Abstract: The purpose of this research is to evaluate the importance and satisfaction level of the components in WILEY PLUS that offered in Vector Calculus. Mean analysis is applied to measure the importance and satisfaction level. The differences between these mean shows the gap values. T-test assists the gap value analysis in explaining the difference, if any. If there is no difference in analysis, it shows that the students get what they are expected from the WILEY PLUS components. However, if there are existence of the difference, it means students satisfy their expectation or otherwise. Questionnaire has been distributed to 193 respondents from all four departments and the results were analyzed. The research result shows that the students agree on 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.

1 Introduction
The convergence of technology and traditional method in education system will give the better impact towards teaching and learning progress. Studied by Yao Lin (2008) mentioned that technology has a crucial role to enhance student’s motivation and reach their goal. Nowadays, student in higher education has been familiarizing with the application of e-learning. Simply put, e-learning is where teaching and learning progress occurs within an internet based environment (Berge & Collins, 1995). E-learning has been implemented in various subjects such as mathematics. Mathematics subject is known as the tough subject for the student. According to National Council of Teachers Mathematics,(2000), “technology is essential in teaching and learning mathematics; it influence the mathematics that is taught and enhance students’ learning”. Basically, students facing the difficulties in understand the subject contents and remember the formula. 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.

Thus, 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. WILEY-PLUS is an extension alternative after implementing the SPIN (Sistem Pengurusan dan Pembelajaran Interaktif-Interactive Learning and Management System) system. Norgainy and et al (2010) shown that students believe that it will give the positive impact in teaching and learning progress by employed the e-learning system (SPIN) in mathematics subject.

WILEY-PLUS is the system where it integrate the entire digital textbook and simplifies and automates such tasks as making assignments, scoring student work, keeping grades, and more. 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 activity. It contains the full online text and may also include other study materials to help student learn about the subject of the course. The Assignment tab is where students navigate to see all of their assignments, with their due dates. Assignments can be either scored questions or un-scored 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. Study by Wyllie (2009) found students’ agreed that WILEY-PLUS is accessible to communicate between instructor and students.

The objective of this research is to investigate and analyze the students’ level of importance and satisfaction towards WILEY-PLUS in vector calculus subject.

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

3 Data Analysis
Evaluation on the WILEY-PLUS components is based on:

3.1. 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.

3.2. 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:

\[ H_0: \mu_{JKAS} = \mu_{JKMB} = \mu_{JKKP} = \mu_{JKEES} \]

\[ H_1: \text{At least one mean is different from others} \]

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

3.3. 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.

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

where

\( i = \text{refer to the } i^{th} \text{ student} \)

\( p = \text{refers to the } p^{th} \text{ attribute} \)

\( n = \text{refers to the total number of students} \)

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.

3.4. 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:

\[ H_0: \text{Non-existence of difference between importance and satisfaction towards WILEY-PLUS components.} \]

\[ H_1: \text{Existence of difference between importance and satisfaction towards WILEY-PLUS components.} \]

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 $\alpha$, and otherwise. However, if there is existence of difference between the means, the gap analysis will be referred to in order to determine as to whether the said difference is positive or negative.

4 Result and Analysis

4.1. Demographic Characteristic
The percentage of demographic characteristic (gender, races, hometown) was calculated and represent as referred to Figure 1. 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.

4.2. 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 2. 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 3.

Fig. 1: The percentage of the students based on their (a) gender, (b) races, and (c) hometown.

Fig. 2: Mean Values of Students’ Perception towards WILEY–PLUS components.
Fig. 3: Mean Values of Students’ Satisfaction towards WILEY-PLUS components.

Briefly, Table 2 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 satisfaction 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 2 Mean Values of Students’ Perception and Satisfaction towards WILEY-PLUS components.

<table>
<thead>
<tr>
<th>Department</th>
<th>Read, Study &amp; Practice</th>
<th>Assignment</th>
<th>Gradebook</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mean-importance</td>
<td>mean-satisfaction</td>
<td>mean-importance</td>
</tr>
<tr>
<td>JKAS</td>
<td>3.84</td>
<td>3.96</td>
<td>4.36</td>
</tr>
<tr>
<td>JKMB</td>
<td>3.51</td>
<td>3.56</td>
<td>3.92</td>
</tr>
<tr>
<td>JKKP</td>
<td>3.91</td>
<td>3.84</td>
<td>4.06</td>
</tr>
<tr>
<td>JKEES</td>
<td>3.64</td>
<td>3.74</td>
<td>3.87</td>
</tr>
</tbody>
</table>

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 3, the p-value for mean of importance and satisfaction is lower than α=0.05. It means, there are significant difference between means for importance and satisfaction among the department.

Table 3 Values of ANOVA test for mean importance and satisfaction between department

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Importance</td>
<td>3.033</td>
<td>0.031*</td>
</tr>
<tr>
<td>Mean Satisfaction</td>
<td>4.490</td>
<td>0.005*</td>
</tr>
</tbody>
</table>

*level of significant = 0.05

4.3. Comparative Analysis Between Importance and Satisfaction of Students

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 4 Students’ importance and satisfaction toward components of WILEY-PLUS

<table>
<thead>
<tr>
<th>Component</th>
<th>Attribute</th>
<th>Mean Gap</th>
<th>t-test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read, Study, &amp; Practice</td>
<td>The use of tools with multimedia teaching aids in the WILEY-PLUS help the students to improve to mastery the subject.</td>
<td>0.118</td>
<td>1.760</td>
<td>0.08*</td>
</tr>
<tr>
<td></td>
<td>Examples of questions related to the courses available in the WILEY-PLUS can help students to prepare for the exam</td>
<td>0.222</td>
<td>3.316</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td>Notes that provide by WILEY-PLUS help me to answer the task given.</td>
<td>0.060</td>
<td>0.954</td>
<td>0.342*</td>
</tr>
<tr>
<td>Assignment</td>
<td>The task or assignments that given help the students to get better understanding with the content of the subject.</td>
<td>0.20</td>
<td>3.781</td>
<td>0.00*</td>
</tr>
<tr>
<td></td>
<td>Application of assignments allows students send their task easily.</td>
<td>0.131</td>
<td>2.393</td>
<td>0.018*</td>
</tr>
<tr>
<td></td>
<td>The total number of questions are reasonable for each assignment</td>
<td>0.142</td>
<td>2.908</td>
<td>0.004*</td>
</tr>
<tr>
<td>Gradebook</td>
<td>The assignments given are relevant according to the lecture.</td>
<td>0.221</td>
<td>4.220</td>
<td>0.00*</td>
</tr>
<tr>
<td></td>
<td>This application is useful for students to see the score obtained after answer the assignments question</td>
<td>0.212</td>
<td>3.583</td>
<td>0.00*</td>
</tr>
</tbody>
</table>

*level of significant = 0.05
5 Conclusion
This research revealed that students in Faculty of Engineering and Built Environment give positive response towards WILEY-PLUS. Generally, students agreed with the importance of components in WILEY-PLUS to assist them to get the better understanding of the subject. Students also satisfied with WILEY-PLUS that proven on result’s study that mean for satisfaction is exceeding 3. However, through mean gap analysis, it shown that the importance level is higher than satisfaction level. 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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References: