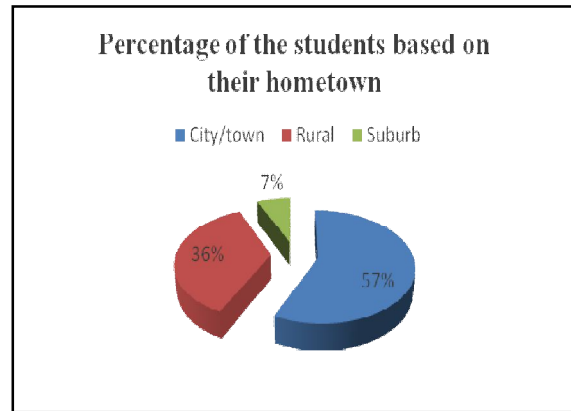
The percentage of demographic characteristic (gender, races, hometown) was calculated and represented in Figure 2. The total students that involved are 193 students which are 119 male (62%) and 74 female (38%). Among the students, the highest percentage of the students based on races is Malay students, 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%) living at city or town, 70 students (36.3 %) living at rural area and others students living at suburb area.



(a)



(b)



(c)

Fig. 2 The percentage of the students based on their (a) gender, (b) races, and (c) hometown.

It is important to see whether the students from different races and living area has significant difference in terms of adapting elearning in their studies.

5.2 Analysis of students’ Importance and Satisfaction toward WILEY-PLUS components.

The mean values of students’ perception toward WILEY-PLUS components for all departments are illustrated in Figure 3. Based on the graph, mean value for Read, Study &Practice components is the lowest value as compared to other components. Similarly with mean value of students’ satisfaction that represent in Figure 4.

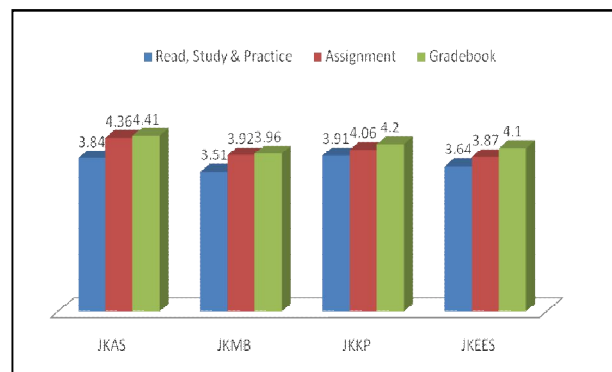


Fig. 3 Mean Values of Students’ Perception towards WILEY-PLUS components.

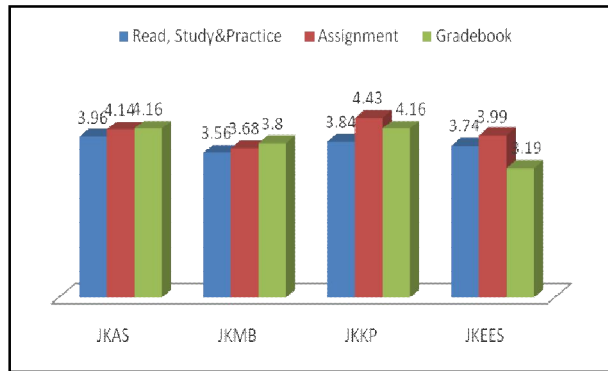


Fig. 4 Mean Values of Students' Satisfaction towards WILEY-PLUS components.

Briefly, Table 1 below shows students importance and satisfaction level based on department about Wiley Plus components. The comparison with these two elements demonstrate that all departments are satisfied with the use of Read, Study & Practice component in Wiley Plus, except that JKKP students find that their importance level in Table 2 (3.91 point) is higher as compare to their satisfaction level (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 student's satisfactory level are decreasing as compare to their perception with 4.14 and 3.68 points respectively. Finally, for the Gradebook component, all departments satisfactory levels are less compare 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 compare to their importance, the values are still above 3 which is above neutral and in the satisfied range.

Table 1 Mean Values of Students' Perception and Satisfaction towards WILEY-PLUS components.

Department	Read, Study& Practice		Assignment		Gradebook	
	mean-importance	mean-satisfaction	mean-importance	mean-satisfaction	mean-importance	mean-satisfaction
JKAS	3.84	3.96	4.36	4.14	4.41	4.16
JKMB	3.51	3.56	3.92	3.68	3.96	3.8
JKKP	3.91	3.84	4.06	4.43	4.2	4.16
JKEES	3.64	3.74	3.87	3.99	4.1	3.91

Significantly, students satisfied and realize the importance of Read, Study & Practice components such as the example provided is very useful 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 also satisfied that by using multimedia as learning tools, the student can enhance further their learning process through the course. The importance role of assignment components which satisfied the students when it help the student get better understanding about the content of the course and this application allow the students to send their task easily. Other than that, the number of questions are reasonable and relevant according to lecture that given to the students.

The application of the Gradebook is very useful when the students can know the marks that obtained after they complete the task given. Students feel that this component is important because it can show the student's performance and the level of understanding about the course.

ANOVA test is applied to determine if there are significant differences among the department for importance mean and satisfaction's mean.

Based on Table 2, the p-value for mean of importance and satisfaction is lower than $\alpha=0.05$. It means, there are significant difference between means for importance and satisfaction among the department.

Table 2 Values of ANOVA test for mean importance and satisfaction between departments.

	F	P value
Mean Importance	3.033	0.031*
Mean Satisfaction	4.490	0.005*

*level of significant = 0.05

5.3 Comparative Analysis between Importance and Satisfaction of Students

5.3.1 Gap Analysis

Research results show that students have the importance mean and satisfaction exceeding 3 that illustrated in **Table 2**. However, the students have different insight when the values of importance mean and satisfaction mean are compared. This can be further proven by t-test.

For the Read, Study& Practice, even though there is different between mean of importance and satisfaction, it is found that most of attribute that test

by t-test are significant. Only attributes of notes that provide by WILEY-PLUS help me to answer the task given is not significant. This shows that even though students satisfied with this component with the mean value exceeding 3, their real satisfaction is less than importance. In other word, students feel that this component is important at the beginning but it is not helpful and useful than he or she expected so that it will affect the satisfaction of this components.

As for the Assignment and Gradebook components, all the attributes have recorded different mean values. This is supported by t-test whereby all the components' attributes stated are significantly different at significance level of 0.05. As a whole, all the attributes shows positive value for mean gap .It indicates that, even though students satisfied all the components, but their real satisfaction is less than level of importance.

Table 3 Students' importance and satisfaction toward components of WILEY-PLUS

Component	Attribute	Mean Gap	t-test	p-value
Read, Study,& Practice	The use of tools with multimedia teaching aids in the WILEY-PLUS help the students to improve to mastery the subject.	0.118	1.760	0.08*
	Examples of questions related to the courses available in the WILEY-PLUS can help students to prepare for the exam	0.222	3.316	0.001*
	Notes that provide by WILEY-PLUS help me to answer the task given.	0.060	0.954	0.342*
Assignment	The task or assignments that given help the students to get better understanding with the content of the subject.	0.20	3.781	0.00*
	Application of assignments allows students send their task easily.	0.131	2.393	0.018*
	The total number of questions	0.142	2.908	0.004*

	are reasonable for each assignment			
Gradebook	The assignments given are relevant according to the lecture.	0.221	4.220	0.00*
	This application is useful for students to see the score obtained after answer the assignments question	0.212	3.583	0.00*

*level of significant = 0.05

6 Conclusion

This research revealed that students in Faculty of Engineering and Built Environment give positive response towards WILEY-PLUS. Generally, students agreed on the importance of components in WILEY-PLUS in assisting them to get the better understanding of the subject. The result of the study shows that the students satisfied with the WILEY-PLUS. The mean of level of satisfaction on the application of WILEY-PLUS is exceeding 3. However, the mean gap analysis shows that the level of importance is higher than the level of satisfaction. It implies that students were less satisfied with the component even though they feel WILEY-PLUS is important for them. The additional actions are required to overcome the limitations such as give the different examples from the text book and adding the tools of equation in order to ensure the effectiveness of WILEY-PLUS.

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