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**STUDENT ENGAGEMENT, STUDENT INTERACTIONS
AND 'QUALITY OF USE' IN BLENDED LEARNING
USING FLIPPED CLASSROOM**



**DOCTOR OF PHILOSOPHY
UNIVERSITI UTARA MALAYSIA
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**STUDENT ENGAGEMENT, STUDENT INTERACTIONS AND
'QUALITY OF USE' IN BLENDED LEARNING USING FLIPPED
CLASSROOM**

By

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**Thesis Submitted to
School of Technology Management and Logistics,
Universiti Utara Malaysia,
in Fulfillment of the Requirement for the Degree of Doctor of Philosophy**



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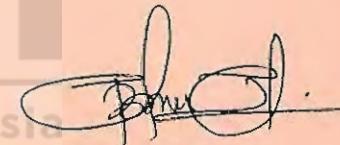
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ABSTRACT

The research of blended learning using flipped classroom is still at the early stage, hence the fundamental issues still unclear. Therefore, this study has examined the quality of use, by incorporating the quality constructs for entrepreneurship education. The framework was developed base on 'Quality of Use' Model underpinned by Luhmann's System Theory, Model of Online Learning and Social Learning Theory: Groups Nets and Sets. There were five variables tested in this study, namely satisfaction, efficiency, effectiveness, student interactions and student engagement. This study was conducted in two phases, firstly this study examined whether blended learning provide impacts on the studied variables. Later this study tested the relationship between variables based on the research framework. Data for the first stage were obtained through quasi-experimental among 90 students of entrepreneurship education for the Semester 20154 in the Universiti Teknologi MARA Perlis. The results reveals that there were significant differences between treatment group and control group for all variables tested. Data for the second stage were collected through a self-administered survey questionnaires among 281 students of entrepreneurship education for Semester 20162 in the same university. This result reveals that student interactions have a significant relationship with satisfaction, efficiency, effectiveness. However, student engagement exhibits a significant influence to satisfaction, but insignificant influence to efficiency and effectiveness. Further analysis reveals that student interactions provides a partial mediation between student engagement and satisfaction and full mediation between student engagement and efficiency, as well as effectiveness. This study contributes to the development of quality framework for large enrollment in flipped classroom, a multi-method of data collection to ensure the appropriateness of variables selected, and a quality measure of blended learning in entrepreneurship education, as well as business management disciplines. Conclusions, limitation and suggestions for future studies are also highlighted.

Keywords: Quality of Use, blended learning, flipped classroom, entrepreneurship education, quasi-experimental.

ABSTRAK

Penyelidikan berkaitan pembelajaran gabungan menggunakan kaedah *flipped classroom* masih di peringkat awal, menyebabkan isu-isu asas seperti kerangka kualiti perlu di kaji secara berterusan. Untuk itu, kajian ini dijalankan bagi mendalami kualiti penggunaan melalui pembolehubah kualiti di dalam kontek pendidikan keusahawanan. Kajian dijalankan berasaskan Model ‘Kualiti Penggunaan’ dan disokong oleh Sistem Teori Luhman, Model Pembelajaran atas Talian dan Teori Pembelajaran Sosial: Kumpulan Rangkaian dan Set Lima pembolehubah telah dikaji iaitu kadar puashati, efisyen, keberkesan, interaksi pelajar dan penglibatan pelajar. Kajian ini dijalankan dalam dua fasa, di mana fasa pertama ialah untuk memastikan pembelajaran gabungan memberi kesan kepada pemboleh-pembolehubah yang dikaji dan fasa kedua ialah untuk menguji hubungan antara pembolehubah mengikut kerangka kajian. Fasa pertama menggunakan kuasi eksperimen yang melibatkan 90 pelajar asas keusahawanan bagi Semester 20154 di Universiti Teknologi MARA Perlis. Dapatkan kajian menunjukkan terdapat perbezaan yang signifikan di antara kumpulan rawatan dengan kumpulan kawalan untuk semua pembolehubah kajian. Manakala data untuk fasa kedua dikumpul melalui kaedah bincian soalselidik kendiri yang melibatkan 281 pelajar asas keusahawanan bagi Semester 20162 di universiti yang sama. Dapatkan kajian menunjukkan interaksi pelajar mempunyai hubungan yang signifikan di antara pembolehubah ‘kualiti penggunaan’ (kadar puashati, efisyen, keberkesan). Demikian juga, penglibatan pelajar mempunyai hubungan yang signifikan dengan kadar puashati, tetapi tidak menunjukkan hubungan yang signifikan dengan pembolehubah efisyen dan keberkesan. Analisis lanjutan menunjukkan interaksi pelajar menjadi pengantara separa di antara penglibatan pelajar dengan kadar puashati dan pengantara penuh di antara penglibatan pelajar dengan efisyen serta keberkesan. Kajian ini menyumbang kepada pembangunan kerangka kualiti *flipped classroom* berskala besar menggunakan konsep kualiti penggunaan, menggunakan kaedah berperingkat pengumpulan data bagi memastikan ketepatan penggunaan pembolehubah-pembolehubah kajian, serta pengukuran kualiti *flipped classroom* dalam kontek pembelajaran asas keusahawanan khususnya, dan disiplin pengurusan perniagaan umumnya. Kajian ini juga turut membincangkan batasan kajian dan cadangan untuk kajian masa hadapan.

Keywords: ‘Kualiti penggunaan’, pembelajaran gabungan, *flipped classroom*, kuasi-eksperimen.

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LIST OF ABBREVIATIONS

ENT300	Fundamentals of Entrepreneurships
UiTM (Perlis)	Universiti Teknologi MARA (Perlis), Malaysia
MOHE	Ministry of Higher Education, Malaysia
OBE	Outcome Based Education
SCL	Student Centered Learning
MQA	Malaysian Qualification Agency
PSPTN	Pelan Strategik Pengajian Tinggi Negara (National Higher Education Strategic Plan)
MEIPTA	Majlis e-Pembelajaran IPTA Malaysia
MOE	Ministry of Education, Malaysia
ICU-JPM	Implementation Coordination Unit- Prime Minister's Office
TVET	Technical Vocational Education and Training
MOOC	Massive Open Online Courses
PO	Program Outcome
LO	Learning Outcome
CO	Course Outcome
SLT	Student Learning Time
ISO	International Organization for Standardization
ICT	Information Communication Technology
IS	Information System
SOW	Scheme of Work
i-CREATE	Instructional Model for ENT300 in UiTM (Perlis)
LMS	Learning Management System

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Electronic learning or e-learning, is widely use in various organizations including higher learning institutions or universities. Statistics by Docebo (2016) reported that e-learning market will continue to grow approximately 5% yearly between 2016 and 2023, with expected revenue exceeding US 240 billion in 2024. Moreover, Asia region was reported as the second highest expenditure related to e-learning products and services after North America. The report further highlights that subjects related with business and management contribute 16.8%, the highest percentage of course distribution in e-learning (Docebo, 2016). Report by Docebo (2016) also pulled together insights from various sources and pointed out that among some important characteristics in the future e-learning are social learning (collaborative tools, virtual classroom and content management), personalized learning, and micro learning (bit-sized content). These characteristics also align with the online learning trends for 2017 that predicted efficiency, measures of usability, virtual classroom, personalized and micro learning as important factors that require more attention by institutions that offer blended learning in their teaching and learning activities (Black, 2017).

Furthermore, in the universities, it is known that e-learning provides benefits not only to the institutions, but also to the students and faculties. Study conducted by Education Centre for Analysis and Research (ECAR) in 2013 found that e-learning offers benefits of growth in enrolment, increases revenue, enhance the reputation of the institutions

and streamline the universities' curriculum. Most of e-learning in the universities are conducted using blended learning in the classroom setting. Scholar such as Arbaugh (2014) identifies that flipped classroom is one of the approaches of blended learning that is suitable for classroom setting. This regard, the flipped classroom also identified as one of teaching and learning trends in the universities around the globe (Baepler, Walker, & Driessen, 2014; Hao & Lee, 2016; Lindeman et al., 2015; Raihanah, 2014; UOREGON, 2016).

In Malaysia, the government is very serious in producing quality human and intellectual capital. Because of that, Ministry of Higher Education (MOHE) in 2007 introduced National Higher Education Strategic Plan (PSPTN) (MOHE, 2011). This plan was developed as one of a strategic moves to transform the nation into a high-income nation by 2020. PSPTN is supported by 23 Critical Agenda Projects (CAPS), where e-learning is one of the CAPs in PSPTN (MOHE, 2011). It is used as the driver to support traditional learning (Mohamed Amin Embi, 2011), which encourages instructors to adopt blended learning approach in teaching and learning activities. A study related to the blended learning and flipped classroom readiness in Malaysia revealed that currently respondents are ready to adopt blended learning and flipped classroom (Mohamed Amin Embi, Hussain, & Panah, 2014; Mohammad Amin Embi, Mohd Norsin, & Panah, 2014). Moreover, the flipped classroom approach is widely used in various universities in Malaysia (Alsagof, Baloch, & Hashim, 2014; Mohamed Amin Embi et al., 2014; Raihanah, 2014; Salam, Bakar, Mohd Asarani, & Mohamed Saki, 2014; Wah, Ing, Keaong, & Jhee, 2014)

Blended learning integrates the use of Information Communication and Technology (ICT) in education. Currently, the technology associated with education is at infancy stage (High, 2013) thus requires a lot of attentions from scholars to gain more knowledge and understandings about this area. With the integrations of the ICT technologies, this area offers plenty of research opportunities such as fundamental issues related with blended learning, quality measurement, comparison of delivery methods in learning and instruction models related with blended learning (Arbaugh, 2014; Arbaugh & Hwang, 2015; Drysdale, Graham, Spring, & Halverson, 2013; Halverson, Graham, Spring, Drysdale, & Henrie, 2014; Ladhari, 2010).

Since blended learning is considered a new research area, there are some disagreements in terminology used in publications, which contribute to the difficulties in developing suitable measurements (Graham, Woodfield, & Harrison, 2013). The problem related to measurements not only occur in blended learning but also in other online application platforms including commercial applications. Scholar such as Ladhari (2010), highlighted the issue of difficulties in measuring quality in online applications as compared to traditional service quality. Similarly with online applications in education, scholars of e-learning suggested that more studies need to be done to explore and confirm the quality dimensions for online education (Martínez-argüelles & Callejo, 2013; Shelton, 2010; Teo, 2010). These suggestions were supported by scholars of blended learning that urged the need of having a substantive discussions about theory, developing new theoretical framework and accompanied by empirical research in order to increase the understanding in this area (Drysdale et al., 2013; Halverson et al., 2014). In the review of highly cited publications by Halverson et al. (2014), community of

inquiry is the only framework that is widely used in the study of blended learning so far.

Currently, majority of researches related with quality of online education focuses on student satisfaction as the research attention (Chen, 2010; Gilbert, Morton, & Rowley, 2007; Kuo, Walker, Schroder, & Belland, 2014; Wu, Tennyson, & Hsia, 2010). Students satisfaction is widely used in previous researches due to its capabilities to improve students retentions as well as assisting the institutions to formulate the strategic planning for online learning (Kuo et al., 2014). However, in the context of using a system, Bevan, (1995b) had coined a term known as ‘quality of use’ to capture the user experiences based on the usage of the system. ‘Quality of use’ can be measured using effectiveness, efficiency and satisfaction in online applications (Bevan, 1995b; Renner, Laumer, & Weitzel, 2014; Sultan & Wong, 2013). The ‘quality of use’ is known as outcome of the interactions between the user and the experience of using the product in the specified environment (Bevan, 1995b).

Besides quality of use, student interactions and student engagement issues captures attentions among scholars among online learning (Bigatel, 2016). As reported by Elearning and Government Elearning Magazines (2014), interactions among users in corporate online learning promote engagement and collaboration, thus provide benefits such as the increment of innovations and profits in an organizations. Similarly, in education, the integrations of technology in teaching and learning activities promotes student interactions (Kuo et al., 2014) and student engagements (Junco, Heibergert, & Loken, 2011), and improved student performance (Bradford & Wyatt, 2010; Kuo et al., 2014). At present, there are insufficient studies related to contemporary’s issues of

quality related to student interactions (Drysdale et al., 2013; Kuo et al., 2014) and student engagement (Dixson, 2010) in online learning context, including blended learning. As for that, researchers of blended learning are encouraged to include variables related to students interactions and student engagement in their future studies (Drysdale et al., 2013; Halverson et al., 2014).

In Malaysia, blended learning has been used as a driver of the e-learning implementation. Thus, most of universities in Malaysia utilize the blended learning in their teaching and learning activities. However, the intensity of implementation varies from one institutions to another. Blended learning instructional model has been used widely to handle a large and diverse enrollments (McKenzie et al., 2013). Similarly, in this country, there are several subjects such as Introductions to Entrepreneurship and Information Communications and Technology (ICT) competency that is offered through open learning via Massive Open Online Courses (MOOCs). This approach has been introduced with the aim to reduce face to face hours and enhance the learning experience among tertiary students. Even though Malaysian universities adopted the latest technology in education, one main issue that needs to be addressed here is the quality and effective measurement in blended learning. Unfortunately, there is no standard measurements that is introduced by the government to measure this area (Mohamed Amin Embi, 2011). Recently, Ministry of Higher Education Malaysia (MOHE) published *e-Learning Guidelines for Malaysian HEIs*, highlighted the importance of ensuring student interactions (students, instructors and content) in blended learning environment, student engagement, quality of online pedagogy, and planning the course design suitable with content delivery (MOHE, 2014)

A review of research methodologies choices conducted by Bliuc, Goodyear, & Ellis (2007) categorizes the research methodologies into four general categories namely case study, survey based, a comparative studies in a specific context and a comparative studies in a holistic context. Case study method is widely used in research related to information system (Esyutina, Fearon, & Leatherbarrow, 2013; Gao, 2013; Triantafyllou & Timcenko, 2014), as it offers an insight of the situations (Bliuc et al., 2007) . However, case study method received criticisms because it is embedded in the context, making it hard to generalize (Bliuc et al., 2007).

Another research methodology as highlighted by Bliuc et al. (2007) is survey based research. Most of the studies related with blended learning applied a survey methods to gather the data (Ahmed, 2010; Bradford & Wyatt, 2010; Kuo et al., 2014; Ramayah, Wai, & Lee, 2012; Rubin, Fernandes, & Avgerinou, 2013). The evidence from these studies showed a positive impact to the leaners outcome, however these studies were not able to conclude ‘why’ it works (Drysdale et al., 2013). However, survey based research focuses more on exploring the causal effect in the research, thus neglected the richness descriptions offers in the research setting (Bliuc et al., 2007). A study related with blended learning may include the comparison of the technology used in the research setting. Subsequently, research methodology such as experimentation can be employed to capture the different preferences of learning activities in different modalities (Halverson et al., 2014).

Additionally, a research methodology in blended learning normally was embedded with the research setting. Blended learning research requires an instructional model as a basis of the data gathering in the study (Bliuc et al., 2007; Drysdale et al., 2013; Halverson

et al., 2014). Because of this situation, instructional designers were inspired to leverage the ICT technology in their method of delivery as drivers to handle challenges offered by education in the 21st century. The teaching approaches such as massive open online courses (MOOCs) and flipped classroom have been exploited in handling a large and diverse enrollment (Findlay-thompson, Saint, & Mombourquette, 2014; Margaryan, Bianco, & Littlejohn, 2014; McKenzie et al., 2013). Thus, more studies related with instructional model and blended learning approaches are beneficial to understand the suitable approaches to handle specified environments (Drysdale et al., 2013; Halverson et al., 2014).

From the above discussion, it can be concluded that blended learning, particularly flipped classroom approach is a new research area, thus more attention to the fundamental issues must be addressed. Unlike, the traditional learning, blended learning requires careful research planning and research design to ensure the quality of the research as a whole. These fundamental issues such as development of measurement that integrates it with the research setting including methods to be used in collecting data, the comparison approach in different modalities related to teaching and learning and instructional model to be used in developing the measurement, enable measuring quality of blended learning suitable in the specified context. This measurement will serve as a standard quality measurement to evaluate the effective of e-learning implementation for the nation.

1.2 Problem Statement

The emergence of technology in ICT gives a huge impact to teaching and learning activities. The integration of ICT in education creates multi-modalities in learning and

teaching approach such as blended learning using flipped classroom. According to Graham et al. (2013), the growth of adoption in blended learning will lead to the need of revising the strategy, structure, as well as support to strengthen the quality of learning and teaching in the universities. The researcher also suggests that future researchers in blended learning investigate the processes and interventions that contribute to the success of institutionalizing of this approach. Therefore, issues such as underpinning theories and framework (Arbaugh, 2014; Drysdale et al., 2013; Halverson, Graham, Spring, & Drysdale, 2012; Halverson et al., 2014), research methodology (Ahmad & Buchanan, 2015; Arbaugh, 2014; A. Zainuddin, Kamaluddin, & Hassan, 2012) and research design, and data analysis in blended learning must be addressed (Arbaugh & Hwang, 2012; Halverson et al., 2014).

Until now, scholars in the quality of online learning have been unable to confirm the dimensions for the area. As mentioned by Ladhari (2010), currently most of the variables related to the e-service quality are developed for commercial context. In education, although there are several measurements related to online learning (Martínez-argüelles & Callejo, 2013; Shelton, 2010; Teo, 2010), however the measurement are not comprehensive. These studies suggest that future researches need to be conducted to confirm and enhance the dimensions of e-service quality in education.

One of the reasons that contributes to this matter is due to the disagreement in the definition, as well as ambiguous definitions terminologies for online learning, and blended learning in the publications, thus, making this area difficult to be measured (Graham et al., 2013). One of a comprehensive definitions offered by Allen and Seaman

(2011), where online learning, blended learning (web facilitated, and blended or hybrid learning) and traditional learning could be classified through the percentage of course content delivered online. However, scholars of blended learning pointed out that blended learning area requires framework, including conceptual framework, and theories that is accompanied by empirical findings specifically developed for this area (Arbaugh, 2014; Drysdale et al., 2013; Halverson et al., 2012, 2014).

Moreover, measuring the quality elements for technologies in education is complex. It seems that, quality is not an absolute property of the system; rather, it depends on the context where it is implemented (Bevan, 1999) thus makes the quality metrics vary from one context to another. As for blended learning, scholars pointed out that at minimum blended learning approach should be as effective as teaching in other methods (Drysdale et al., 2013). This situation indicates that, in any blended learning exercise, institutions should not only focus on the satisfaction of its implementation but also on the efficiency (knowledge gain) and effectiveness (task completion) during and after the blended learning session (Renner et al., 2014; Tullis & Albert, 2012). These important quality factors have been defined earlier through ‘quality of use’ concept that includes effectiveness, efficiency and satisfaction in the technology mediated environments (Bevan, 1995b; Renner et al., 2014; Sultan & Wong, 2013). Putting these arguments together, it can be concluded that future studies must not separate these three quality variables (satisfaction, efficiency and effectiveness) in any research related with blended learning, particularly in the education setting.

Furthermore, blended learning approach integrates different education technologies such as learning management system, social site networks and/or mobile applications

to support teaching and learning in higher learning institution making it harder to conduct the blended learning research (Par, 2004). However, previous scholars of blended learning highlighted that little studies put their attention on technologies used to facilitate online learning (Drysdale et al., 2013). Hence, this issue must be addressed in the future studies of blended learning.

Until recently, studies on blended learning give more attention to student satisfactions and effectiveness as measured variables (Drysdale et al., 2013; Halverson et al., 2014). Thus, less attention is given to efficiency measures as compared to effectiveness measure in blended learning (Renner et al., 2014) even though in universities, efficiency is one of the important measures that reflects service quality of the institution (Sultan & Wong, 2013). Apparently, this is due to the issue of ambiguity between efficiency measure and efficiency drivers with technology in learning environment (Renner et al., 2014). Previous literature recognized quality of use or usability measures as the dimension of satisfaction, efficiency and effectiveness (Bevan, 1995) of user interface for information technology products and system quality. In this regard, future scholars have the opportunities to investigate on quality measurement by incorporating effectiveness, efficiency and satisfaction, as a quality of use in blended learning studies.

Other than quality of use, there are some quality issues which are related with technology in learning environment. Scholars of blended learning using flipped classroom suggest that future researchers should include some quality variables such as, student engagement and interactions in their study (Drysdale et al., 2013; Halverson et al., 2014; Z. Zainuddin, Halili, Aceh, & Lumpur, 2016). Moreover, the quality concept such as ‘quality of use’ claimed that quality variables are the outcome of

interactions between the user and the experience (participation) in a technology mediated environment (Bevan, 1995b). Seemingly, these issues are not only discussed in education, but are also identified as the contemporary issues of e-learning at corporate level (Elearning & Government Elearning Magazines, 2014). Future researchers therefore must not only emphasize the direct effects of some variables to the learning outcomes, but to understand how the technology influences the quality of learning through a well-planned research design (Ginns & Ellis, 2007; Z. Zainuddin et al., 2016).

Furthermore, in blended learning, attention also must be given to the research methodologies and research design, as it will capture the influence of quality elements in its implementation (Ginns & Ellis, 2007). Currently, there are various types of research methodologies used in blended learning. However, previous scholar found that little studies related to comparative blends were conducted, particularly comparative in fidelity of blending in the area of business and management (Arbaugh, 2014).

Moreover, Arbaugh (2014) also highlighted that little studies of blended learning were conducted in the classroom setting and he suggested flipped classroom as one of the approaches that can be utilized in order to conduct a research in the classroom setting. Moreover, previous studies also reported that less attention on technologies used to facilitate the activities related with online teaching and learning activities were conducted in this area (Drysdale et al., 2013). This is due to the fact that various adoption levels of blended learning in the higher learning institutions affect the intensity of technology involved in learning activities (Graham et al., 2013). Previous literatures show that instructional model is one of the topmost focuses in blended learning

environment (Drysdale et al., 2013; Halverson et al., 2014), where the design process is a core activity in the knowledge creation. A design process such as innovation in pedagogy can be tailored to the specific needs of the students (Halverson et al., 2014), as well as blended learning strategies (Halverson et al., 2012; O'Flaherty & Phillips, 2015; Z. Zainuddin et al., 2016). Hence, blended learning using flipped classroom offers a variety of research methodologies and research designs that can be conducted in the future.

Another important matter that requires attention for future studies is data analysis for blended learning research. Majority of previous studies in business and management area did not use a sophisticated data analysis such as path analysis in their data analysis and did not report the effect size (Arbaugh & Hwang, 2012; Halverson et al., 2014). Therefore future studies must ensure that future studies focus on the latest data analysis methods available at a particular time to ensure that the results reported are comprehensive.

From the above discussions, it can be concluded that quality in online setting including education is one of the issues that need to be addressed because the context is very different from traditional setting. In blended learning, this issue becomes critical due to the inconsistency of definitions used to define terms by various scholars, which make this area hard to measure. Because of this, the measurements available now are not comprehensive. Furthermore, blended learning is considered as a new research area, thus the fundamental discussions are limited. The research setting for blended learning study is also unique, as it involves other critical elements such as instructional model,

comparison settings and specific research methodology to observe the cause and effect of variables used in the study.

Thus, this study will focus on the development of a quality of use measurement in blended learning by extending the quality of use concept, and underpinned by Luhmann's System Theory, Model of Online Learning and Social Learning Theory: Groups Nets and Sets. The variables for quality of use are effectiveness, efficiency and satisfaction as the main attention of this study. Other variables incorporated in this study are student engagement as the predictor variable and student interactions a mediator variable.

The instructional model of innovation of pedagogy via flipped classroom was used as a platform of the data gathering. This instructional model standardized the learning outcomes and course assessments for the same course taught in different modalities. This study was conducted using a multimethod quantitative data collection methods, namely quasi-experimental and survey. Firstly, data were collected using quasi-experimental, where a homogenous test was conducted to identify the eligibility of groups involved in this study through background information derived from Student Information Management System (SIMM). Data were analyzed using an independent t-test. Secondly, a survey was conducted to develop a quality of use model for blended learning environment. For this stage, data was analyzed using Structures Equation Model SmartPLS.

1.3 Research Questions

Based on the above discussions, the research questions for this study are as follows:

RQ1: What is the impact of blended learning on student engagement, student interactions and quality of use variable (satisfaction, efficiency and effectiveness) in a flipped classroom?

RQ2: Do student engagement and student interactions have any relationship with quality of use variable (satisfaction, efficiency and effectiveness) in blended learning using flipped classroom?

1.4 Research Objectives

Hence, the this study consists of two main objectives.

RO1: To investigate a significant difference between groups in student engagement, student interactions and quality of use variables (satisfaction, efficiency and effectiveness) in blended learning using flipped classroom.

RO2: To examine whether student engagement and student interactions have relationships with quality of use variables (satisfaction, efficiency and effectiveness) in blended learning using flipped classroom.

1.5 Scope of the Study

This study investigated two main objectives associated with blended learning using flipped classroom in the Malaysian context. The study investigated the impact of blended learning on student engagement, student interactions and quality of use in a flipped classroom and examined whether student engagement and student interactions have any relationship with quality of use in blended learning using flipped classroom.

Therefore this study was conducted in two stages of data collection: in the first stage of this study the researcher confirmed the level of blended learning for this setting, and at the second stage the researcher investigated the relationship between student engagement and student interactions with quality of use.

Moreover, this study was conducted in the blended learning environment using flipped classroom for entrepreneurship education (ENT300) subject, where the blended learning was used as the delivery method for this subject. The technologies incorporated in this study were learning management system (LMS), Facebook and WhatsApp. The exposure of the online activities were limited to the activities planned for teaching and learning of the subject based on the control documents (such as syllabus, student learning time, rubrics and test specification table) provided by the university. The instructional model for this subject (i-CREATE) was used to guide the setting for this study. The samples for this study were students who enrolled this subject for Semester 20154 and Semester 20162 in Universiti Teknologi MARA (Perlis). The measurement was adapted from previous studies that represent five constructs, namely satisfaction, efficiency, effectiveness, student interactions and student engagements.

1.6 Significance of the study

The study provides significance to theoretical, methodological and managerial aspects.

From a theoretical perspective, this study offers a quality framework based on quality of use concept proposed by Nigel Baven (1995b) where user perspective can be measured based on satisfaction efficiency and effectiveness. Additional variables namely student interactions and student engagement were added to the framework. The

context of use had been translated as the blended learning using flipped classroom for the entrepreneurship education. Furthermore, this study has empirically explained Luhmann's System Theory, through its binary situation, where in order for students to be active in the education system, students have a choice whether the students get themselves engaged or not engaged in the teaching and learning activities related to the subjects they are taking at a particular semester. Moreover, this study verifies three dimensions of student interactions as proposed by Model of Online Learning (Anderson & Garrison, 1998). Since the unit of analysis for this study was student, therefore only three main dimensions had been included namely, student-student, student-instructor and student-content. Another contribution on the theoretical implication from this study is the inclusion of Social Learning Theory: Groups Nets and Sets introduced by Dron and Anderson in 2014 to explain the research setting. This theory has been included because this is one of the learning theories that focus on the presence of social software as medium of communication. For this study, this theory has been conceptualized to explain the research setting and how the interactions happen in the flipped classroom for ENT300 subjects. Finally, this study contributes to the development of quality framework for blended learning in the context of entrepreneurship educating using flipped classroom.

For methodological perspective, the study answer the call of research of blended learning related with the use of generic online learning as research setting, fidelity of blending and the use of flipped classroom for blended learning setting. The study was conducted in the specific context (entrepreneurship education) in the flipped classroom using multi-method data collection approach namely quasi experimental and survey. This study proved that fidelity of blending can be answered using quasi experimental

method and the development of framework was conducted using survey. By using this multi method approach, this study offers not only a comprehensive framework, but also variables that are truly impacted by the blended learning activities and which represents a quality of use model in the research setting.

Also from managerial perspectives, the study offers a guideline to develop a course design and online content to ensure the success flipped classroom implementation. Furthermore, the study proved that flipped classroom also suitable for large enrollment subjects including entrepreneurship education. Also, the technologies used for blending is not only limited to the learning management system (LMS), but also the social software that are freely available in the market.

1.7 Definition of Terms

This section provides the definition of terms for blended learning, flipped classroom, and quality of use (satisfaction, efficiency and effectiveness), student interactions and student engagement.

1.6.1. Blended Learning

Blended learning refers to the hybrid learning method (traditional and online) with 30 to 80 percent of its instructions use online method of delivery (Bart, 2014)

Flipped classroom is one that inverts the typical cycle of content acquisition and application so that students gain necessary knowledge before class and instructors guide

students to actively clarify and apply that knowledge during class (Triantafyllou & Timcenko, 2014)

1.6.2. Quality of Use

Quality of use refers to the state to measure the extent to which the product can be used with effectiveness, efficiency and satisfaction in a particular context (Bevan, 1995b).

Satisfaction refers to the users' perception of comfort and acceptable to use, so that if users perceive the product as comfort and acceptable to use, they are assumed to be satisfied (Bevan, 2009).

Effectiveness refers to the state of being able to complete the task (Tullis & Albert, 2012).

Efficiency refers to the learning outcome or knowledge gained in relation to learning time (Renner et al., 2014).

1.6.3. Student Interactions

Student interactions are described as actions among individuals in the systems including individual interactions with other individuals, instructors and content (R. M. Bernard et al., 2009).

1.6.4. Student Engagement

Student Engagement is concerned as the interaction of the time, effort and other relevant resources invested by both students and their institutions intended to optimize the student experience and enhance the learning outcomes and development of students and the performance, and reputation of the institution (Trowler, 2010).

1.8 Organization of the Thesis

This study is organized in the following format: Chapter one focuses on the background of the study, problem statement, research objectives and research questions, and scope of the study, limitations of the study and definition of terms that are used in this report. In chapter two, the discussion is focused more on the reviews of past literatures of blended learning, flipped classroom, entrepreneurship education, international standards related with education systems and relevant theories. Chapter three discusses about the development of the conceptual framework and chapter four provides information related to the research methodology. Findings are discussed in chapter five. Finally chapter six presents the discussions, contributions, limitation, conclusions and recommendations of this study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews from previous scholars of blended learning. The discussions relate with the technology innovation and education, followed by reviews of past literatures from mainstream of blended learning and flipped classroom, situations of online learning in Malaysia. In doing so, the chapter presents discussions on technology innovation, blended learning, and flipped classroom situation in institutions. This chapter also highlights entrepreneurship education and the research methodologies used in blended learning. It also reviews the concept of quality of use and underpinning theories for this study

2.2 Technology Innovation in Education

Until now, innovation has been studied at various contents: namely industry, organization, as well as individual (Huizer, 2016). Moreover, Damanpour (1996) believed that innovation at the level of organization involves, generation, development or implementation of new ideas to react to changes in external environment for sustainability in the industry. Study by Johannessen, Olsen, and Lumpkin (2001), highlighted that innovation is influenced by internal and external factors in the industry, hence the understanding of these factors may foster the innovation strategies that organizations could formulate to ensure its sustainability.

Moreover, there is a tremendous evolution of information technology and communication (ICT) that has a huge impact on our life. ICT shifts the world from the information age to the interaction age (Milne, 2007). As elaborated further by Milne (2007), in the Information Age, the attention has been given more to the media of delivery and methods of accessing digital content. However, as the world step into the Interaction Age, the technology emphasizes more about how information facilitate people to interact. The emergence of internet for example, changes how people live their life today. ICT appears in many forms (products or services): influences every facets of our life, either positively and negatively. As emphasized by Huizer (2016), ICT has several advantages, such as benefits of online transaction that helps business to foster and remains competitive in the respective industries. However, the ugly sides of the technology such as cybercrime and cyberbullying requires further attention in order to ensure the safety of the community.

Further, the diversification of innovations through technology, particularly, has attracted many scholars to explore better explanation on its development in various contexts through the introduction of new theory. The Disruptive Theory, for instance, introduces by Clayton Christensen in 1997 through his book *The Innovator's Dilemma* (Adams, 2016), is a theory that explains how the offering of cheaper and simpler products and services is able to compete and win over big companies such as Xerox and Digital Equipment. In another word, this theory is seen as a way to explain why the established companies were defeated by doing everything right but ignoring the signal made through the changing of the environments in a particular industry (The Current, 2016). During the interview between The Current and Clayton Christensen on the November 8, 2016, he said, '... new technologies can only resolve simple things and

then they get better and better. And as disruptive innovation is a particular type of innovation that transforms a product, which historically was complicated and expensive ... make it so much more affordable and accessible that many more people able to own and use products that historically had been beyond their reach'. This situation clearly describes that, those incumbents in the industries are doing everything is right, however, the technology was disrupted by competitors through a new business model that can offer similar products or services at an affordable price. For example, the airline industry previously offered a package of premium service, meals and baggage checking, however, new business model offers it with affordable price and no frill especially for domestics and short haul routes (Markides, 2006). The above example utilized the new offering to the previously non-customers, or the niche that had been neglected by the incumbents in a particular industries (Waters, 2015).

Generally the Theory of Disruptive Innovation consists of four elements, namely (1) sustaining the innovation, (2) the increments of customer needs, (3) the progressing of a disruptive innovation to satisfy the customers' need, and (4) incumbent firms stumbling as they are disrupted. At the beginning, the disruptors started below the mainstream technology offered by the incumbents. However, as the technology evolved, the products and services offered by disruptors become better and able to fulfill the customer needs hence the incumbents will be disrupted (at the intersection between disruptive innovation and customer needs) , or in some cases, make them paralyzed and not able to remain competitive in the industries. Refer to Figure 2.1

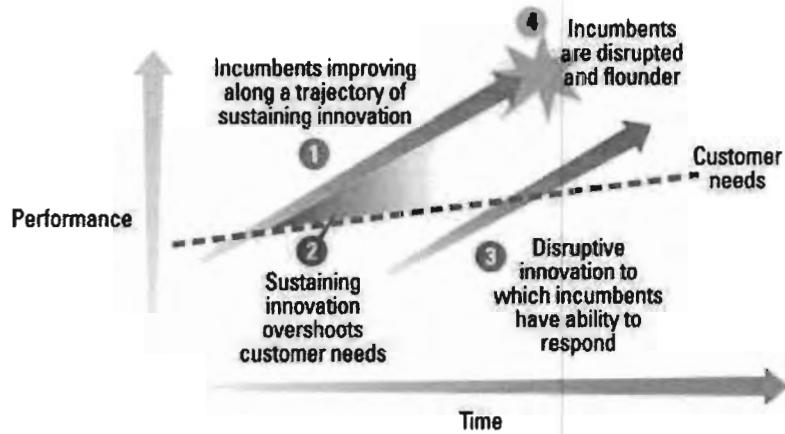


Figure 2.1

The Disruptive Innovation Model

Source: (King & Baatartogtokh, 2015)

At the early stage of this theory, Christensen use the term disruptive technology to explain the phenomenon effected by disruptive technology. However in 2003, through *The Innovator's Solution*, Christensen switched the term disruptive technology with disruptive innovation because of the application of the theory that is not limited to radical product innovation only but also to the area of services and business models (Markides, 2006; Yu & Hang, 2008). The widen application of disruptive innovation received critics from innovation scholars. Scholars of innovation disagree about the application of the concept of disruptive innovation for technology and business models (Markides, 2006) because the concept for both applications are distinct. Markides (2006) in his review about this theory explains that disruptive innovation truly represent the radical product innovation However, for business model, there is a need to refine the definition of innovation, since there is an ambiguous definition between the improvement of business process such as Amazon.com, that selling books over internet, and totally represent a new business model that never existed before.

Thus, the needs for innovation is not only limited to profit oriented setting, but also to the non-profit organization. Hence, the discussion about disruptive innovation not only limited to the business context (King & Baatartogtokh, 2015), but also in education setting (Christensen, Raynor, & McDonald, 2015). There were debates about whether technology that is related to education such as online learning or blended learning could be referred as a disruptive technology in education. A report by Christensen, Horn, Caldera, and Soares (2011) claimed that education sector is one of the sectors that has immune from disruption in the past, however the online learning has a huge potential to provide disruptive in the future through offering of courses by low-cost universities that may exist in the future.

The evolution of ICT creates more opportunities to improve the teaching and learning in the higher institution. Indiana University Bloomington (IU Bloomington) for instance, through Center for Innovative Teaching and Learning (CITL) recognized the importance of innovation in their teaching and learning activities (Seiring, 2011). As for that, CITL of IU Bloomington encouraged their instructors to adopt several innovations for teaching activities such as flipped classroom, learning analytics and electronic textbook (Siering, 2012) to complement their existing traditional teaching and learning activities.

Clearly, online learning is undeniable innovation that disrupts the existing learning at universities around the globe. As technology, particularly, ICT evolved, it brings more opportunities to innovate the activities related with teaching and learning suitable with the existing education systems and learning style of the new generations. It is hope that with the innovation in education particularly in teaching and learning activities, the

institutions are able to ensure that the cost involved is affordable without sacrificing the quality of services offered to students. As for this study, the researcher decided not to include Theory of Disruptive Innovation as the underpinning theory because this study focus on developing a ‘quality of use’ model in blended learning using flipped classroom. In this regard, the researcher is more interested in developing a conceptual framework based on the disruptive technology in its pedagogy, flipped classroom, from the perspective of user experience.

From the above discussion, it can be concluded that blended learning, including flipped classroom is one of the disruptive technology in education. Therefore it is important to understand how to manage this technology in this context. Hence, this study was conducted on the technology management using blended learning in the context of higher learning education. The following section discussed about past literatures in blended learning and flipped classroom.

2.3 Blended Learning

This section discusses about the concept of blended learning. The discussion includes the ambiguous definition of terminologies in blend learning and model of blended learning. This subsection explains various definitions related with blended learning and concluded with the definition used for the study. In order to ensure that issues that have been presented in the previous chapter are relevant, the researcher reviews previous literatures in blended learning and flipped classroom from a selected database. The reviews confirm that, the issues that have been discussed in the problem statement are relevant and requires more understanding through empirical researches.

2.3.1 Online Learning, E-Learning and Blended Learning

The evolution of technology in education changes the method of interactions and method of delivery of teaching and learning in education. The medium of teaching and learning has been transformed from a traditional learning place, like classrooms (Mohd. Yusoff, Abdul Karim, Othman, Mohin, & Abdull Rahman, 2013), to learning space, such as blended learning (Ginns & Ellis, 2009) and e-learning (Wahlstedt, Pekkola, & Niemelä, 2008).

Until now, scholars of e-learning debate about the terminology that can be used to represent online learning, e-learning and blended learning. Some scholars believe that the term e-learning was originated in the mid 1980's, along with other delivery method, online learning (Moore, Dickson-deane, & Galyen, 2011). At that time, e-learning was also known as a subset of distance learning (Hassanzadeh, Kanaani, & Elahi, 2012). National Higher Education Strategic Plan (PSPTN) by Malaysian government define e-learning as the use of information technology and communication to facilitate teaching and learning process in a learning environment (MOHE, 2011) (pg. 99). This technology allows the communication and interactions between students to students, student to instructors and students to context, in order to improve learning.

As for online learning, All (2005) gives a precise definition of online learning as '...the use of the Internet to access learning materials; to interact with the content, instructor, and other learners; and to obtain support during the learning process, in order to acquire knowledge, to construct personal meaning, and to grow from the learning experience' (pg. 5). However, Allen and Seaman (2011) proposed a comprehensive definition

online learning. Generally, online learning delivered a minimum of 80 percent of the course content over internet. The description of type of courses in online learning is presented in Table 2.1.

Table 2. 1
Descriptions of Online Learning Adapted from Allen & Seaman (2011)

% of content delivered online	Type of course	Description
0%	Traditional	Course conducted using traditional learning, delivered in writing or orally.
1-29%	Web Facilitated	Course that uses the online technology to drive face-to-face courses. Instructors use technology such as learning management system (LMS) or to post the syllabus and assignments.
30%-79%	Blended/Hybrid	Course conduct in dual mode; online and face-to-face delivery. Some proportion of the content is delivered online where some of class activities are shifted online, in order to reduce face-to-face meetings.
>80%	Online	Majority of a course is delivered online, with minimal face-to-face meetings.

Furthermore, there are numerous definitions of blended learning. Generally, blended learning refers to a combination of instructions delivery - traditional learning and online learning in learning environment (Faculty Focus, 2014). Another definition offers by Innosight Institute is that blended learning allows students to learn some part of the contents in traditional environment, and some part in online environment at their own time, place, path or pace (Horn & Staker, 2011). In view of this, blended learning can be referred to as a hybrid instruction delivery method (traditional and online learning) which helps to achieve learning outcomes.

For the purpose of this study, blended learning refers to a combination of instructions delivery; traditional learning and online learning, which allows students to learn some part of the contents in traditional environment, and some part in online environment, in

order to achieve learning outcomes. The following section presented the models related to the blended learning.

2.3.2 Models of Blended Learning

In 2010, Innosight Institute together with Charter School Growth Fund conducted a study on the growth of blended learning in United States (Horn & Staker, 2011). The study concluded that blended learning could be classified into six clusters, or blended learning model. The variety of models offers instructors with different style of instructions delivery suitable with the needs of students in their learning environment.

Refer to Table 2.2.

Table 2.2
Blended Learning Models

Model	Description
Model One Face to Face Driver	The instructors maintain face-to-face delivery in most of the pedagogy. However, they deploy online learning as a supplement the traditional learning.
Model Two Rotation	In this model, students rotate between a fixed schedule of online learning, flexible self-paced learning environment and traditional classroom. The instructors will monitor the online activities.
Model Three Flex	This model utilizes the online learning in the curricular. Instructors will provide face-to-face support base on as-needed basis though personal tutoring sessions and small group sessions. This model is suitable for drop-out recovery programs and credit-recovery programs.
Model Four Self-Blend	There are cases where students improve their understanding in their study plan by enrolling other online courses offer by other program or faculty. Normally the online courses offer in nearly ubiquitous method. For this model, these student 'self-blend' their study with online courses to supplement their subjects in the study plans.
Model Five Online Diver	In this model, instructors deliver all curricular using online method. Students will work independently most of the time. Traditional classroom is optional. Sometimes, the traditional gathering opts as extracurricular activities.
Model Six Online Lab	This model utilize the delivery the entire course in the online learning but conduct in the traditional classroom such as computer lab.

Source: Horn & Staker (2011)

This study focus on the model two, rotation. For this model, the researcher schedule the lesson plan by calculating the student learning time for traditional classroom and online activities. The instructors monitored the student activities (face to face and online learning) in order to ensure that these activities achieve the course outcome for the related subject.

2.3.3 Previous Literatures in Blended Learning

Blended learning is not just about replacing the traditional classroom, it also involves leverage affordance provided by these methods of delivery to achieve learning objectives (Kelly, 2014). By using the combination techniques, the instructors deliver lower level contents using online methods, which focus on critical thinking activities in classroom (Shibley, 2014). By doing this, students cannot be passive in the classroom. They have to actively participate in the class (individual or group) which simultaneously improves their understanding in the subjects. Moreover, working together in group will promote collaboration and teamwork among students in their learning.

Many issues on blended learning have been highlighted by prominent researchers through their systematic reviews or meta-analysis. For this study, the researcher used nine reviews reported from prominent databases is used as the pilot references and guidelines to ensure the discussions in the main streams. Table 2.3 listed the list of those references. Overall, these reviews could be categorized into four main categories, namely, (1) reviews related to overall blended learning, (2) reviews related to blended learning in the management education, (3) review related to student engagement in the

technology mediated learning and (4) review related to the student interactions in the distance education.

Distance education was taken into consideration because before blended learning was introduced in the education landscape, it was distance education that faced almost similar problems with blended learning. Moreover, distance education relies heavily on various technologies in their teaching and learning activities, with limited face to face interactions between students and instructors or institutions. These reviews are presented in Table 2.3.

Table 2. 3
Main Articles' Reviews for This Study

Authors	Journal	Title	Remarks
<i>Category 1: Overall blended learning</i>			
(Halverson et al., 2012)	Distance Education	An Analysis of High Impact Scholarship and Publication Trends in Blended Learning	Blended learning in highly cited publications
(Drysdale et al., 2013)	The Internet and Higher Education	An Analysis of Research Trends in Dissertations and Theses Studying Blended Learning	Blended learning in dissertation and theses
(Halverson et al., 2014)	The Internet and Higher Education	A Thematic Analysis of the Most Highly Cited Scholarship in the First Decade of Blended Learning Research	Blended learning in highly cited scholarship
<i>Category 2: Blended Learning and Management Education</i>			
(Arbaugh et al., 2009)	The Internet and Higher Education	Research in Online and Blended Learning in the Business Disciplines: Key Findings and Possible Future Directions	Blended learning in business disciplines
(Arbaugh, Desai, Rau, & Sridhar, 2010)	Organization Management Journal	A Review of Research on Online and Blended Learning in the Management Disciplines: 1994–2009	Blended learning in management education
(Arbaugh & Hwang, 2012)	Journal of Management Education	Uses of Multivariate Analytical Techniques in Online and Blended Business Education: An Assessment of Current Practice and Recommendations for Future Research	Data analysis in blended learning (management education)
(Arbaugh, 2014)	Journal of Management Education	What Might Online Delivery Teach Us About Blended Management Education? Prior Perspectives and Future Directions	Blended learning in management education

Continue

Table 2. 3 (Continued)
Main Articles' Reviews for This Study

Authors	Journal	Title	Remarks
<i>Category 3: Student Engagement in Technology Mediated Learning</i>			
(Henrie, Halverson, & Graham, 2015)	Computer & Education	Measuring Student Engagement in Technology-Mediated Learning: A Review	Student engagement in technology mediated learning
<i>Category 4: Student Interactions in Distance Education</i>			
(Bernard et al., 2009)	Review of Educational Research	A Meta-Analysis of Three Types of Interaction Treatments in Distance Education	Student interactions in distance education

The development of the models and frameworks specifically for this area is required as blended learning is still a young research area (Arbaugh, 2014; Drysdale et al., 2013; Halverson et al., 2012, 2014). Based on the review by Halverson et al., (2014) , frameworks in blended learning area can be categorized into explore, explain and design. Explore refers to the situation where scholars conduct their studies with the aim to explain the content richness of a particular context such as defining the factors or attributes of a phenomenon. Explain refers to a situation of causal or correlation of a particular variables to another variable in order to explain a phenomenon. Design refers to model that explains the theory of an instructional model, such as instructional interventions that will influence the learning outcome. Currently, a majority of the studies used Garrison's Community of Inquiry as the theory that underpinned their studies, followed by Moore's Transactional Distance Theory, Wenger's Communities of Practice (Halverson et al., 2014). However, in the area of business disciplines, the earlier studies focus more on the adoption of the technology of blended learning, therefore Technology Adoption Model (TAM) was widely used to capture the perceived behavior among blended learning users (Arbaugh, 2014). Also, Halverson et al. (2014) highlighted that among 60 articles and 25 edited book chapters reviewed in

the area of blended learning, only 11 publications considered as ‘gold star’ publications because these publications combine a framework and empirical research in one study. However, Arbaugh (2014) emphasized that studies related to the comparative blends in education probably is one of the biggest gap in the blended learning in business and management area, and requires attention from future scholars in this area. Thus, these findings indicates that, more studies related with the development of models and frameworks specifically blended area accompanied by empirical research must be conducted in order to increase the understanding of blended learning, particularly in the education related to business or management discipline.

Furthermore, for the types of blended learning researches, most studies normally utilize the explain types of research (Halverson et al., 2014). Explain types of research, which is either causal or correlational research refers to quantitative type of research, where data were analyzed using descriptive and multivariate analysis such as multiple regression and path analysis (Arbaugh & Hwang, 2012; Halverson et al., 2014). Also, scholars suggested some improvement made to the data analysis, such as the exploratory analysis prior to testing the hypothesis and constantly reporting the effect size in the related result (Arbaugh & Hwang, 2012). However, the empirical studies of blended learning are still lacking, which indicates that blended learning is still young and in a battle between design, development, and research (Halverson et al., 2012). Therefore, it can be said that blended learning is considered as a young area that offers plenty of opportunities for future studies.

On the other hand, Arbaugh (2014) also urged future scholars to look into studies that focus on a comparative studies, as it is able to speed up the understanding of the online

settings. A majority of scholars in earlier blended learning literatures made a comparative studies by comparing between the traditional and blended learning in one research setting, however, current development shows that the comparison was also made between traditional, blended and online learning in a single research setting (Drysdale et al., 2013; Halverson et al., 2014). Arbaugh (2014) in his review also raised concern related to the importance of studies related to the fidelity of blending in order to achieve an optimal blend between the online and face to face learning in a particular research setting. Apart from that, a research related with technology mediated in education requires a well-organized course design. Course design will affect student learning process, thus, influencing learning outcome among them (Kuo, Walker, Belland, & Schroder, 2013).

In the field of blended learning, therefore the technology used to facilitate the learning has received less attention among previous scholars (Drysdale et al., 2013). One of the studies that focus on technology was conducted by Bernard et al. (2009) who emphasized that testing the student interactions based on student-student, student-content and student-instructor, facilitate by information technology were able to achieve effective learning. However, scholars must bear in mind that researches in blended learning must be designed properly especially when it relates with the interventions made in the research settings (Shadish, Cook, & Campbell, 2005). The researcher also realized that none of the above reviews mentioned about the issue of reliability or validity related to the research design, hence more future studies must ensure that these issues are addressed in order to ensure quality outcomes of studies in blended learning area.

Arbaugh (2014) also raised one interesting issue, which focuses on the classroom setting, where currently, most previous studies have ignored. This review also pointed out that flipped classroom may become one of an interesting approach to address this type of setting. Since this area is relatively new, researches which are related to the flipped classroom produced a mixed result. Several scholars found that flipped classroom approach improves students' performance (Triantafyllou & Timcenko, 2014) and students' thinking (Bristol, 2014). However some studies found that there is significance difference between traditional classroom and flipped classroom (Findlay-thompson et al., 2014).

Meanwhile, scholars of blended learning in business and management education raised the issues related to the entrepreneurship education, as there are little studies that focus in this area while more attention was given to the strategic management and organizational behavior (Arbaugh et al., 2010; Arbaugh & Hwang, 2015). This situation may be due to the facts that entrepreneurship education scholars are more interested on about how to teach this course, rather than how to teach this course online (Arbaugh et al., 2010).

From the above reviews, none of those scholars mentioned about the measurement related to the quality in the research setting. The researcher suggested that this is due to the fact that the development of this area is currently at the fast lane, therefore there are many issues that need to be addressed at the same time, such as the disagreement of the terminology used, a solid framework representing blended learning, the methodological issues, analytical issues and more (Halverson et al., 2012). Moreover, only Bernard et al., (2009) mentioned about quality as a text citation, but did not test it as a construct in

a research setting. This finding is not surprising because scholar like Ladhari (2010) highlighted that it is more difficult to measure quality in online applications as compared to traditional service quality because there are many factors that influence the setting at the same time. Similarly, with the technology mediated in education, scholars of online learning suggested that more studies need to be done in order to explore and confirm the quality dimensions for online education (Martínez-argüelles & Callejo, 2013; Shelton, 2010; Teo, 2010).

Even though these reviews do not specifically mentioned about the measurements, they highlighted the variables that are commonly used in the blended learning area. Among all the blended learning variables, learning outcome is the most used in the studied area and the highest sub-topic of learner outcome is student performance (Drysdale et al., 2013). However, other scholars pointed out that, performance score alone was not able to provide a new insight to the studies, therefore studies related to the attitude and usage will contribute to the development of the framework (Arbaugh, 2014).

Furthermore, student satisfaction and effectiveness are highlighted as the important variables in the mainstream researches (Drysdale et al., 2013; Halverson et al., 2014). Satisfaction has always been used in a quality indicator to measure blended learning where satisfactions levels are high among students who are involves in blended learning (Kuo et al., 2014; Overbaugh & Nickel, 2011; So & Brush, 2008; Wu et al., 2010). Previous literatures also proved that blended learning improves effectiveness and students' performance (Triantafyllou & Timcenko, 2014). However, none of the reviews stated that efficiency is one of the variables that is required in the blended learning studies, even though efficiency is known as one of the important variables to

measure quality of use in any context related to technology mediated environment, where efficiency and effectiveness represent performance (Bevan, 1995a).

All reviewers agree that student interactions is very important in the online learning (Arbaugh et al., 2009, 2010; Arbaugh & Hwang, 2015; Robert M Bernard et al., 2009; Drysdale et al., 2013; Halverson et al., 2012, 2014). Moreover, most of the reviewers identified student interactions based on three types of interactions by Moore (1989) namely student-student, student-interaction and student-content. In the earlier stage of blended learning research, most of the studies used either one type of interactions or a combination of student-student and student-content interaction in one study, and less attention has been given to student-content interaction (Drysdale et al., 2013). However, as more studies are conducted, all types of interactions proposed by Moore (1989) had been considered in one research setting (Halverson et al., 2014). The study by Kuo et al., (2014) probably is among the premiere studies that included all types of interactions in online setting.

Additionally, scholars also suggested that student engagement is one of the important variables in the mainstream researches of blended learning (Drysdale et al., 2013; Halverson et al., 2014). Student engagement started to gain attention among scholars in blended learning. Recently, scholars such as Henrie et al. (2015) published a review article, '*Measuring Student Engagement in Technology-Mediated Learning: A Review*'. This review also highlighted that the inconsistent definition of student engagement in the technology mediated environment is a major issue. However, the review revealed that student engagement can be operationalized generally into three main categories: behavioral, cognitive and emotional. There were 16 measurements listed, 14 of them

reported the Cronbach alpha value, and eight of the measurements reported the Cronbach alpha value below 0.8. This finding clearly shows that the measurements related to the engagement is still at the early stage of its development. The review further reported that student engagement was measured using various method namely, quantitative self-report, qualitative measure, quantitative observational measures and physiological sensors.

Importantly, there are many issues that require improvements and which call for more studies in this research area. Indirectly, this situation also happens in the business and management discipline. None of the above reviews reported about the quality framework or quality framework, thus indicating that little studies have been conducted so far. Also, Arbaugh (2014) mentioned about the need of having a research on a classroom setting, and a possibilities that a flipped classroom approach can be used to represent this setting. Most of the discussion refers to the need to develop a model specifically for blended learning in education. However, there was a suggestion from previous scholar to look into quality issues in blended learning. Therefore this study reacted to this call by developing a quality framework of blended learning using flipped classroom approach in the entrepreneurship education. The model was developed using a multi method approach (quasi experimental and survey), based on the enrichment made to the quality of use model proposed by Nigel Bevan in 1995. There were five constructs tested which are student satisfaction, efficiency, effectiveness, student interactions and student engagement.

The following section presented a systematic review on flipped classroom in the blended learning. The aim of this review was to confirm if the discussion of flipped

classroom articles published are aligned with the main stream discussions of blended learning in education.

2.3.4 Systematic Reviews of Flipped Classroom

Blended learning has been widely adopted by higher learning institutions (Graham et al., 2013). Arbaugh (2014), posited that flipped classroom can be utilized for a classroom setting research. Chen, Wang, and Chen (2014) define flipped classroom as the condition where students will learn using several technologies at their own pace and complete the exercise in the physical class (Chen et al., 2014). Scholars found that flipped classroom has been used in various levels of educations such as K-12, undergraduates and postgraduate levels (Bristol, 2014; Butgereit & Osman, 2014; Horn & Staker, 2011).

In this regard, the researcher decided to conduct a systematic review about flipped classroom in order to gauge the insight about the research in this area. Furthermore, the researcher would like to ensure that the issues raised in the studies of flipped classroom are aligned with the main stream discussion of blended learning in education. Due to the limitation of database access, the researcher's search was limited to the Sciendirect database provided by the university. A few combinations of keywords has been used to find the related articles from various disciplines, namely 'blended learning', 'flipped classroom', 'satisfaction', 'efficiency', 'effectiveness', 'engagement', and 'interactions'. The constructs used in this study were used as the keywords search because the researcher like to focus directly on these constructs, as those had been selected earlier in from the reviews of the main stream journals. There were 129 articles

found from the search starting from 2006 until 2016, which mean, researchers of flipped classroom started to address issues related with this area in these year. Then, the researcher excluded the redundant articles, review articles, proceedings, editorial, book reviews and articles that have quality issues. At the end, only 16 articles were selected based on the characteristics of this study. This section presents the findings and conclusion drawn from this review. The conclusions is made based on contextual, theoretical, and methodological issues.

All of these articles were taken from American Journal of Surgery (2), Computers and Education (4), Computers in Human Behavior (2), Currents in Pharmacy Teaching and Learning (2), Education for Chemical Engineers (1), Internet and Higher Education (1), Nurse Education in Practice (3) and Surgery (United States) (1). The articles were published in 2014 (5), 2015 (5) and 2016 (6). Researches were conducted in various countries namely Australia (3), Canada (1), Norway (1) Qatar (1), Taiwan (3), United States of America (5) and United Kingdom (1). The researches were conducted in various disciplines, namely Chemistry (1), Education (2), Engineering (1), Information Technology (2), Medical (3), nursing (3), Pharmacy (2), Social Studies (1) and multidiscipline (1). Refer to Table 2.4

From Table 2.4, it could be concluded that, majority of flipped classroom researches were reported from United States of America, Australia and Taiwan starting 2014. Only one study by Kim et al., (2014) was conducted using various academic discipline (Sociology, Engineering, Humanities) in one research setting. Similarly, only one study by Wanner and Palmer (2015) was conducted in the social studies for Governance and

Sustainable Development. Majority of the studies were reported in the area of medical and nursing.

Table 2. 4
Summary of Articles by Year, Country, Journal and Area of Study

Studies	Year	Country	Journal	Area of Study
(Baepler, Walker, & Driessen, 2014)	2014	USA	Computers & Education	Chemistry
(Chen, Wang, & Chen, 2014)	2014	Taiwan	Computers & Education	Information Technology
(O'Flaherty & Laws, 2014)	2014	Australia	Nurse Education in Practice	Nursing
(O'Flaherty & Laws, 2014)	2014	Australia	Nurse Education in Practice	Nursing
(Kim, Kim, Khera, & Getman, 2014)	2014	USA	Internet and Higher Education	Multidiscipline: Sociology, Engineering, Humanities
(Lindeman et al., 2015)	2015	USA	American Journal of Surgery	Medical
(Kakosimos, 2015)	2015	Qatar	Education for Chemical Engineers	Engineering
(McLaughlin & Rhoney, 2015)	2015	USA	Currents in Pharmacy Teaching and Learning	Pharmacy
(Wang, 2015)	2015	Norway	Computers & Education	Information Technology
(Wanner & Palmer, 2015)	2015	Australia	Computers & Education	Social Studies
(Hanson, 2016)	2016	Australia	Nurse Education in Practice	Nursing
(Hao & Lee, 2016)	2016	Taiwan	Computers in Human Behavior	Education
(Hao, 2016)	2016	Taiwan	Computers in Human Behavior	Education
(Liebert, Lin, Mazer, Bereknyei, & Lau, 2016)	2016	USA	American Journal of Surgery	Medical
(Liebert, Mazer, Bereknyei Merrell, Lin, & Lau, 2016)	2016	Canada	Surgery (United States)	Medical
(Morris, 2016)	2016	UK	Nurse Education in Practice	Nursing
(Hughes, Waldrop, & Chang, 2016)	2016	UK	Currents in Pharmacy Teaching and Learning	Pharmacy

The second attention of this review is on the methodological issues. The summary in Table 2.5 shows various research methodologies were used for flipped classroom research namely, experiment (4), quasi experiment (2), mix methods (experiment and

narrative comments) (6), survey (3) and qualitative (1). The timeline of data collection varies from minimum of 5 weeks to a maximum of 3 semesters. Most of the studies utilized learning management system (LMS) as the main platform for communication with students and a workspace for electronic contents. Six studies do not report the platform used but generally can be concluded as online support, only one study that used a combination of LMS and social network site such as YouTube, Google Doc, Video Cam and Dropbox (Kim et al., 2014) and two studies adapted Bring Your Own Device (BYOD) and Student Response System (SRS) such as Kahoot which is incorporated in the flipped classroom

Table 2. 5

Summary of Articles by Research Methodology, Duration of Data Collection and Platforms in Flipped Classroom

Studies	Research Methodology	Timeline of Data Collection	Platforms in Flipped Classroom
(Liebert, Lin, Mazer, Bereknyei, & Lau, 2016)	Experiment	2 semesters (1 year)	Not Reported (Online Support)
(McLaughlin & Rhoney, 2015)	Experiment	1 semester	LMS Sakai
(Kakosimos, 2015)	Experiment	2 semester	LMS StoryLine
(Hughes, Waldrop, & Chang, 2016)	Experiment	1 semester (5 week)	LMS
(Kim, Kim, Khera, & Getman, 2014)	Mix method	1 semester	LMS, Youtube, Google Doc, video cam, and Dropbox
(Hao & Lee, 2016)	Mix method	1 semester	Not Reported (Online Support)
(Liebert, Mazer, Bereknyei Merrell, Lin, & Lau, 2016)	Mix method	2 semesters (1 year)	Not Reported (Online Support)
(Chen, Wang, & Chen, 2014)	Mix method	3 semesters (18 weeks)	LMS
(Morris, 2016)	Mix method	2 semesters (1 year)	NR - online support
(Wanner & Palmer, 2015)	Mix method	1 semester	LMS e-portfolio
(Hanson, 2016)	Qualitative	1 semester	LMS eLecture
(Baeppler, Walker, & Driessen, 2014)	Quasi Experiment	3 semesters	Not Reported (Online Support)
(Wang, 2015)	Quasi Experiment	1 semester (5 weeks)	SRS - Kahoot

Continue

Table 2. 5 (Continued)

Summary of Articles by Research Methodology, Duration of Data Collection and Platforms in Flipped Classroom

Studies	Research Methodology	Timeline of Data Collection	Platforms in Flipped Classroom
(Hao, 2016)	Survey	1 semester	BYOD & IRS
(Lindeman et al., 2015)	Survey	1 semester	Not Reported (Online support)
(O'Flaherty & Laws, 2014)	Survey	1 semester (13 weeks)	LMS (Adobe Connect)

Note: LMS – Learning Management System; BYOD –Bring Your Own Device; IRS – Instant Response System; SRS – Student Response System

From theoretical review, only three studies were underpinned by theory or model namely Revised Community of Inquiry (RCOI) (Kim et al., 2014), Concern-Based Adoption Model (CBAM) (Hao & Lee, 2016) and FLIPP Model (Chen et al., 2014). There are several types of measurement used in these studies namely self-developed measurement (8), student performance such as assessments and student evaluations (5) and adapted measurement from previous scholars (3). Finally, the majority of experiment and quasi experiment studies used descriptive analysis. Only three studies reported inferential statistics (Hao, 2016; Hao & Lee, 2016; Kim et al., 2014) and one study conducted path analysis (Chen et al., 2014). The qualitative studies were analyzed using transcription to come out with theme related to the research. The findings are presented in Table 2.6.

Table 2. 6
Summary of Articles by Research Theories, Measurements and Data Analysis

Studies	Theories	Measurement	Data Analysis
(Hao & Lee, 2016)	CBAM	Adapted Measurement from Previous Scholars	Descriptive, Inferential statistics
(Kim, Kim, Khera, & Getman, 2014)	RCOI	Adapted Measurement from Previous Scholars	Descriptive, Inferential statistics
(Hao, 2016)	Not Reported	Adapted Measurement from Previous Scholars	Descriptive, Inferential statistics
(Wanner & Palmer, 2015)	Not Reported	Self-developed	Descriptive
(Wang, 2015)	Not Reported	Self-developed	Descriptive
(Hughes, Waldrop, & Chang, 2016)	Not Reported	Self-developed	Descriptive
(Baepler, Walker, & Driessen, 2014)	Not Reported	Self-developed	Descriptive
(Kakosimos, 2015)	Not Reported	Performance	Descriptive
(McLaughlin & Rhoney, 2015)	Not Reported	Performance	Descriptive
(Lindeman et al., 2015)	Not Reported	Performance	Descriptive
(Liebert, Lin, Mazer, Bereknyei, & Lau, 2016)	Not Reported	Performance	Descriptive
(Morris, 2016)	Not Reported	Self-developed	Descriptive, Transcription
(Liebert, Mazer, Bereknyei Merrell, Lin, & Lau, 2016)	Not Reported	Self-developed	Descriptive, Transcription
(Chen, Wang, & Chen, 2014)	FLIPP	Self-developed	Inferential statistics (Path Analysis)
(Hanson, 2016)	Not Reported	Self-developed	Transcription
(O'Flaherty & Laws, 2014)	Not Reported	Performance	Transcription

A comparison between blended learning and flipped classroom literatures revealed that the underpinning issue of theories is still relevant since in flipped classroom systematic review, only three studies reported the underpinning theories from various scholars namely Revised Community of Inquiry (Kim, Kim, Khera, & Getman, 2014), Concern-based Adoption Model (Hao & Lee, 2016) and FLIPP Model (Chen, Wang, & Chen, 2014). Only Community of Inquiry can be said to be similar to underpinning theories reported as in the mainstream literature. As for quality framework or measures, no previous studies focused on this.

From review of the mainstream journals of business and management discipline, there are few issues that had been highlighted but were not reported in the reviews of blended learning namely comparative in fidelity of blending options, studies in classroom setting, entrepreneurship education, duration of studies, data analysis using structural equation model and report of effect size (Arbaugh, 2014; Arbaugh & Hwang, 2012). For this systematic reviews, it was found that all studies were conducted in the classroom setting, one study used structural equation model which is SmartPLS (Kim et al., 2014) , one study report effect size in their result (McLaughlin & Rhoney, 2015), and all studies were conducted within 1 semester to 3 semesters to collect data. However, this systematic review also yield no result for comparative in fidelity of blending options, and entrepreneurship education. The finding of this review confirms the suggestion made by Arbaugh (2014) that flipped classroom should become a research setting for research of classroom based setting.

Finally, this review also reported the methodologies used in the studies of flipped classroom, in which not so much different with the mainstream reviews in the blended learning. This review also detailed out the technology used to support technology mediated environment, whereas the review of mainstream journals only reported that little studies were conducted with respect to the used in blended learning, but not types of technologies used in the reviewed studies. The comparison between the mainstream journals of blended learning (including business and management discipline) with systematic review of flipped classroom offers opportunities for researches to conduct the studies in this area in order to increase the understanding in the blended learning, particularly in business and management discipline. Based on the discussion, the researcher concluded that a study in blended learning using flipped classroom is

important in order to increase the understanding of the area through its contribution to the literatures and developments of theories.

2.4 Online Learning in Malaysia

This section discusses about the online learning in Malaysia. The discussion includes the overview of online learning and past literatures of blended learning as well as flipped classroom in Malaysia. This section lead to the understanding on the online learning (including blended learning) in Malaysia. This section is important to this study because it provides the essential information related to the research setting. Therefore this section covers the overview on online learning in Malaysia and reviews related to the blended learning and flipped classroom in Malaysia.

2.4.1 Overview

As compared to other country in ASEAN, Malaysia has some advantages in education.

The price, language and accreditations through Malaysian Qualification Agency (MQA) positions Malaysian's education packages appears to be more attractive (Lim, 2009). Because of these factors, it attracts the interest of potential local students, as well as international students to study in Malaysia (Grapragasem, Krishnan, & Mansor, 2014).

In 2007, Ministry of Higher Education (MOHE) introduced a strategic plan, called National Higher Education Strategic Plan (PSPTN) (MOHE, 2011). This plan was developed with the aim to transform the nation into a high-income nation by 2020. This plan serves as a blueprint to achieve the strategic goals, a guideline of the implementation plan and a key performance indicator for the respective areas. E-

learning is one of CAP in PSPTN (MOHE, 2011). Currently, the implementation of e-learning CAP is at the middle stage. Hence, majority of universities in Malaysia consist of parallel cohorts of students; those with previous study plans utilize the traditional methods of learning, while the new study plans use the blended methods in their learning environment.

In Malaysia, e-learning has been used as the driver to support traditional learning (Embi, 2011). Recently, another important development is the introduction an Open Educational Resource (OER) to promote life-long learning using various platforms (Embi, 2013). Massive Open Online Course (MOOC), is one of the OER components. MOOC is one type of online course with the aim for large-scale participation and open access via the web. Currently, there are four universities participating and contributing in the OER using MOOC. Those universities are Universiti Putra Malaysia (Tamadun Islam dan Tamadun Asia), Universiti Kebangsaan Malaysia (Hubungan Etnik), Universiti Malaysia Sarawak (ICT Competency), and Universiti Teknologi MARA (Introduction to Entrepreneurship).

In 2011, MOHE had study on issues, challenges and trends of e-learning in Malaysia. The study covers several issues including governance, integration of e-learning in teaching and learning, quality assurance, and future e-Learning planning. It reveals majority of universities in Malaysia do not perform periodical quality assessment to observe the impact and effectiveness of e-Learning in their institutions. In this regard, the current study outlines suggestion to the government to develop the guideline to measure the effectiveness of e-learning in Malaysia. From students' perspectives, this

study also reveals several issues related with student engagements and students interactions to promote collaborative learnings.

2.4.2 Reviews of Blended Learning and Flipped Classroom in Malaysian Universities

Scholars of blended learning such as Graham et al. (2013) is probably among pioneer scholars that published articles related with framework for institutional adoption and implementation of blended learning in higher education. In their article, Graham and friends identified three stages of adoption and implementation of blended learning, namely: (1) awareness/exploration, where at this stage no institutional strategy regarding blended learning but institutions awareness of the its development in education area, with limited support for faculties to explore ways to employ blended learning approach in in their teaching and learning activities; (2) adoption/early implementation, whereby institutions adopted blended learning strategies and experimentation with governance and practices to support its implementation; (3) mature implementation/growth, when institutions have a well-established blended learning strategies, structure, and support that are integrated to institutional' operations.

In order to get the insight of the blended learning and flipped classroom in public universities in Malaysia, the researcher reviewed articles published by Majlis e-Pembelajaran IPTA Malaysia (MEIPTA) and Ministry of Education Malaysia (MOE) in a compilation book entitle, '*Blended and Flipped Learning: a Case Studies in Malaysia HEIs*'. This book was published in 2014 and was edited by Mohamed Amin Embi. This book consists of 18 chapters, however, only 14 chapters are included in this

review. Chapter overview of blended learning, overview of flipped classroom and chapter for concluding remarks has been excluded. These articles can be divided into two main categories namely blended learning and flipped classroom, from various universities, Universiti Kebangsaan Malaysia (4), Universiti Malaysia Sabah (2), Universiti Teknologi MARA (1), Universiti Malaysia Sarawak (1), Universiti Islam Antarabangsa Malaysia (1), Universiti Malaysia Perlis (1), Universiti Malaysia Trengganu (1), Universiti Perguruan Sultan Idris (1), International Medical University (1), dan Universiti Teknikal Malaysia Melaka (1). See Table 2.7.

Table 2. 7
Articles Review: Blended Learning and Flipped Classroom in Malaysian Universities

Authors	Title	Universities
<i>Category 1: Blended Learning</i>		
(Mohammad Amin Embi, Mohd Norsin, & Panah, 2014)	Blended Learning Readiness in Malaysia	Universiti Kebangsaan Malaysia
(Mohamed Amin Embi & Hamat, 2014)	Meaningful Blended Learning via iFolio@UKM	Universiti Kebangsaan Malaysia
(Wah, Keong, Ing, Jhee, & Lajium, 2014)	A Qualitative Study of In-service Teacher's Blended Learning Experiences via Schoology	Universiti Malaysia Sabah
(Alias, Luaran, & Yahya, 2014)	Regulating Learning through Linking, Flipping and Wrapping	Universiti Teknologi MARA
(Man & Kian, 2014)	Morpheus UNIMAS: Strengthening Student Engagement in Blended Learning Environment	Universiti Malaysia Sarawak
(Md Fhalib, Mat Daud, & Shahir, 2014)	Investigating Faculty Adoption of Blended Learning	Universiti Islam Antarabangsa Malaysia

Continue

Table 2. 7 (Continued)

Articles Review: Blended Learning and Flipped Classroom in Malaysian Universities

Authors	Title	Universities
(Razali & Kamarudin, 2014)	Experience on Blended Learning: Toward e-Laboratory	Universiti Malaysia Perlis
(Nural Azhan & Mohd Saman, 2014)	Enhancing Student Interaction and Engagement in Blended Learning	Universiti Malaysia Trengganu
(Md. Saad, Selamat, & Ahmad, 2014)	Blended Learning in UPSI	Universiti Perguruan Sultan Idris
<i>Category 2: Flipped Classroom</i>		
(Mohamed Amin Embi, Hussain, & Panah, 2014)	Flipped Learning Readiness among Graduate and Postgraduate Students in UKM	Universiti Kebangsaan Malaysia
(Raihanah, 2014)	Flipped Classroom & Meaning Learning among UKM Graduate Students: A Teacher Reflection	Universiti Kebangsaan Malaysia
(Wah, Ing, Keaong, & Jhee, 2014)	To Flip or Not to Flip? Finding from a Malaysian Undergraduate Course in UMS	Universiti Malaysia Sabah
(Alsagof, Baloch, & Hashim, 2014)	Flipping Large Lectures @ IMU	International Medical University
(Salam, Bakar, Mohd Asarani, & Mohamed Saki, 2014)	Designing an Interactive Book for Flipped Learning	Universiti Teknikal Malaysia Melaka

From the above review, several conclusion can be derived. All articles reviewed clearly show that the adoption of blended learning in Malaysia is in the continuum between early implementation and mature implementation, because all articles show that the government and universities provided facilities to carry out blended learning. The articles related with readiness show that students are ready to accept blended learning (Mohammad Amin Embi et al., 2014) and flipped classroom approach (Mohamed Amin Embi et al., 2014; Wah, Ing, et al., 2014). However, the results from these studies showed that students who are involved in blended learning and flipped classroom have uncertainties about how to adapt their learning styles with this new learning approach.

There are few studies that reported the level of adoption of blended learning with their institutions (Md. Saad, Selamat, & Ahmad, 2014; Md Fhalib, Mat Daud, & Shahir, 2014; Nural Azhan & Mohd Saman, 2014; Razali & Kamarudin, 2014). As mentioned by Graham et al. (2013) at the early stage of implementation, institutions adopted blended learning strategies and experimentation with governance, as well as practices to support its implementation. Studies show that blended learning is well accepted by users of blended learning in universities (Md. Saad, Selamat, & Ahmad, 2014; Md Fhalib, Mat Daud, & Shahir, 2014), however, it is reported that these universities have inadequate infrastructures and facilities for blended learning, as well as conformation with the regulations by professional accreditation and national standards (Razali & Kamarudin, 2014).

This review also revealed that some universities are in the stage of experimenting the best way to adopt blended learning and implement blended learning and flipped classroom (Alias, Luaran, & Yahya, 2014; Alsagof et al., 2014; Salam et al., 2014). The study by Alsagof, Baloch, & Hashim, (2014), explain how to handle a flipped classroom for large classes using web tool to increase student engagement and promote learning. Similarly with study by Nural Azhan & Mohd Saman, (2014), that proposed the use of system log, this study is able to explore the Push-Pull and Just in Time Teaching techniques to increase the usage of blended learning.

In order to carry out an empirical research related with blended learning, the technologies mediated blended learning and flipped classroom must achieve a mature implementation. Out of these 14 articles, there are five articles that can be categorized in the mature stage of implementation (Mohamed Amin Embi & Hamat, 2014; Man &

Kian, 2014; Raihanah, 2014; Wah, Ing, et al., 2014; Wah, Keong, Ing, Jhee, & Lajium, 2014). Only one study was conducted using mix method (descriptive and qualitative) (Wah, Ing, et al., 2014) and four studies were conducted using qualitative method. Among the advantages of blended learning and flipped classroom produced from qualitative researches are those that promotes learning, improve learning skills, more engagement among student, improve student instructor relationship, and promotes self-regulated learning. These articles also presented limitation to the implementation of blended learning and flipped classroom namely, increase tension among students due to uncertainties to adapt with new method of learning, time consuming, language barriers, infrastructures and supports from universities.

After reviewing blended learning and flipped classroom in Malaysia, the researcher concluded that overall the adoption of blended learning and flipped classroom is at the early stage of adoption. Only five studies that show maturity in its implementation represent Universiti Kebangsaan Malaysia, Universiti Malaysia Sabah and Universiti Malaysia Sarawak (Mohamed Amin Embi & Hamat, 2014; Man & Kian, 2014; Raihanah, 2014; Wah, Ing, et al., 2014; Wah, Keong, et al., 2014). The research methodologies used in the review of Malaysian's universities were limited to descriptive and qualitative, thus it indicates that the blended learning in Malaysia is still looking for suitable dimensions (that lead to development of framework and model) representing this area. This finding align with reviews made by the mainstreams journals of blended learning (Drysdale et al., 2013; Halverson et al., 2012, 2014), that more studies need to be conducted in order to facilitate the development of this area.

2.5 Entrepreneurship Education in Malaysia

This section provides the understanding related with entrepreneurship education in Malaysia because this study used entrepreneurship education as its research setting. The section also covers discussion reviews of entrepreneurship flipped classroom and entrepreneurship education in Universiti Teknologi MARA Perlis because this study was conducted at this university through Fundamentals of Entrepreneurship (ENT300).

2.5.1 Reviews of Entrepreneurship Education in Malaysian Universities

Entrepreneurship education can be defined as a formal program developed to prepare students with entrepreneurship knowledge, ability to understand customers' insights, analyzing the market needs and recognize business opportunities. It consists of understanding of internal and external factors that facilitate the operation of a business (Rahim et al., 2015). The need for entrepreneurship education become a synonym discussion with the employment rate in Malaysia, hence scholars in this area are looking into the possibilities to inculcate entrepreneurship spirits as a formal education and as a part of a solution to the employment issues (Ahmad, 2013). Article by Ahmad (2013) suggested that the entrepreneurship education in Malaysia must be started from the early stage, of primary school, up to secondary school. Currently, this level of education has not been exposed to any entrepreneurship activities, thus inculcating them at tertiary level becoming more difficult.

The researcher found two reviews related with entrepreneurship education in the Malaysian university: (1) '*Entrepreneurship Education in Malaysia's Public*

Institutions of Higher Learning - A Review of the Current Practices' by Yusoff, Zainol, and Ibrahim (2014), and (2) '*Entrepreneurship Education in Malaysian Universities*' by Ahmad and Buchanan, (2015). From this review, the researcher found that most of the issues discussed are related to how to teach this course, rather than how to teach this course online, which aligned with what had been mentioned by scholars in the mainstreams of blended learning in the business and management discipline (Arbaugh et al., 2010). Both of the reviews agrees that the pedagogy used to delivered is less effective, therefore the new approach that is non-traditional should be included in order to foster engagement and interaction among students (Ahmad & Buchanan, 2015; Yusoff et al., 2014). It is also suggested that course design needs to be revised and revisited in order to align with the current needs in this area (Ahmad & Buchanan, 2015). In order for the universities to do that, they have to revise the objectives of entrepreneurship education in Malaysian universities, and align them with the revised course design (Ahmad & Buchanan, 2015; Yusoff et al., 2014).

The above reviews also mentioned the issues of support, partnering with different parties and partnership with local communities (Ahmad & Buchanan, 2015; Yusoff et al., 2014). However, some universities have implemented various entrepreneurship activities to promote entrepreneurial skill. In Universiti Teknologi MARA (UiTM), there are programs that integrate partnering with different parties such as Tunas Mekar collaboration between UiTM and ICU-JPM (Implementation Coordination Unit-Prime Minister's Office) and business student in campus that provide partnership with local communities (Rahim & Chik, 2014). Apart from that, entrepreneurship education has also been taught as a formal subject at all levels of studies in UiTM (diploma, undergraduates, and graduates) (Loh et al., 2015).

Importantly, the field of entrepreneurship is not only limited to business discipline, however, the integration with other discipline is seen as a good partnership in an academic discipline. In Malaysia, Technical Vocational Education and Training (TVET) has been introduced since the secondary school. The Malaysian government aimed that 75% of TVET who completed their study from TVET institutions particularly, must be employed within six months of their graduation and some of these graduates will participate in the labor markets as entrepreneurs (Idris, 2011). As such, a technopreneur courses that intergrate entrepreneurship and engineering and other technical dicipline is a good move (Bon, 2010a). It's Universiti Malaysia Perlis and Universiti Teknikal Malaysia Melaka (UTeM) that reacted to this call (Bon, 2010a). In order to accelarate the development of technopreneur, a center of excellence would be a good approach in order to promote partnership with other parties, as well as local community to foster the development of entrepreneurship in the TVET area (Ahmad & Buchanan, 2015; Bon, 2010b; Loh et al., 2015)

Universiti Utara Malaysia

2.5.2 Flipped Classroom and Entrepreneurship Education in Universiti Teknologi MARA (UiTM) Perlis

Studies in blended learning using flipped classroom requires a well-organized course design in order to increase the effectiveness and efficiency of its implementation (Drysdale et al., 2013; Halverson et al., 2012). Entrepreneurship is one of the academic area in the business or management discipline, and scholars such as Arbaugh et al. (2010) identified that entrepreneurship as one of the least researches regarding blended learning. Therefore, for this study, the researcher chose

Fundamentals of Entrepreneurship or ENT300 as the subject for the research setting. This subject is chosen because, in UiTM Perlis, its faculty has developed an instructional model to manage the teaching and learning activities in blended learning using flipped classroom approach since 2012.

UiTM has received Entrepreneurial University of the Year Award in three years, namely 2012, 2013, and 2015 due to the university strong focus on the development of entrepreneurial activities among students and local community (Loh et al., 2015). For student development on entrepreneurship education, UiTM has pronounced ENT300/ETR300 – Fundamentals of Entrepreneurship as the core university subject among diploma students. Thus, every student (business and non-business) must enrol and pass the subject as the requirement for graduation.

There are seven faculties in UiTM (Perlis) that generally categorized as Science and Technology, and Social Sciences. Science and Technology category consists of (1) Faculty of Applied Science, (2) Faculty of Architecture, Planning and Surveying, (3) Faculty of Sports Science and Recreation, (4) Faculty of Plantation and Agro Technology, and (5) Faculty of Computer and Mathematical Science. While Faculty of Accounting and Faculty of Business Management (FBM) are categorized as Social Science. Currently, the niche focus of UiTM (Perlis) is the development of Science and Technology; therefore, the enrolment of the subject among non-business students is reported higher than the business students. The number of students increase from 570 students in the semester 20102 to a maximum of 1,383 students in the semester 20134. Previously, business students enrolled ENT300 and non-business students' enrolled ETR300. However, in 2012, the Fundamentals of Entrepreneurship's code has been

standardized to ENT300. Table 2.8 presents student enrolment for ENT300/ETR300 for the semester 20102 – 20144.

Table 2. 8

Student Enrolment for ENT/ETR300 subject for Semester 2010 Session 2 to Semester 2016 Session 2

Semester	ENT300	ETR300	Total Students
Semester 20162	531	0	531
Semester 20154	881	0	881
Semester 20152	716	0	716
Semester 20144	1041	0	1041
Semester 20142	882	0	882
Semester 20134	1382	1	1383
Semester 20132	1180	11	1191
Semester 20124	1045	104	1149
Semester 20122	315	571	886
Semester 20114	313	483	796
Semester 20112	315	511	826
Semester 20104	94	581	675
Semester 20102	97	473	570

Source: Student Information Management System (SIMS) Universiti Teknologi MARA

Since July 2010, the syllabus for this subject has been developed based on Outcome Based Education (OBE). Thus, this subject has been equipped with program outcome, course outcome, student learning time (SLT) and level of cognitive and soft skills. In order to achieve the standardization in its pedagogy, the faculty introduced several control documents such as Scheme of Work (SOW), Test Specification Table (TSU) and rubric to facilitate the instructors to manage teaching and learning activities for this subject. For ENT300, there are two type of assessments for ENT300, namely (1) continuous assessment (business plan, progress report of business plan, presentation and mid-semester exam) and (2) final exam.

The high enrolment of students in UiTM (Perlis) for this subject creates challenges to instructors. Firstly, it was difficult to achieve the standardization of assessments between (1) the junior generation of instructors and senior generations of instructors,

(2) experiences of instructors in teaching the subject, and (3) assessments between business students and non-business students. Beside the problems related with instructors, the separation of the academic calendar between diploma and degree requires a better planning in handling classroom and activities for the subjects. Some of the facilities such as classrooms and laboratories are shared, thus creating problems during the overlapping weeks between diploma and degree students.

Therefore, in UiTM (Perlis), the faculty applies an instructional model to assist the instructors to manage the teaching and learning activities, as well as the assessments for this subject. Blended learning has been integrated in the teaching and learning activities in an instructional model using flipped classroom approach known as i-CREATE. The percentage of online interactions was calculated using Student Learning Time (SLT). However, the university highlighted that online classes must not exceed more than 30% of 42 hours allocated to lecture and tutorial classes in one semester. The ENT300 flipped classroom utilized a combination of social software namely Learning Management System (LMS, Facebook, WhatsApp and traditional short message service (SMS)).

Through i-CREATE, the faculty is able to achieve a standardization of assessment between the junior generation of instructors and senior generations of instructors through common marking and centralized activities (presentation and mid semester examination). This instructional model also eliminates problems with the difference experiences among instructors by having team teaching and centralized content. Students are able to have to access information not only from their respective classes, but also from various lecturers who are teaching ENT300 from other campuses around

Malaysia. The assessments between business students and non-business students also improved based on the discussion made through common marking. i-CREATE also overcome problems related with venue for assessments due to limited classroom and common areas, thus making the assessment of ENT300 effective especially where the results for ENT300 reported higher percentage of excellence performing for this subject. Refer Table 2.9.

Table 2.9

Student Enrolment and Results for ENT/ETR300 for Semester 2010 Session 2 to Semester 2016 Session 2

Semester	ENT300			ETR300			Total ENT Students		
	Tot Std	Score A	%	Tot Std	Score A	%	Tot Std	Score A	%
20144	1041	438	42	0	0	-	1041	438	42
20142	882	361	41	0	0	-	882	361	41
20134	1382	369	27	1	0	-	1383	369	27
20132	1180	525	44	11	2	18	1191	527	44
20124	1045	565	54	104	48	46	1149	613	53
20122	315	122	39	571	252	44	886	374	42
20114	313	68	22	483	112	23	796	180	23
20112	315	49	16	511	87	17	826	136	16
20104	94	24	26	581	169	29	675	193	29
20102	97	29	30	473	96	20	570	125	22

Note: Tot Std = Total Student; Score A = Students who obtained A+, A and A- for ENT300/ETR300

Cohort non OBE = 20102-20114; Cohort OBE = 20122-20142; Cohort i-CREATE + OBE = 20124 – 20142

Source: Student Information Management System (SIMS) Universiti Teknologi MARA

In term of efficiency, i-CREATE measures based on the completion of task and assessments. Tasks related with ENT300 are lectures and tutorials while the assessments are one group report (progress and final report), presentation, mid semester exam and final exam. Table 2.10 exhibits the efficiency target, efficiency achievement for tasks and assessments for ENT300.

Table 2. 10
Efficiency Targets and Efficiency Achievements for Tasks and Assessments for ENT300

Tasks & Assessments	Targets	Achievements
Lectures and Tutorials	Complete before Presentation and Mid Semester Examination	Lecture completed before Presentation and Mid Semester Exam
Progress Report and Final Report	Progress Report – based on the specified date (as stated in SOW) Final Report – on the day of Presentation (as stated in SOW)	Progress Report – as SOW Final Report – on presentation day
Presentation (on Week 11 of Academic Calendar)	Able to present on the specified date (as stated in SOW) Able to prepare and submit the related documents on the day of the presentation	Completed in one day Rubric according to OBE standards
Mid Semester Exam	Multiple sets of question papers ready and comply with OBE requirements Mid Semester Exam conducted on the specified date	Completed in one day Questions paper according to OBE standards
Final Exam	Upload marks within seven days from the final exam ENT300 date	Complete marking – max three days. Upload marks to system within seven days

Note: SOW – scheme of work; OBE – Outcome Based Education

Source: Academic Affair Universiti Teknologi MARA

Currently, this instructional model has been copyrighted as intellectual properties with myIPO. i-CREATE had participated in various innovation invention and design (IID) events at national and international levels. Among the achievements of this instructional model are Gold Medal Award in National University Carnival of E-Learning 2014 (NUCEL 2014), Bronze Medal Award (Professional Event) in International Innovation Design and Articulation (iIDEA) 2016, and Gold Medal Award in Invention, Innovation & Design Exposition (iidex) 2016. This structure also has been highlighted as the success of entrepreneurship education structure, one of the criteria evaluated for the Entrepreneurial University of the Year Award 2015 at university level.

The problems with i-CREATE is that it measures effectiveness based on student result (performance), and completion of tasks and assessments only. As mentioned by

Arbaugh (2014), performance score alone was not able to provide a new insight to the studies, therefore studies related to the attitude and usage will contribute to the development of the framework. Currently, this model has been unable to capture the quality elements of using blended learning using flipped classroom for ENT300. Therefore, a study need to be conducted to capture the quality elements provided through teaching and learning using this approach. However, based on the well-design of i-CREATE in managing ENT300, the researcher decided to use this subject as the research setting for quality of use in blended learning using flipped classroom study.

2.6 Research Methodologies in Blended Learning

This study was conducted using a multi method of data collection. Theresore this section provides the reviews of research methodologies that related with blended learning environment.

A research on choices of methodologies that was conducted by Bliuc, Goodyear, and Ellis (2007), categorized the research methodologies into four general categories namely case study, survey based, a comparative studies in a specific context and a comparative studies in a holistic context. Case study method is widely used in research related to information system (Esyutina et al., 2013; Gao, 2013; Triantafyllou & Timcenko, 2014), as it offers an insight of the situations (Bliuc et al., 2007) . However, case study methods received critics because the study will be embedded in the context, making it hard to generalize (Bliuc et al., 2007).

Case study research also has been used in the positivist research, such as information system (IS) (Dube & Pare, 2003). As defined by Yin (2014), ‘... case study is empirical

inquiry that investigates a contemporary phenomenon and within real-world context, especially when the boundaries between phenomenon and context may not be clearly evident'. In the case of IS, the investigations mostly regards with the contemporary phenomenon (blended learning), in which the phenomenon (blended learning) and context (learning) may not be clearly evident. Adelman and Member, (1991) believe that this definition fits any study related to information technology. Yin (2014) further explain that a single-case study is analogous to a single experiment, thus many researchers refer to it as a single experiment that can justify a single case study (p.51).

Case study has been used by previous researchers in the IS to justify a single case quasi-experimental in decision support system (Adelman & Member, 1991). Yin (2014) clarifies that case study addresses the questions of 'how' and 'why', but if some intervention is involved, therefore researcher shall conduct an experimental research (p.10). Hence, this study will be conducted as a single case (holistic – single unit of analysis) because study requires control of behavioral events (intervention).

Another research methodology highlighted by Bliuc et al. (2007) is survey based research. Most of the studies related with blended learning applied survey methods to gather their data (Ahmed, 2010; Bradford & Wyatt, 2010; Kuo et al., 2014; Ramayah et al., 2012; Rubin et al., 2013). The evidence of these studies showed a positive impact to the learners outcome, however these studies were not able to conclude 'why' it works (Drysdale et al., 2013). However, survey based research focuses more on exploring the causal effect in the research, thus neglected the richness it offers in the research setting (Bliuc et al., 2007).

Aligned with the perspectives highlight in Bliuc et al. (2007), study related with blended learning may include the comparison of the technology used in the research setting. Subsequently, research methodology such as experimentation can be employed to capture the different preferences of learning activities in different modalities (Halverson et al., 2014). Empirical research indicates that a comparison study is able to capture the students' preferences in a particular environment. For example study conducted by Campbell, Gibson, Hall, Richards, & Callery (2008) concluded that a research methodology course for postgraduate students can be conducted using blended learning approach because it will assist students in getting better grades as compared to traditional learning. Clearly, experimental studies are able to provide an insight of the situations by explaining the reasons of 'why' it happens.

A research methodology such as case study and comparison study in blended learning are context based and must include instructional model of a particular subject in the research setting (Bliuc et al., 2007; Drysdale et al., 2013; Halverson et al., 2014). Blended learning has inspired instructional designers to leverage this technology in their method of delivery especially in HLIs to handle challenges offers by education in 21st century. The teaching approaches such as Massive Open Online Courses (MOOCs) and Flipped Classroom have been exploited in handling a large and diverse enrollment (Findlay-thompson et al., 2014; Margaryan et al., 2014; McKenzie et al., 2013). Thus, more studies related with instructional model and blended learning approaches are beneficial to understand the suitable approaches to handle specified environments (Drysdale et al., 2013; Halverson et al., 2014).

Experimental design is claimed as a powerful design for testing causal hypotheses on the effects of an intervention (treatment) to the studied variables. It allows the researcher to establish the criteria for causal with confidence (Ronet & Schutt, 2006).

Ronet and Schutt (2006) highlight three criteria of true experiment. The criteria are as follows:

1. Two comparison groups, one of which receives the experimental condition (e.g., treatment or intervention) and named as the experimental group which the other receives no treatment or intervention, named as a control group.
2. Random assignment to the two (or more) comparison groups.
3. Assessment of change in the dependent variable for both groups after the experimental condition has been received.

In many natural settings, the researcher can introduce an experimental design to the data collection procedures. However the researcher lacks some experimental controls, such as the ability to randomly assigned to the subjects, in which make a true experiment impossible (Campbell & Stanley, 1963). In this case, a quasi-experiment can be employed to obtain the data.

As regard to this study, the researcher has no control on the second criteria present by Ronet and Schutt (2006), because the classroom has been assigned by the faculty. Hence, this study will employ quasi experimental using non-equivalent control group design (Campbell & Stanley, 1963).

2.7 Synthesis of Literatures in Blended Learning and Flipped Classroom

This section provides a synthesis of literatures in the area of blended learning in business and management and flipped classroom. The researcher also provides the synthesis related with blended learning and flipped classroom in Malaysia. Since one of the issues related with blended learning was reported in the entrepreneurship education, therefore the review of entrepreneurship education in Malaysia is also included in this synthesis. Finally, the researcher concluded the synthesis of literatures in the progressive of blended learning model, in the context of Malaysian universities.

This model further explain that blended learning consist of three stages. In order to conduct the research related to this area, the researcher must understand the issues related and types of research suitable for each stages. This model finally support the research questions for this study, where the first research question addressed the issues and the second stage and the second research question was addressed the issues in the third stage of blended learning.

2.7.1. Reviews of Literatures in Blended Learning in Business and Management Disciplines

This section presents the synthesis of literatures in blended learning for business and management discipline. 10 issues in blended learning particularly in the area of business and management have been identified. The researcher categorized these issues into three main categories, namely (1) underpinning theories and frameworks (3 issues), (2) research methodology and research design (5 issues), and (3) data analysis (2 issues). Details of these issues exhibit in Table 2.11.

Table 2. 11

Synthesis of Issues in Blended Learning for Business and Management Discipline

Issues	Synthesis from Mainstream Reviews in Blended Learning (Business and Management Discipline)	Note for Future Studies
<i>Underpinning Theories and Framework</i>		
Underpinned Theory	Blended learning requires theory specifically developed for this area (Arbaugh, 2014; Drysdale et al., 2013; Halverson et al., 2012, 2014).	<i>Current research used the following theories: Garrison's Community of Inquiry; Moore's Transactional Distance Theory; Wenger's Communities of Practice; Technology Adoption Model (TAM). Hence more future studies need to focus on developing theories specifically foot this area.</i>
Framework	Blended learning requires framework that accompanied by empirical findings	<i>Most of the empirical studies were based on Garrison's Community of Inquiry (CoI)</i>
Framework related to quality measure	Blended learning requires quality framework that accompanied by empirical findings specifically developed for this area (Halverson et al., 2012)	<i>The reviews did not report any quality framework for blended learning.</i>
<i>Research Methodology and Research Design</i>		
Research Methodology	Currently, there are various types of research	<i>Types of research methodologies currently used in the blended learning area are as follows:</i>
	methodologies used in blended learning. However, little studies were conducted related to	<i>Qualitative, Quantitative</i>
	comparative blends in the area of business and management	<i>(Survey, Experiment,</i>
	(Arbaugh, 2014)	<i>Quasi Experiment), and Mix Method</i>
Comparative in Fidelity of Blending	Little studies were conducted related to comparative in fidelity of blending in the area of business and management	<i>The reviews did not report any quality framework for blended learning.</i>
Classroom Setting	Little studies were conducted in the classroom setting in the area of business and management.	<i>The reviews of blended learn did not report any flipped classroom to represent classroom setting for blended learning.</i>
Entrepreneurship Education	Flipped classroom may become one of the approach in the classroom setting (Arbaugh, 2014).	
	Little studies were conducted in entrepreneurship education in the area of business and	
	management (Arbaugh, 2010; Arbaugh & Hwang, 2015)	<i>More attention were given to strategic management and organizational behavior</i>

Continue

Table 2. 11 (Continued)

Synthesis of Issues in Blended Learning for Business and Management Discipline

Issues	Synthesis from Mainstream Reviews in Blended Learning (Business and Management Discipline)	Note for Future Studies
Technology of Blended Learning	Previous studies give less attention on technologies used to facilitate online learning (Drysdale et al., 2013).	<i>Future research must ensure that this issue is addressed in their studies.</i>
<i>Data Analysis</i>		
Data Analysis (Quantitative)	Majority of previous studies in business and management area did not use a sophisticated data analysis such as path analysis in their data analysis(AR Baugh & Hwang, 2012; Halverson et al., 2014)	<i>Future research must ensure that this issue is addressed in their studies.</i>
Structural Equation Model		
Data Analysis (Quantitative)	Majority of previous studies in business and management area did not report the effect size (Arbaugh & Hwang, 2012)	<i>Future research must ensure that this issue is addressed in their studies.</i>
Effect Size		

Based on the suggestion made by Arbaugh (2014), this study was conducted in the classroom setting using flipped classroom. Therefore the following section presents the reviews for flipped classroom.

2.7.2. Synthesis of Issues in Blended Learning and Flipped Classroom

In this section, the researcher presents the reviews for flipped classroom in tertiary education. The results of this review were compared with the issues identified in blended learning for business and management discipline. The researcher found that no flipped classroom study was reported in the area of business and management disciplines. This review also proved that little studies in flipped classroom that focus on the underpinning theories and framework, a comparative study on fidelity of blending, and data analysis issues such as the use of path analysis and reporting of effect

size. This review also revealed that the timeline for data collection was reported between one to three semesters. The synthesis of the flipped classroom literature exhibits in the Table 2.12.

Table 2. 12
Synthesis of Issues in Blended Learning in Flipped Classroom

Issues	Synthesis from Mainstream Reviews in Blended Learning (Business and Management Discipline)	Synthesis from Literatures in Flipped Classroom
<i>Underpinning Theories and Framework</i>		
Underpinned Theory	Blended learning requires theory specifically developed for this area (Arbaugh, 2014; Drysdale et al., 2013; Halverson et al., 2012, 2014).	Blended learning (business and management discipline): <i>Not found</i> Blended learning (other discipline): Revised Community of Inquiry; Concern-Based Adoption Model (CBAM); FLIPP Model
<i>Framework</i>		
	Blended learning requires framework that accompanied by empirical findings specifically developed for this area (Halverson et al., 2012)	Blended learning (business and management discipline): <i>Not found</i> Blended learning (other discipline): One study based on Revised Community of Inquiry (CoI) using SmartPLS
<i>Framework related to quality measure</i>		
	Blended learning requires quality framework that accompanied by empirical findings specifically developed for this area (Halverson et al., 2012)	Blended learning (business and management discipline): <i>Not found</i> Blended learning (other discipline): <i>Not found</i>
<i>Research Methodology and Research Design</i>		
Research Methodology	Currently, there are various types of research methodologies used in blended learning. However, little studies were conducted related to comparative blends in the area of business and management (Arbaugh, 2014)	Blended learning (business and management discipline): <i>Not found</i> Blended learning (other discipline): Various types of studies namely qualitative, quantitative (survey, experiment, quasi experiment), and mix method.
<i>Comparative in Fidelity of Blending</i>		
	Little studies were conducted related to comparative in fidelity of blending in the area of business and management (Arbaugh, 2014).	Blended learning (business and management discipline): <i>Not found</i> Blended learning (other discipline): <i>Not found</i>

Continue

Table 2. 12 (Continued)

Synthesis of Literatures between of Issues in Blended Learning for Business and Management Discipline and Flipped Classroom

Issues	Synthesis from Mainstream Reviews in Blended Learning (Business and Management Discipline)	Synthesis from Literatures in Flipped Classroom
Classroom Setting	Little studies were conducted in the classroom setting in the area of business and management. Flipped classroom may become one of the approach in the classroom setting (AR Baugh, 2014).	Blended learning (business and management discipline): <i>Not found</i> Blended learning (other discipline): All studies conducted in the classroom setting either in small classrooms and large classrooms
Entrepreneurship Education	Little studies were conducted in entrepreneurship education in the area of business and management (Arbaugh, 2010; Arbaugh & Hwang, 2015)	Blended learning (business and management discipline): <i>Not found</i> Blended learning (other discipline): <i>Not applicable</i>
Technology of Blended Learning	Previous studies give less attention on technologies used to facilitate online learning (Drysdale et al., 2013).	Blended learning (business and management discipline): <i>Not found</i> Blended learning (other discipline): Learning Management System (LS); Combine LMS with social networks such as YouTube Google Doc and Dropbox; Bring Your own Device (BYOD); Cahoots; Instant Response System (IRS) and System Response System (SRS)
Timeline for Data Collection	Not Reported	Blended learning (business and management discipline): <i>Not found</i> Blended learning (other discipline): Between 1 semester to 3 semesters
<i>Data Analysis</i>		
Data Analysis (Quantitative) Structural Equation Model	Majority of previous studies in business and management area did not use a sophisticated data analysis such as path analysis in their data analysis(AR Baugh & Hwang, 2012; Halverson et al., 2014)	Blended learning (business and management discipline): <i>Not found</i> Blended learning (other discipline): one study using SmartPLS
Data Analysis (Quantitative) Effect Size	Majority of previous studies in business and management area did not report the effect size (Arbaugh & Hwang, 2012)	Blended learning (business and management discipline): <i>Not found</i> Blended learning (other discipline): one study report effect size

In the following section, the researcher investigated the situation of blended learning and flipped classroom in Malaysia.

2.7.3. Synthesis of Issues in Blended Learning and Flipped Classroom in Malaysia

For this section, the researcher reviewed literatures for blended learning and flipped classroom in tertiary education in Malaysia. There was no study reported in the area of business and management discipline in Malaysia. Only one study used Action Theory to underpin their study. There were many issues of blended learning that have not been addressed in three main categories (1) underpinning theories and frameworks, (2) research methodology and research design, and (3) data analysis. See Table 2.13.

Table 2. 13

Synthesis of Issues in Blended Learning for Business and Management Discipline and Literatures in Blended Learning and Flipped Classroom in Malaysia

Issues	Synthesis from Mainstream Reviews in Blended Learning (Business and Management Discipline)	Synthesis from Literatures in Blended Learning and Flipped Classroom in Malaysia
<i>Underpinning Theories and Framework</i>		
Underpinned Theory	Blended learning requires theory specifically developed for this area (Arbaugh, 2014; Drysdale et al., 2013; Halverson et al., 2012, 2014).	Blended learning (business and management discipline): <i>Not found</i> Blended learning (other discipline): Action Theory
Framework	Blended learning requires framework that accompanied by empirical findings specifically developed for this area (Halverson et al., 2012)	Blended learning (business and management discipline): <i>Not found</i> Blended learning (other discipline): <i>Not found</i>
Framework related to quality measure	Blended learning requires quality framework that accompanied by empirical findings specifically developed for this area (Halverson et al., 2012)	Blended learning (business and management discipline): <i>Not found</i> Blended learning (other discipline): <i>Not found</i>

Continue

Table 2. 13 (Continued)

Synthesis of Issues in Blended Learning for Business and Management Discipline and Literatures in Blended Learning and Flipped Classroom in Malaysia

Issues	Synthesis from Mainstream Reviews in Blended Learning (Business and Management Discipline)	Synthesis from Literatures in Blended Learning and Flipped Classroom in Malaysia
Research Methodology	Currently, there are various types of research methodologies used in blended learning. However, little studies were conducted related to comparative blends in the area of business and management (Arbaugh, 2014)	Blended learning (business and management discipline): <i>Not found</i> Blended learning (other discipline): Various types of studies namely qualitative, quantitative (survey, experiment, quasi experiment), and mix method.
<i>Research Methodology and Research Design</i>		
Comparative in Fidelity of Blending	Little studies were conducted related to comparative in fidelity of blending in the area of business and management (Arbaugh, 2014).	Blended learning (business and management discipline): <i>Not found</i> Blended learning (other discipline): <i>Not found</i>
Classroom Setting	Little studies were conducted in the classroom setting in the area of business and management. Flipped classroom may become one of the approach in the classroom setting (Arbaugh, 2014).	Blended learning (business and management discipline): <i>Not found</i> Blended learning (other discipline): All studies conducted in the classroom setting either in small classrooms and large classrooms
Entrepreneurship Education	Little studies were conducted in entrepreneurship education in the area of business and management (Arbaugh, 2010; Arbaugh & Hwang, 2015)	Blended learning (business and management discipline): <i>Not found</i> Blended learning (other discipline): <i>Not applicable</i>
Technology of Blended Learning	Previous studies give less attention on technologies used to facilitate online learning (Drysdale et al., 2013).	Blended learning (business and management discipline): <i>Not found</i> Blended learning (other discipline): Learning Management System (LS)
Timeline for Data Collection	Not Reported	Blended learning (business and management discipline): <i>Not found</i> Blended learning (other discipline): 1 semester
Data Analysis (Quantitative) Structural Equation Model	Majority of previous studies in business and management area did not use a sophisticated data analysis such as path analysis in their data analysis (Arbaugh & Hwang, 2012; Halverson et al., 2014)	Blended learning (business and management discipline): <i>Not found</i> Blended learning (other discipline): <i>Not found</i>
Data Analysis (Quantitative) Effect Size	Majority of previous studies in business and management area did not report the effect size (Arbaugh & Hwang, 2012)	Blended learning (business and management discipline): <i>Not found</i> Blended learning (other discipline): <i>Not found</i>

This review revealed that there are many of blended learning issues that have not been addressed by the Malaysian universities. Furthermore, there was a limited studies that has been conducted in the area of entrepreneurship education.

2.7.4. Synthesis of Issues in Blended Learning for Entrepreneurship Education in Malaysia

Based on the above reviews, the researcher concluded that very little studies have been conducted in blended learning for the business and management discipline, particularly the entrepreneurship education. This finding confirmed the arguments made by previous scholars that little studies of blended learning were conducted in entrepreneurship education (Arbaugh, 2010; Arbaugh & Hwang, 2015). However, the review of entrepreneurship education in Malaysia highlighted that course design is one important issues that need to be considered if institutions decided to blend the teaching and learning activities for this subject (Ahmad & Buchanan, 2015; Yusoff et al., 2014). The course design must be aligned with the current trends and objectives of entrepreneurship education of the institutions (Ahmad & Buchanan, 2015). Therefore, the synthesis of this review exhibits in Table 2.14.

Table 2. 14
Synthesis of Issues in Blended Learning Entrepreneurship Education in Malaysia

Issues	Synthesis from Mainstream Reviews in Blended Learning (Business and Management Discipline)	Blended Learning for Entrepreneurship Education in Malaysia
<i>Underpinning Theories and Framework</i>		
Underpinned Theory	Blended learning requires theory specifically developed for this area (Arbaugh, 2014; Drysdale et al., 2013; Halverson et al., 2012, 2014).	<i>Not found</i>
Framework	Blended learning requires framework that accompanied by empirical findings specifically developed for this area (Halverson et al., 2012)	<i>Not found</i>
Framework related to quality measure	Blended learning requires quality framework that accompanied by empirical findings specifically developed for this area (Halverson et al., 2012)	<i>Not found</i>
<i>Research Methodology and Research Design</i>		
Research Methodology	Currently, there are various types of research methodologies used in blended learning. However, little studies were conducted related to comparative blends in the area of business and management (Arbaugh, 2014)	<i>Not found</i>
Comparative in Fidelity of Blending	Little studies were conducted related to comparative in fidelity of blending in the area of business and management (Arbaugh, 2014).	<i>Not found</i>
Classroom Setting	Little studies were conducted in the classroom setting in the area of business and management. Flipped classroom may become one of the approach in the classroom setting (Arbaugh, 2014).	<i>Not found</i>
Technology of Blended Learning	Previous studies give less attention on technologies used to facilitate online learning (Drysdale et al., 2013).	<i>Not found</i>

Continue

Table 2. 14 (Continued)

Synthesis of Issues in Blended Learning for Business and Management Discipline and Literatures in Entrepreneurship Education in Malaysia

Issues	Synthesis from Mainstream Reviews in Blended Learning (Business and Management Discipline)	Blended Learning for Entrepreneurship Education in Malaysia
Timeline for Data Collection	Not Reported	<i>Not found</i>
Course Design	Not Reported	Course design must be aligned with the current trends and objectives of entrepreneurship education of the institutions (Ahmad & Buchanan, 2015).
<i>Data Analysis</i>		
Data Analysis (Quantitative)	Majority of previous studies in business and management area did not use a sophisticated data analysis such as path analysis in their data analysis(Arbaugh & Hwang, 2012; Halverson et al., 2014)	<i>Not found</i>
Structural Equation Model		
Data Analysis (Quantitative)	Majority of previous studies in business and management area did not report the effect size (Arbaugh & Hwang, 2012)	<i>Not found</i>
Effect Size		

2.7.5. Blended Learning Model among Malaysian Universities

Prior to starting any studies in blended learning, the adoption of blended learning in any institution or universities must be determined, as it will determine the types of research that can be conducted. For each stage of adoption, the level of maturity in blended learning is determined by level of course design and adoption of technologies (infrastructure provided by universities and other social technology available) which facilitate learning.

Blended learning involved with the use of technology, such as ICT to mediate the learning environment. Most importantly the main infrastructure, such as the internet connection, laboratories, learning management system must be ready to facilitate

learning (Mohamed Amin Embi & Hamat, 2014; Hughes, Waldrop, & Chang, 2016; Razali & Kamarudin, 2014). However, instructors have a choice either to integrate the social software available to facilitate teaching and learning activities (Kim et al., 2014). As for the level of adoption in blended learning, the stages of blended learning adoption introduced by Graham et al. (2013) is used as the basis of the explanation.

Hence, there are several conclusions related to the studies of blended learning area. Graham et al. (2013) identified three stages of adoption and implementation of blended learning, namely, awareness/exploration, adoption/early implementation, and mature implementation/growth. The discussion below detailed out the stages in blended learning with types of research conducted at various stages in the context of blended learning in Malaysia.

2.7.5.1. Stage 1: Awareness/Exploration

In this stage, the universities show awareness of blended learning and its development in education area. However, only limited support is available for faculties to explore ways in to employ blended learning approach in their teaching and learning activities.

In Malaysia, the program is offered by different universities. However, the ability of any courses or subjects to apply blended learning approach or not, depends on the confirmation of a particular course with quality assurance enforced by universities and other professional bodies (if the program has link with any professional bodies).

All courses or subjects offered in Malaysian universities must comply with the Malaysia Quality Assurance (MQA), a body that handles the quality issues in education

(MOHE, 2011). Moreover, those courses must ensure the alignment of program outcomes (PO) and course outcomes (CO), with the learning outcomes (LO) provided by Ministry of Higher Education (MOHE). Therefore, the syllabus must be developed based on the Outcome Based Education (OBE), and the information about each course consists of program outcome, course outcome, student learning time (SLT) and level of cognitive and soft skills (MOHE, 2011). Majority of the programs offered in Malaysia conformed to these standards.

As the technology in this stage is limited in terms of support provided by the universities to facilitate the blended learning approach, no universities in Malaysia belongs to this stage. This is because Malaysian universities are equipped with basic communication infrastructures such as internet connection, computer laboratories and learning management system. As such, most of blended learning studies from this stage focus on the advantages or challenges of adoption in blended learning technology.

2.7.5.2. Stage 2: Adoption/Early Implementation

At this stage, the institutions adopted blended learning strategies and experimentation with governance and practices to support its implementation. Universities that belong to this stage have clear course designs that conform to qualities guideline as outlined by government. Instructors translate the course requirements into activities for teaching and learning for a semester. Normally, an instructional model or educational tools will be used to assist instructors to achieve the desired results (Alonso, López, Manrique, & Viñes, 2005).

At this stage, instructors urged to blend the teaching and learning activities using technology provided such as internet connection, computer laboratories and learning management system. Most of the instructors are experimenting on the best way to blend the activities. In Malaysia, there are some universities that belongs to this stage. Studies related to this stage are descriptive analysis about the adoption (Md Fhalib et al., 2014), types of applications of blended learning in university (Md. Saad et al., 2014), and designing of an interactive content for learning (Salam et al., 2014). If the technology related with blended learning has been well accepted, then the studies on how to conduct the class will be highlighted (Alsagof et al., 2014).

The usage of blended learning currently was reported based on several results such as system log (Man & Kian, 2014), self-report survey (qualitative and quantitative) (Wah, Keong, et al., 2014) , interviews (qualitative) (Raihanah, 2014) or mixed method (descriptive and qualitative only) (Mohamed Amin Embi & Hamat, 2014; Hughes, Waldrop, & Chang, 2016). No study has reported the experimental or quasi experimental in blended learning. Another issues with this stage is the possibilities that instructors integrates their activities with other social software as a medium of communication (Kim et al., 2014). However the decision to integrate the LMS with social software was determined by the instructional model developed to facilitate the course or subject to be taught by instructors and the requirements of the assessments.

At this point, the research related to development of framework cannot be conducted because there are many unclear issues related to what to use and how to use.

2.7.5.3. Stage 3: Mature Implementation/Growth

At this stage, institutions have well-established blended learning strategies, structure, and support that are integrated to institutional' operations. Courses that achieved a maturity of blended learning approach are able to comply with the quality of the course design and the instructional model or educational tools that used to support the course and also able to show comprehensive results such as effectiveness and efficiency related with its implementation. The instructional model and educational tools must also be well-managed in order to avoid the confusion among students to adapt and follow this new method of teaching. At this point, these instructional models or educational tools can be used as the research setting to develop a quality framework in blended learning.

Therefore, it can be said that, the development of framework related with quality of blended learning only can be made, when the instructional course or educational tools conform to the quality requirements of a particular course, well managed and achieve the effectiveness as well as efficiencies of its implementation. Otherwise, universities must find ways to ensure the stability of course design, instructional model or educational models to support learning and decided of the optimal ways to blend. See Figure 2.2 for the illustration of a progressive model of research types and stages of adoption in blended learning.

		Situations	Issues of Blended Learning
STAGE 3 MATURE IMPLEMENTATION		<ul style="list-style-type: none"> Integration of instructional model, technology supported by universities (internet connection and LMS) and social software (Facebook and WhatsApp) to facilitate the teaching and learning in the blended learning environment 	<ul style="list-style-type: none"> Underpinning Theories and Framework: study can be conducted (1) with suitable underpinning theories, (2) develop framework and (3) develop quality framework Research Methodology and Design: (1) comparative framework related with fidelity of blended activities, (2) classroom setting, (3) technology in blended learning, (4) timeline of data collection and (5) course design Data analysis: (1) the option to use path analysis (multivariate analysis), and (2) effect size
STAGE 2 ADOPTION		<ul style="list-style-type: none"> Course designs conform to the quality assurances (universities and/or professional bodies) Instructional model developed to facilitate teaching and learning in blended learning Universities provide technology related to blended learning such as LMS 	<ul style="list-style-type: none"> Development of framework: limited study of developing framework can be conducted Research Methodology and Design: (1) comparative studies related with fidelity of blended activities, (2) classroom setting, (3) technology in blended learning, (4) timeline of data collection and (5) course design Data analysis: (1) comparison between group analysis, and (2) effect size
STAGE 1 AWARENESS		<ul style="list-style-type: none"> Universities struggle with conformation of course design to the quality assurances (universities and/or professional bodies) Limited support for development of technology in blended learning 	<ul style="list-style-type: none"> Limited blended learning study can be conducted as this stage

Figure 2. 2
A Progressive Model of Research Types and Stages of Adoption in Blended Learning

2.8 Summary of the Chapter

This chapter provides insight related to blended learning in education. It started with the technology innovation and education, followed by reviews of past literatures from mainstream of blended learning and flipped classroom, situations of online learning in Malaysia. This chapter also highlighted entrepreneurship education and the research methodologies used in blended learning. This part of discussion was concluded with the requirements of quality studies in blended learning among Malaysian universities. This chapter further reviews the concept of quality of use and underpinning theories for this study. In the next chapter, the discussion related with the development of theoretical framework will be discussed.



CHAPTER THREE

CONCEPTUAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

3.1 Introduction

This chapter provides the underpinning theories for this study. It also highlight the literatures and relationship between the measurement variables, followed by the theoretical framework and hypothesizes for this study.

3.2 Underpinning Theories

This section presents the underpinning theories that are used to explain this study. These theories include: Quality of Use, Luhmann's System Theory, Model of Online Learning, and Social Learning Theory: Groups Nets and Sets.

3.2.1. ‘Quality of Use’

This section discusses the concept of quality of use. The discussion includes the ambiguous definition of terminologies, namely quality of use, quality in use and usability that explain the concept. This section explains briefly about the relationship between the concept and the international standard related with quality.

3.2.1.1. Understanding the ‘Quality of Use’ Concept

Nigel Bevan (1995b) in his article ‘*Measuring usability as quality of use*’ explained that the quality was not solely about product but also in the context of use that involve interactions of users, task and environment in the application. The result of these experiences was referred to as the quality of use. Bevan defined quality of use as ‘... the extent a product satisfies stated and implied needs when used under stated conditions.’ Measuring quality of use will lead to the determination of whether the design of the attributes achieves system’s quality of use criteria (Bevan, 1995a).

Tracking back the literatures, terminology of ‘quality in use’ that has been discussed is used interchangeably with the ‘quality of use’. However, the researcher failed to locate any literature that confirm the similarities or differences between these terminologies. As for that, the researcher e-mail Nigel Bevan personally to get the answer. According to Nigel Bevan (personal communication, November 04, 2016), although the terms ‘quality of use’ and ‘quality in use’ have slightly different implications, they have been operationalized in the same way. The discussion of ‘quality of use’ could be seen as a user perspective, while ‘quality in use’ is from product perspective. Since this study focused on user experience, therefore the researcher selected ‘quality of use’ as the terminology to represent the quality framework in blended learning using flipped classroom. As for that, the term ‘quality of use’ for this study has been operationalized as the extent to which a flipped classroom satisfies and fulfills the needs of students through the subject of fundamentals of Entrepreneurship for a particular semester.

Figure 3.1 illustrates ‘quality of use’ in the context of use by Nigel Bevan (Bevan, 1995b). Context of use consists of three main environments namely, social and organization environment, physical environment and technical environment. In any context, user will need to perform any task based on the goal of the task. The task goal belongs to the social and organizational environment. When performing any task in the physical environment, user will interact with the product to complete the task. The product itself belongs to the technical environment. Once the task is completed, the quality of use will be measured based on the extent that the user is satisfied and fulfilled his need in performing the task using the respective product. Initially, ‘quality of use’ measure consists of two important measurements, which are user satisfaction and performance (effective and efficiency), and user perceived of interactions that can be measured using effectiveness and efficiency.

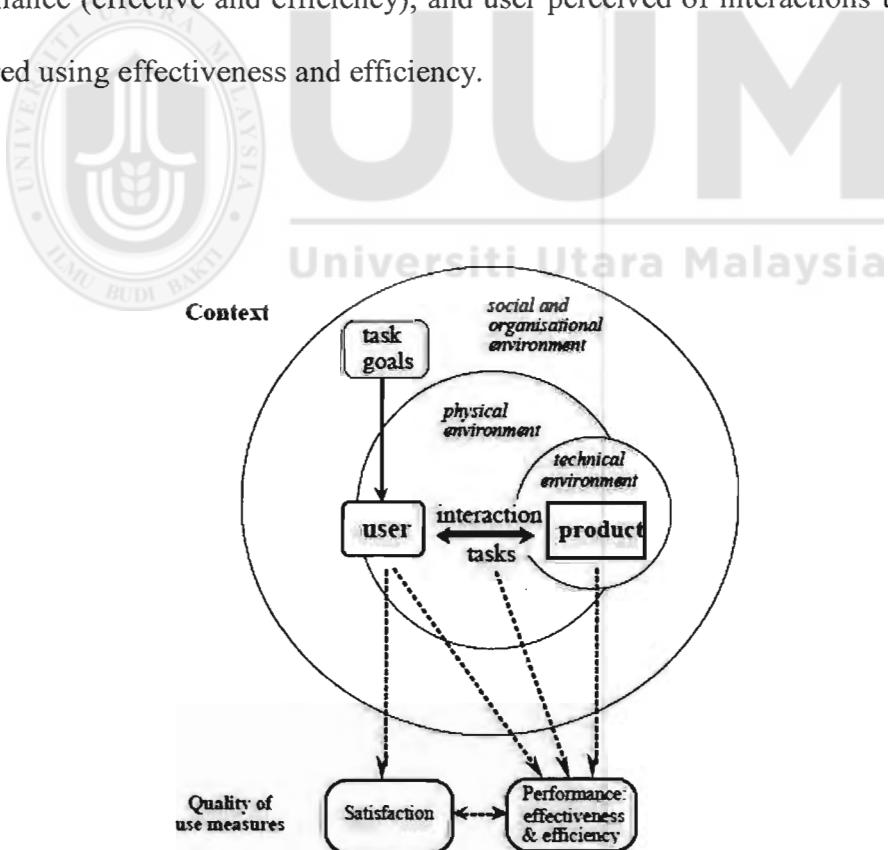


Figure 3.1
Quality of Use Measure Determine by Context of Use
Source: (Bevan, 1995b)

There is a relationship between quality of use and usability. In the article '*What is Usability?*', Bevan, Kirakowski, and Maissel, (1991) proposed that usability should be defined as easy to use and acceptability for any users who used the product to perform any task in a specific environments, based on three different approaches namely, ease of use, actual usage and context of use from the user perspectives. At this point, literature was not able to distinct clearly how usability relates with quality of use. Later, through '*Quality of Use is Usability*' Bevan (1995b) noted that quality of use should be explained as the aim for a design objective for any interactive product, in which, the product must be able to assist the user to achieve a task goal in a particular environment. This article also highlighted how usability and quality of use relates to each other, by noting that usability of any products offered by organization must be easy to use and acceptable by user (usability), and at the same time facilitate user to achieve the goal of any tasks through the use of the product in a respective environment (quality of use). Hence, through '*Measuring usability as quality of use*', Bevan clarifies that '... quality of use can be used to measure usability as the extent to which specified goals can be achieved with effectiveness, efficiency and satisfaction by specified users carrying out specified tasks in specified environments' (Bevan, 1995a). Hence, this definition wades the conventional assumption of quality of use that solely refers quality as the attributes of a product. Whereas, the quality of use of a product should be referred to as the quality attributes of any product depending on how the product is used in order to achieve a specific goal. This has been emphasized in International Organization for Standardization (ISO) for ergonomic standard, ISO 9241-11 (1994).

3.2.1.2. International Standards Related to Usability

The International Organization for Standardization (ISO) has developed various human computer interaction (HCI) and usability standards since last 2 decades. These standards confirm consistency on various interface components that guide the purchase decision among customers (Chua & Dyson, 2004; Lei, Xu, Meng, Zhang, & Gong, 2014). ISO standards related with usability on ergonomic requirements (ISO 9241) have been widely adopted by industry, hence, it is common among the successful standard in that particular area (Folmer & Bosch, 2004; Lei et al., 2014).

Definition of usability has been used as ergonomic standards through ISO 9241-11 (1994) as, ‘...‘the extent to which a product can be used by specified users to achieve specified goals with effectiveness; the extent to which the intended goals of use are achieved, efficiency; the resources that have to be expended to achieve the intended goals and satisfaction; the extent to which the user finds the use of the product acceptable, in a specified context of use’ (Folmer & Bosch, 2004).

ISO offers usability guideline in ISO 9241-210:2010 and ISO/IEC 25022. ISO 9241-210:2010 focuses on standards related with ergonomics requirements including hardware, software and environment factors related with usability. In Part 11, the standard describes the user viewpoints that include effectiveness, efficiency and satisfaction (Abran, Khelifi, & Suryn, 2003). While ISO 9126 (ISO/IEC 25022) reflects the quality of software from product perspectives. In Part 4, the standard provides guidelines to measure the impacts it has among users who use the software (Abran et al., 2003). When the US standard for a Common Industry Format for Usability Test

Reports (CIF) was incorporated with ISO in 2006, the term usability has been redefined, where ‘usability’ in ISO9126 has been renamed as operability, and satisfaction has been given a wider definition by incorporating pragmatic and hedonic user’s purposes of using the system (Bevan, 2009).

In 2016, through the article ‘*New ISO Standards for Usability, Usability Reports and Usability Measures*’, Bevan, Carter, Earthy, Geis, and Harker (2016) listed the latest ISO standards related to usability. These standard are presented in Table 3.1.

Table 3. 1
Latest ISO Standards for Usability, Usability Reports and Usability Measures

ISO Standards	Description	ISO Documents
ISO 9241-11	Usability: Definitions and concepts, replacing the 1988 version of ISO 9241-11	Ergonomics of human-system interaction — Part 11: Usability: Definitions and concepts (2015)
ISO 9241-220	Processes for enabling, executing and assessing human-centered design within organizations, replacing the earlier ISO TR 18529	Ergonomics of human-system interaction — Part 220: Processes for enabling, executing and assessing human-centered design within organizations (2016)
ISO/IEC 25066	Common industry Format for Usability — Evaluation Reports.	Systems and software engineering — Software product Quality Requirements and Evaluation (SQuaRE) — Common Industry Format (CIF) for usability: Evaluation report (2016)
ISO/IEC 25022	Measurement of quality in use, (includes measures of effectiveness, efficiency and satisfaction), replacing ISO TR 9126-4	Systems and software engineering — Systems and software Quality Requirements
ISO/IEC 25023	Measurement of system and software product quality [12], (includes measures for usability attributes), replacing ISO/IEC TR 9126-2 and ISO/IEC TR 9126-3	Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) - Measurement of system and software product quality (2016)

Source: (Bevan et al., 2016)

From the Table 3.1, it can be concluded that the usability standard mainly focuses on two main area, (1) ergonomics of human-system interaction, and (2) systems and

software engineering. None of the usability from ISO focuses on the quality of the information system concept such as the usability measures for flipped classroom design. Since the development of ICT influences the innovation as the improvement of teaching and learning activities, therefore a set of measure for the concept, such as flipped classroom design, need to be developed in order to achieve the quality objective based on the user who are involved directly in this concept during their tenure as student in a particular institution.

3.2.1.3. Previous Literatures in Usability

From the previous section, it can be concluded that ISO international standards for usability focused on ergonomics of human interaction and systems and software engineering. Little is known about the usability studies in the area of online learning or blended learning. A review about usability for healthcare industry in China found that there is insufficient studies related with the area mainly because of the understanding and operationalized definition has not been aligned with international norms (Lei et al., 2014). Study by Lei et al. (2014) further reported that the definition from ISO 9241-11:1998 is well accepted and cited for usability studies among the healthcare scholars in China. Hence, the future studies are encouraged to align the definition of usability with the international standards in order to ensure the consistency of definition, so, generalization and comparison can be made accurately.

As the technology evolved, the existing standards must be revised. The new requirements need to be included depending on the context of use. Usability measures traditionally consist of three main variables, namely satisfaction, efficiency and

effectiveness. However, scholars such as Abran et al. (2003) found that the ISO standards such as ISO 9126 and ISO 9241 could be revised to developed a revised usability model based on the context of use. Several variables have been introduced to the model, such as learnability and security (Abran et al., 2003). Similarly, scholars such as Al-qutaish and Abran (2011) improved the ISO 9126 and introduce a maturity model that was designed to assess the quality of a software product by incorporating six-sigma in the process of developing the model. One of the latest revisions about updating the usability standard by ISO was published by Abran, Al-qutaish, and Desharnais (2005) through '*Harmonization Issues in the Updating of ISO Standards on Software Product Quality*'. This article proposed to upgrade the documents related to ISO 9126 (standards or technical reports) to the new ISO 25000 series in order to improve the interpretation, as well as the quality measures.

Several studies are related to the use of ISO standards in the action research in the area of ICT. One of the studies was conducted on ISO 9126 standard in mobile environments (Idri, Moumane, & Abran, 2013). Another study by Chua and Dyson (2004) who used ISO 9126 as a basis of developing the quality metrics for identifying quality attributes in the context of e-learning. This metric could be used as a guideline to make a purchase decision for e-learning software (Chua & Dyson, 2004).

From the above discussions, it can be concluded that, there are little studies that are related with usability measure in the context of online learning. Hence, more studies are required to understand the usability measures, not only for the products (ICT products) and software quality but also to the new development of the usage, such as flipped classroom that evolved with the evolution of ICT.

3.2.1.4. Conceptualization Quality of Use for This Study

From the literature review on the concept of ‘quality of use’, more studies are required in order to contribute to the empirical evidences related to the online learning, particularly in blended learning. Therefore, for this study, the researcher conceptualized the quality of use concept as the measure of satisfaction, efficiency and effectiveness perceived by students who experienced ENT300 using flipped classroom in a particular semester.

In order to conduct a research in blended learning, a well-managed instructional model which is translated into the course designed is required. As for that, i-CREATE, the instructional model to manage Fundamentals of Entrepreneurship (ENT300) had been chosen as a research setting for this study. This instructional model is proved to be efficient and effective in handling this subject since 2012. Students are required to attend a face to face classroom using traditional method and at the same time the teaching and learning activities have been shifted to the online environment. Various platforms have been used namely LMS, Facebook and WhatsApp to disseminate information, discussion and other communication related with the subject. Students used the blended approach to complete tasks related with their ENT300 assessments. The process of completing their task requires interactions based on three main parties, namely student-student, student-instructor and student-content. At the end of the semester, the researcher measure the quality of use based on the main variables; namely satisfaction, efficiency, and effectiveness.

Apart from that, the researcher also measures another two additional variables; student engagement and student interactions. Student engagement was tested as the predictors of student interactions, satisfaction, efficiency and effectiveness. The engagement reflects tasks performed by students who experienced flipped classroom. Also, student interactions measured as the predictor to the quality of use variables (satisfaction, efficiency, effectiveness) and a mediator between student engagement and quality of use variables (satisfaction, efficiency and effectiveness). The interactions are captured based on how students communicates in the flipped classroom. This study measured students interactions based on three types of interaction by Moore (1989) namely student-student, student-content, and student-instructor. The conceptualization of quality of use in this study is presented in the Figure 3.2.



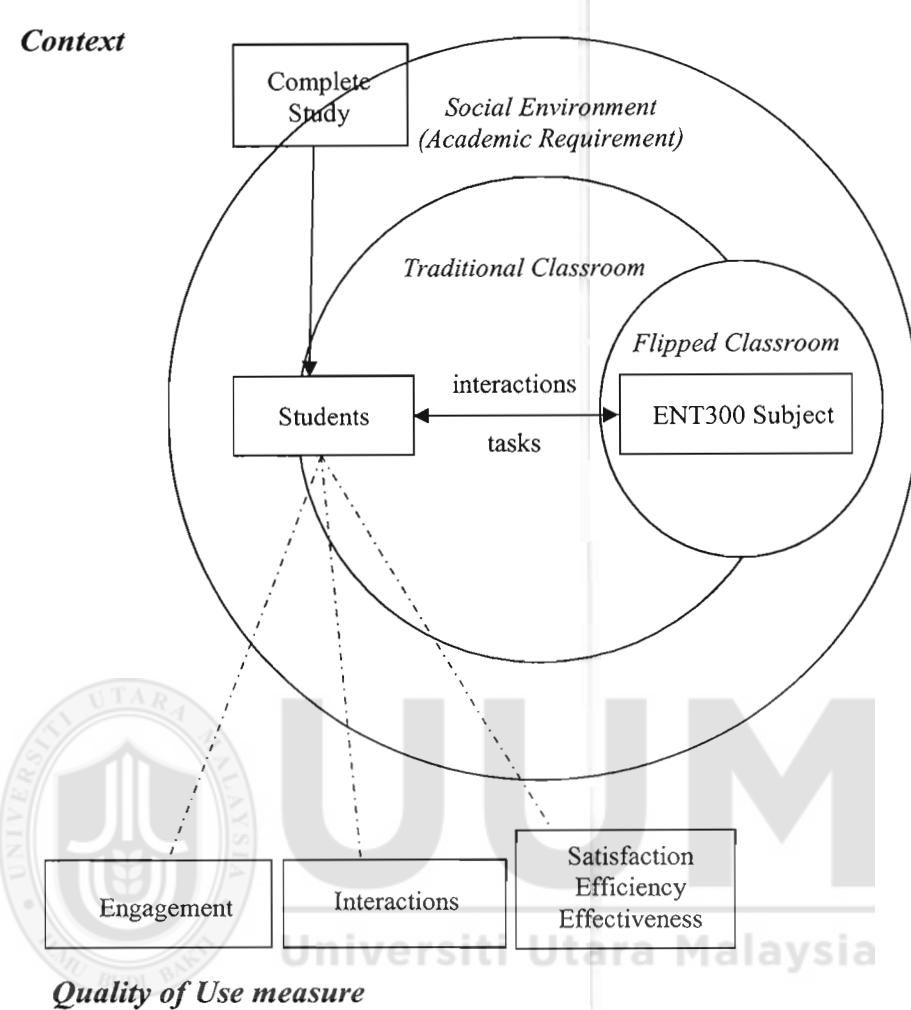


Figure 3.2
Quality of Use Measure for this Study
 Adapted from Bevan (1995b)

3.2.2. Luhmann's System Theory

Niklas Luhmann, a sociologist from Germany, introduced a system theory in the society systems in 1980s (Kihlstrom, 2011). Luhmann developed this theory based on the concept of autopoiesis from biology (Fuchs, 1999) that reflects the reproduction of itself through communications to avoid distinction. Communication is the key

elements in this concept and it appears in every social systems that lead to the network of communications (Kihlstrom, 2011). For modern society, Luhmann introduced a significant contribution through functional differentiation, where the processes involve in any social systems are different based on its functions, such as education (Kihlstrom, 2011). These differences are set as boundaries, thus reducing the complexity of the social systems as a whole (Vanderstraeten, 2004). In order to stabilize the functional differentiation system, Luhmann introduced the binary code such as to participate or not participate, to simplify the roles of definitions and expectations of any social system (Kihlstrom, 2011).

Education is a social system, that functions differently with other social systems such as legal or political (Vanderstraeten, 2004). As compared to other social systems, interactions in education are very demanding and rely heavily on face-to-face interactions (Vanderstraeten, 2004; Vanderstraeten, 2003). This situation reflects the education landscape at the time the articles were written, where the educational technology involved were minimal. However, the presence of technology were seen as an intervention to the setting. Technology implies the cause and effect that will change the final results of the setting.

For this study, Luhmann's system theory is used as the first underpinning theory. The researcher choose this theory because this theory simplifies roles and expectation as a binary code. As such, in order to remain active in the social system, for this study, students must participate with the requirement of it. Participation is part of behavior of engagement (Henrie et al., 2015). After that student must interacts with the actors in this system. As mentioned by Vanderstraeten (2003, 2004) interactions in education is

very intense. This scholar stressed clearly the importance of face-to-face interactions, and the interventions made by technology which will give cause and effect to desired results of the system. After a decade, the technology of education evolve tremendously. The face-to-face interactions are slowly replaced by online interactions. This study seeks if the phenomenon will affect the desired result in this social system.

As for System Theory, this theory focuses on the need of the actors to interact with other actors in order to survive in any social systems. In order to simplify the action, this theory suggests social system as binary such as to participate or not participate in any systems. In education, the interactions are very intense as compared to other social system, and with the disruptive technologies such as social software, the landscape of education and changes in the modalities of education itself have been modified, from face to face traditional learning to blended learning or online learning.

In this environment, there is a concern about hours of face to face interactions in the traditional classroom will determine whether students are able to remain efficient and effective in their studies, at the same time satisfy with the experience of being exposed to a new approach of teaching and learning using flipped classroom. This situation is explained by this theory, where, students must interact with the actors of flipped classroom, namely other students, content, and instructor. Students have the option to participate or not to participate in the teaching and learning activities provided through this classroom where participation of student in online environment is interpreted by the student engagement (Meyer, 2014).

3.2.3. Social Learning Theory: Groups Nets and Sets

Anderson forecasted that social software will be utilized to enhance the process of education in the distance learning and online learning during the year 2000s (Anderson, 2006). He was right, because now, there are many social software such as social network sites that have been integrated to support the learning (Chou & Pi, 2015; Junco et al., 2011; Kisekka, Bagchi-Sen, & Raghav Rao, 2013; O’Boyle, 2014). There are many social network site that are free in the market and could be utilized in the teaching and learning activities. Facebook, Twitter and Google Doc are among the social site that are available and widely used in the online research (Chou & Pi, 2015; Junco et al., 2011; Kisekka et al., 2013; O’Boyle, 2014).

As the technology evolved, the existing theories in social learning need to be revisited because majority of those theories do not include the elements of connectivity or social software. As for that, in 2014, Dron and Anderson through the book ‘*Teaching Crowds: Learning and Social Media*’, interpret the actors in learning environments as a ‘crowd’.

Dron and Anderson extended the discussion of social networks and interactions in the formal education into three important contexts based on the connectivist learning; groups, nets and sets (Anderson, 2016). Groups, are referred as “classes” in formal education systems, where students meet for teaching and learning activities in traditional classroom. Groups are temporarily bonded based on the academic requirements. A second context is known as network, where learning activities expand beyond the learning management system (LMS) to allow learners, alumni, and the general public to engage in formulating networked learning opportunities. Networks may continue to exist even after a formal education completed. The third context is set.

Sets are made up of people who are bound together by the same interests, and can provide values in education. At the same time, three intersections emerge due to the overlapping of these contexts; (1) group-net also known as community of practice (CoP), (2) group-set known as community of interest, and (3) set-net known as the circle. See Figure 3.4.

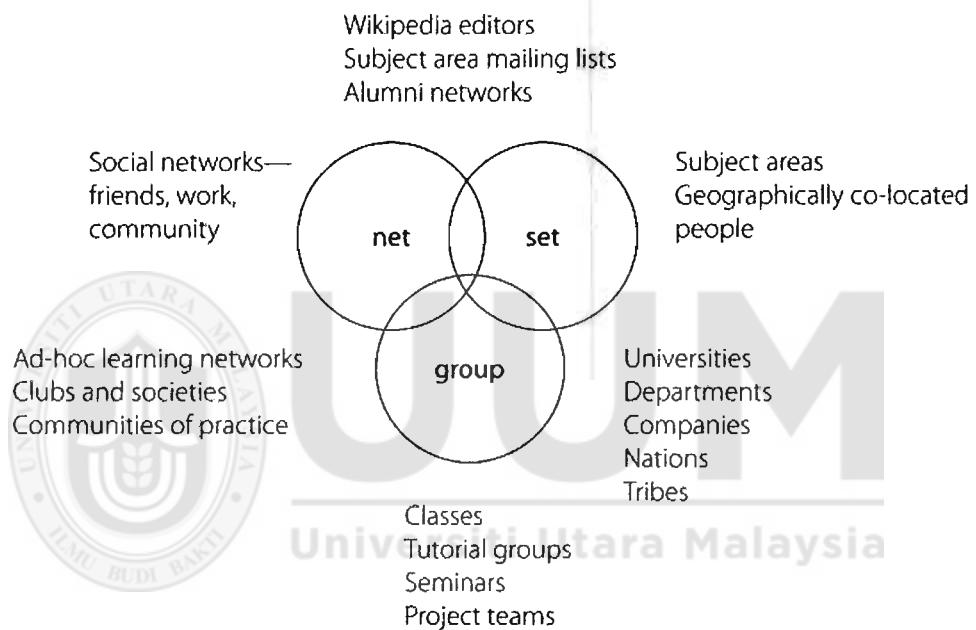


Figure 3.3
A Venn Diagram Shows a Typology of Groups, Nets and Sets
 Source: (Anderson & Dron, 2014)

All the social form, groups, nets and sets bound with communication, sharing and get connected to one another in order to facilitate learning among actors to achieve the goal of learning (collective). See Figure 3.5.

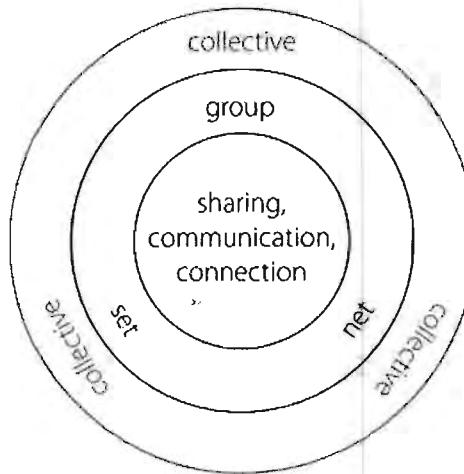


Figure 3.4
Social Forms for Learning Based on Groups, Nets and Sets
 Source: (Anderson & Dron, 2014)

This study also utilized the social software to support the teaching and learning activities namely LMS, Facebook and WhatsApp. Even though WhatsApp has not been listed as the social software, however the researcher believe WhatsApp is a mobile application that could serve similar functions as other social software as it allows instantaneous feedback in the synchronous and asynchronous environment, as well as capabilities to form a closed group of similar interest for discussion.

The Venn diagram in the Figure 3.6 presents the typology of groups, nets and sets applied in this study. Groups represent by the students groups of programs offered by the university. Set refers to students who enrolled for the ENT300 subject for a particular semester and Net refers to the flipped classroom designed for the subject in the online environment based on social software available. This typology also shows the intersection between group-net, namely the informal ad-hoc discussions between

students who enrolled ENT300 and students who already passed the subjects. This ad-hoc discussions were based on the shared interest by those students in order to improve their learning through peer-support activities. Apart from that, there is an intersection between group-set through the informal learning such as seminars or informal lectures that widely available through sharing sessions offered by the university. The last intersection is between net-set, also known as the circle, where students get access to the information or discussion with the students or instructors about ENT300 from other campuses. However, for the purpose of this study, only group, net and set were given the attention because these entities belong s to the formal learning for the ENT300 subjects. Whereas, the intersections reflect the informal learning experienced by students who enrolled for ENT300.



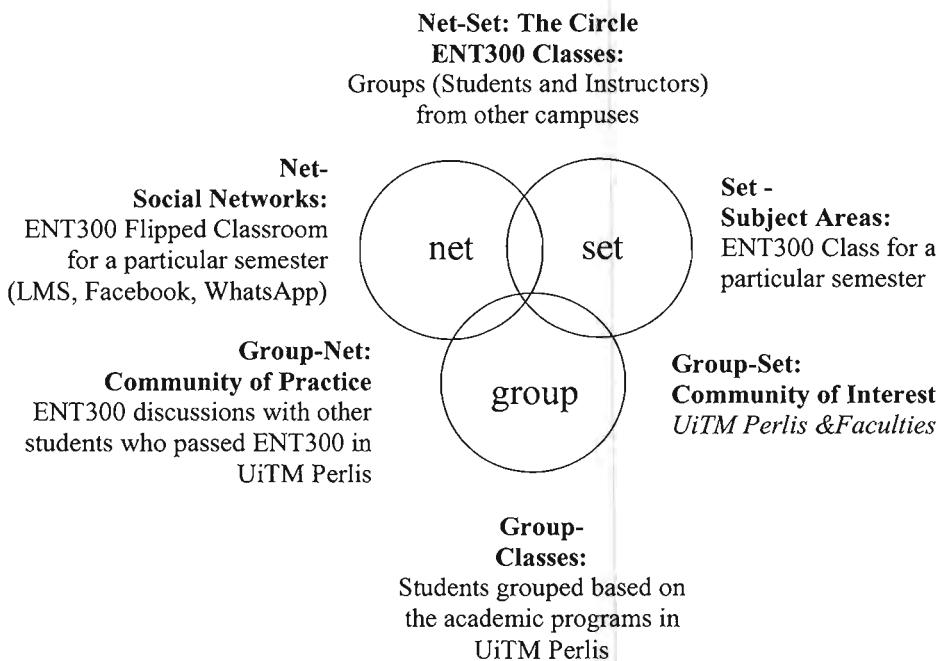


Figure 3. 5
A Venn Diagram Shows a Typology of Groups, Nets and Sets in ENT300 Flipped Classroom
Adapted from (Anderson & Dron, 2014)

In the Figure 3.7, the diagram shows that based on the social entities, groups nets and sets, students share and communicate with the groups in order to achieve their learning goals. Some of the collective information for ENT300 such as issues related to their topics, location, and external factors influencing their solutions will be used to prepare their progress reports, final reports and presentation for this subject.

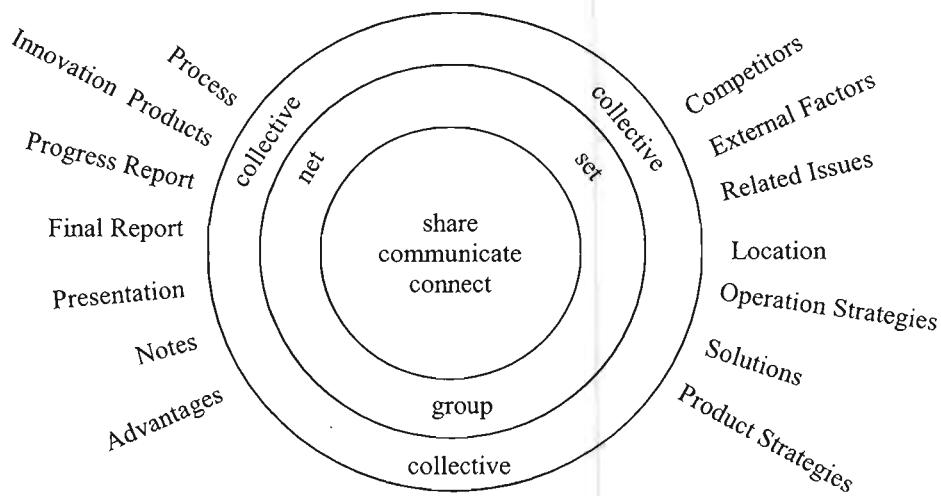


Figure 3.6

Social Forms for Learning Based on Groups, Nets and Sets in ENT300 Flipped Classroom
Adapted from (Anderson & Dron, 2014)

3.2.4. Model of Online Learning

The rise of social software, and its availability in the IT market modifies the pedagogies offering in the education landscape. Now, instructors have various technologies as a platform in blended learning such as learning management system (LMS) and social software, in order to increase the performance among students (Hew, 2011; Ho, 2013), as well as promoting self-regulated learning (Kuo et al., 2014; Tsai, Shen, & Tsai, 2011). As the technologies of ICT emerged, the education landscape changes tremendously. In the year of 1980s, when distance education started to foster, many scholars developed new theories related to the need of this type of educations (Anderson, 2016; Anderson & Dron, 2014). Since distance education relies heavily on the technologies including ICT to operate, therefore, the online interaction is becoming

a vital issue that require attention from HLI. Even though distance learning is a different type of education as compared to a full time approach, however when a full time study started to incorporate its pedagogies with ICT, the interactions in both types of education demanded similar attention. Similarly, like in the distance education, the online learning in the full times studies, also acknowledged that student interactions as an important elements not to be missed in the researches related to the area (Anderson, 2011, 2016; Kuo et al., 2014; Markewitz, 2007).

The main actors who interact in the learning environment are student, instructor and content. It was Michael G. Moore, who systematically introduced the types of interaction in the distance learning education, namely learner-learner, learner-content and learner-instructor (Moore, 1989). Later, the understanding of interactions has been developed further by Terry Anderson and Randy Garrison by introducing another three types of interactions to foster deep learning, namely student-student, instructor-instructor, and content-content (Anderson & Garrison, 1998). Anderson believes that the aim of online learning will be achieved with the affordance provided by information technology and the right approaches of interactions used to deliver the content. Discussion of information technology and learning, creates another challenge, such as students who refuse to participate in e-learning may not enjoy the benefits offer by the learning environment. Figure 2.3 presents the educational interaction in the learning environments.

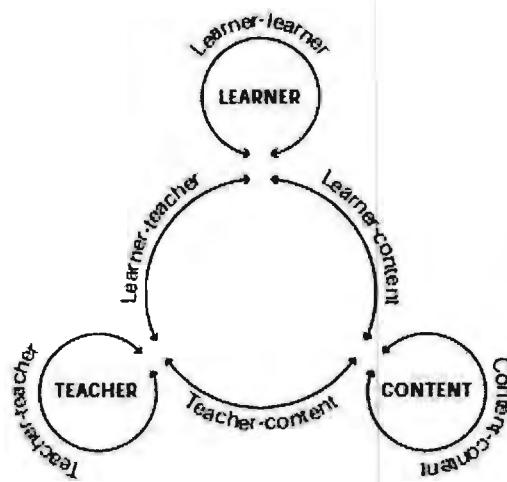


Figure 3.7
Educational Interactions
 Source: (Anderson, 2005)(p.46)

Model of Online Learning stated that in any online environment, three main actors involved namely, student, instructor and online content. Therefore there are six combination of interaction namely student-student, student-instructor, instructor-instructor, instructor-content, content-content, and student-content.

However, for this study, where only students were the respondents, only three types of interaction were investigated namely student-student, student-instructor and student-content. Therefore, in order to ensure that students achieve satisfaction, efficiency and effectiveness in ENT300 classes, instructors ensured that students in this class had interactions with other students, content and instructors.

3.3 Development of Conceptual Framework

This study enriched the existing variables in quality of use concept by Nigel Baven, namely satisfaction, efficiency and effectiveness with another two variables, student engagement and student interactions. This section presents past literatures related to these variables, in order to develop the research framework and hypotheses

3.3.1. Satisfaction

Satisfaction is used as a quality indicator to measure blended learning where satisfaction levels are high among students of blended learning (Kuo et al., 2014; Overbaugh & Nickel, 2011; So & Brush, 2008; Wu et al., 2010). All reviewers of blended learning agree that student satisfaction is very important in the online learning and always been measured as a learning outcome (Arbaugh et al., 2009, 2010; Arbaugh & Hwang, 2015; Bernard et al., 2009; Drysdale et al., 2013; Halverson et al., 2012, 2014). Most importantly, satisfaction is known as one of the variables of quality of use measures in the context of use (Bevan, 1995b).

Satisfaction has always been a concern of marketing area. Generally, satisfaction refers to a person feeling of pleasure or disappointment resulting from comparing a product perceived performance against their expectation (Kotler & Keller, 2008, p. 124). However, satisfaction is not only related with commercial setting, it has also been measured in the education setting (Elliott & Shin, 2002). As such, Elliott and Shin (2002) define student satisfaction as ‘a student’s subjective evaluation of the various outcomes and experiences associated with education system’

Satisfaction in blended learning can be measured based on different conditions. One of the conditions is the platform or technology used to mediate the activities in blended learning. Among those platforms that are normally integrated are, Learning Management System (LMS) (Kabassi et al., 2016), Facebook (Hew, 2011), WhatsApp (Mohamed Amin Embi, 2014), web learning tool such as Kahoot (Alsagof et al., 2014), and YouTube (Kim et al., 2014) in their online learning. Some of the previous researchers used solely one platform in a classroom (Hew, 2011; Kabassi et al., 2016) and some of them combined more than one platform in one classroom (Mohamed Amin Embi, 2014). Even though most of the studies reported that users are satisfied with the technologies used in blended learning, Greek study found that even though blended learning provided benefits to students, students were not satisfied with the platform (LMS) provided by the university to support the blended learning because the platform used was not enhanced with the quality educational material (Kabassi et al., 2016).

Another elements of satisfaction is the level of communication in the flipped classroom. As mentioned by Kuo et al., (2014), communications in the classroom consists of several elements such as communication with the instructors and peers. The online discussion, for example, allows students to discuss openly about their assignments with their friends and instructor at the same time. This communication between parties is very important to determine the level of satisfaction among students in blended learning (Yusoff, McLeay, & Woodruffe-Buron, 2015). Previous study conducted by Campbell et al., (2008) found that there is a significant difference in satisfaction between students who are involved in the online activities such as online discussion as compared to the conventional activities. Furthermore, online activities improved students relationship

with other participants in the environment (Campbell et al., 2008), in which, this relationship is a very important factor to determine the level of satisfaction among students in blended learning (Yusoff et al., 2015).

Course quality is one of the important issues that need to be addressed in the online learning environments. Course content should be carefully designed and delivered effectively (Sun, Tsai, Finger, Chen, & Yeh, 2008). A good presentation of course content is able to improve student interactions and engagement among students (Ahmad & Buchanan, 2015). Furthermore, a well-managed course contents is able to avoid the feeling of uncertainties of what need to be done (Wah, Ing, et al., 2014), thus, increase the understanding among students (O'Flaherty & Laws, 2014). Because of that, students who are familiar with blended learning will continue to use the technology to supplement the traditional coursework (Kabassi et al., 2016). Furthermore, if the course design for a particular subject appears to be successful, it should be continued for other similar subjects, in order to improve the effectiveness of a particular subject delivery (Liebert, Mazer, Bereknyei Merrell, Lin, & Lau, 2016).

According to Hao and Lee, (2016), there was no identical flipped classroom. Hence instructors must be able to make adjustment to any blended activities to suit the students' needs at a particular semester. Thus, this situation creates more challenges to the instructors to adapt themselves to this environment. Instructors who are competent with blended learning approach were able to increase the engagement among students to their learning thus improve the satisfaction among them (Alias et al., 2014). Another challenges pointed out by Hao and Lee, (2016) to the instructors of blended learning was on developing the curriculum design and instructions that are relevant to the

students. For example, a study by Liebert, Lin, Mazer, Bereknyei and Lau (2016), a surgery clerkship course using flipped classroom improved the career interest in surgery among students, and researchers believed that its flipped classroom approach that improved the effectiveness thus improving the satisfaction of learning.

Hence, the hypothesis formulated is as follows:

H1 There is a significant difference in satisfaction among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom

3.3.2. Efficiency

None of the reviewed blended learning articles identified efficiency as the common variable used to measure context of use in blended learning (Arbaugh et al., 2009, 2010; Arbaugh & Hwang, 2015; Bernard et al., 2009; Drysdale et al., 2013; Halverson et al., 2012, 2014). However, Bevan (1995b) acknowledged that efficiency is one of the components of performance in the quality of use measure in the context use of a particular environment.

Efficiency refers to the learning outcome or knowledge gain in relation to learning time (Renner et al., 2014). For instance, a study conducted by Chen et al. (2014) revealed that students are more effective in a blended learning using flipped classroom approach and they found that flipped classroom is beneficial to their learning. Besides, students were able to share their knowledge and experiences in classroom through face to face as well as online environments (O'Flaherty & Laws, 2014). Previous scholars in blended learning such as Jahnke (2010) found that, students in this environment are

able to improve their understanding through online discussion, where students were able to rely on peers' support for confirmation of information and clarification of their problems, even with the absent of the instructor at a particular time.

Another scholar such as Chaberek-Karwacka and Malinowska (2015) found that some advantages of the online learning were that it saves students' time to prepare their assessments and makes the learning easier thus reducing mistake in preparing their assessments or misconception about some topics in the related subjects in blended learning. Also, students are reported to be more prepared before attending classes, thus making the face to face classes more efficient (Wanner & Palmer, 2015). Wanner and Palmer (2015) also suggested that this approach is probably one of the best approach for teaching millennial students.

Previous studies show that efficiency in learning in the blended environments has no significant decline in knowledge (Cook, Levinson, & Garside, 2010), indicating that blended learning is a pedagogy style that is acceptable by students. In fact with this method of learning, students were more flexible with their learning style (Lindeman et al., 2015). Students are committed in both learning environment (face to face and online learning), and participated in activities related to the course assessments as they use face to face as a complement to online learning (Hanson, 2016).

In any education system, there are students that are active and some of them are passive. A study conducted by Chen et al. (2014) found that blended learning is not suitable for passive students. However, another study by Hughes et al. (2016) found that there was a decline in student favorability for traditional lectures as compared to online video

demonstration provided by instructors. Also study by Liebert et al. (2016) found that there was no difference in the score of examination among students who attended blended learning approach and those who were using traditional methods. Therefore, due to time efficiency and the lack of any significant difference in the knowledge gained by students, blended learning could be seen as an alternative teaching method in our existing education system (Kratochvil, 2014). With the emergence of the social network engineering, it opened up more opportunities and selections for instructors to integrate social media network as one of the way to achieve the efficiency of blended learning, particularly using flipped classroom (Maglajlic, 2012).

Therefore, the hypothesis formulated is as follows:

H2

There is a significant difference in efficiency among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom

3.3.3. Effectiveness

Effectiveness refers to the learning outcome such as new understanding or new knowledge a person acquire when experiencing a blended learning activities (Noesgaard & Ørngreen, 2015). Effectiveness also had been highlighted as one of the important variables in the mainstream researches of blended learning (Drysdale et al., 2013; Halverson et al., 2014). Previous literatures also proved that blended learning improves effectiveness through students' performance (Triantafyllou & Timcenko, 2014). This variable also has been included by Baven as one of the quality of use

measures in the context of use (Bevan, 1995b), and this article classified effectiveness as one of the components to represent performance. The reviews of blended learning equally indicated that learners outcome is the most variable used in the studied area (Drysdale et al., 2013). However, other scholars pointed out that, performance score alone was not able to provide a new insight to the studies, therefore studies related to the attitude and usage are required in order to develop a framework for blended learning (Arbaugh, 2014).

Blended learning scholars found that blended learning was able to improve the effectiveness in the environment, as it presents better understanding of computers and related technology. As pointed out by Smith et al., (2009) productive discussion was not about knowing the answer or not, but it was about allowing students to voice out what is right, and indirectly improving their understanding. Previous studies shows that discussion will make students more productive in both face to face classrooms (Jahnke, 2010; Kiviniemi, 2014), and online platforms (Kabassi et al., 2016; Ronald, Stanley, & Arbaugh, 2005)

Moreover, students who were involved in this study belong to the millennial generation. It is known that millennial generation was easily adaptable to technology and are very competent with the information and communication technology devices (Islam, Chittithaworn, Rozali, & Liang, 2010) The students in this categories did not have any problems adapting with the platform introduced in the flipped classroom. Those who were comfortable with flipped classroom approach found it is very convenient and this approach able to facilitated their learning better than the traditional classes (Wanner & Palmer, 2015).

Blended learning with a well-managed course design was able to accelerate students' performance (McLaughlin et al., 2014). Besides, students showed a constructive learning reflected in the activities related to the course and the instructors believed that the students achieved a meaningful learning through this approach of teaching (Mohamed Amin Embi & Hamat, 2014). Another study that involved teacher in-service at remote location found that blended learning helps them to improve their pedagogy skills as well as learning skills (Wah, Keong, et al., 2014).

Effectiveness is widely used as a measurement variables in an experimentation setting. As reported by Kiviniemi (2014) blended learning groups has a significant difference in effectiveness between blended and traditional learning, where Cohen's effect size was reported as medium. Similarly the study by Baepler, Walker, and Driessen (2014) on flipped classroom, found that students in flipped classroom are more effective than the traditional class with medium effect size.

Therefore, the hypothesis formulated is as follows:

H3 There is a significant difference in effectiveness among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom

3.3.4. Student Interactions

Student interactions describe actions among individuals in the systems including individual interactions with other individuals, instructors and content (Bernard et al., 2009). All reviewers agree that student interactions is very important in the online learning (Arbaugh et al., 2009, 2010; Arbaugh & Hwang, 2015; Bernard et al., 2009;

Drysdale et al., 2013; Halverson et al., 2012, 2014). Most of the reviewers identified student interactions based on three types of interactions introduced by Moore (1989) namely student-student, student-interaction and student-content. In the earlier stage of blended learning research, most of the studies used either one type of interactions or a combination of student-student and student-content interaction in one study, while less attention given to student-content interaction alone (Drysdale et al., 2013). However, as more studies are conducted, all types of interactions proposed by Moore (1989) had been conducted in one research setting (Halverson et al., 2014). Student interactions has been included in the quality of use model by Bevan (1995b), as a process between participants and product, but not as a variable to measure in the context use of a particular environment.

A review by Bernard et al. (2009) stated that the types of interactions (student-student, student-instructor, student-content) used in research setting may vary from one setting to another. Most of studies combined interactions namely student-student and student-instructor interactions but few focused on student-content interaction (Drysdale et al., 2013). A study by Kuo et al. (2014) is probably one of the premier studies that includes the three types of interactions suggested by Moore (1989) in one research setting, and found that only student-student interactions is not significant with satisfaction. Another recent study by Kuo and Belland (2016) also reported that student-student interactions does not provide a significant relationship with satisfaction.

Previous scholars such as Jahnke (2010) found that, students in blended learning are able to improve their understanding through online discussion, where students were able to rely on peer support for confirmation of information and clarification of their

problem, even with the absence of the instructor at a particular time. Once the instructor was available, the instructor was able to confirm if the information was accurate or required further explanation. Another scholar such as Chaberek-Karwacka and Malinowska (2015) found that some of the advantages of the online learning were that it saves students' time to prepare their assessment and makes the learning for the subject easier thus reducing mistake in preparing their assessments or misconception about some topics in the related subjects in blended learning. Apart from that, students appreciated the online discussion related to content as it provides a clarity of issues related to the subject (Wah, Ing, et al., 2014) The above findings suggested that student-student interactions have impact on satisfaction, effectiveness and efficiency among students who were involved in this learning environment.

Blended learning environment also requires student-instructor interaction. Instructors' attitudes toward online learning was reported to have a significant impact on students' satisfaction (Sun et al., 2008). Students appreciated positive and constructive comments from instructors, especially immediate feedback to help them completing their assessments with confidence (Wah, Ing, et al., 2014). As mentioned by Demetriadis and Pombortsis (2007), a student-instructor interactions is very important in order to attain deeper understanding of the content related to the course.

Blended learning allows content to be delivered to students more efficiently and effectively, as students were able to customized their learning needs (Kakosimos, 2015). Students might view digital contents multiple times in order to improve their understanding, hence promoted self-regulated learning (Alias et al., 2014). Hence, it is important for instructors to provide a well-managed content (Salam et al., 2014) in order

to avoid confusion among students related to content offered (Alias et al., 2014). A well-presented content makes students adapt the content easily, thus improve their understanding and performance. In this regard, it can be concluded that studies related to student-content interactions produce mix result. For example, study by Hughes et al. (2016) found that students showed less favorable to the traditional face to face session as compared to the online session. However, study by Hanson (2016) found that students prefer traditional classes as compared to online session. A comparison was made and found that the study conducted by Hughes et al. (2016) reported clear procedures (such as types of contents and how the interaction happened in class) used in flipped classroom as compared to study conducted by Hanson (2016). Hence leading to a conclusion that, there are some possibilities that the study by Hanson (2016) was effected by the course design, because these studies were conducted in a different area namely nursing (Hanson, 2016) and pharmacy (Hughes et al., 2016).

Therefore, the hypotheses formulated are as follows:

H4	There is a significant difference in student interactions among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom
H10	There is a significant relationship between student interactions and satisfaction in blended learning using flipped classroom.
H11	There is a significant relationship between student interactions and efficiency in blended learning using flipped classroom.
H12	There is a significant relationship between student interactions and effectiveness in blended learning using flipped classroom.

There are little studies that used student interactions as a mediator in learning environment. Moreover, most of these studies focused only on student-faculty

interactions. A recent study by Hu, Hung, Ching, Hu, and Ching (2015) revealed that student interactions (student-faculty) fully mediated the indirect relationship between student engagement and learning outcome. Another study found that student interactions (student-faculty) mediated the relationship between class participation (student engagement through behavior) and learning outcome (Ko, Park, Yu, Kim, & Kim, 2016). Even though some studies did not clearly defined student-faculty interaction, scholar such as Meyer (2014) argued that instructors are also a representation of faculty in academic setting.

Therefore, the hypotheses formulated are as follows:

H13	Student interactions mediate the relationship between student engagement and satisfaction in blended learning using flipped classroom.
H14	Student interactions mediate the relationship between student engagement and efficiency in blended learning using flipped classroom.
H15	Student interactions mediate the relationship between student engagement and effectiveness in blended learning using flipped classroom.

3.3.5. Student Engagement

Scholars of blended learning also suggested that student engagement is one of the important variables in the mainstream researches in blended learning (Drysdale et al., 2013; Halverson et al., 2014). Recently, scholars such as Henrie et al. (2015) published a review article, '*Measuring Student Engagement in Technology-Mediated Learning: A Review*'. This review also highlighted inconsistent definitions of student engagement in the technology mediated environment. For this study, the researcher adapted the

definition from Meyer (2014) that refers to student's involvement in learning (such as participating in a discussion or collaborating on solving problems) contributes to their learning and sustains their further involvement in course activities. The review of student engagement also revealed that student engagement can be operationalized generally into three main categories: behavioral, cognitive and emotional.

Also, factors related to students, like learning engagement and social presence, gave a huge impact in achieving learning goals (Ally, 2005; Anderson, 2005). Student who engaged with the system will perform better, as compared to those who do not engage with learning (Junco et al., 2011). The literatures related with perceived usability stated that engagement has its role in a technology mediated environment. Therefore the researcher believed, this variable provided more flavor to the quality of use model in blended learning environment.

Review of student engagement listed 16 measurements, only 14 of them reported the Cronbach alpha values, while eight of the measurements reported the Cronbach alpha value below 0.8. This finding clearly shows that the measurements related to the engagement is still at the early stage of its development. Among these measurements, there were two measurement that focused on student engagement in online environment, namely National Survey of Student Engagement (NSSE) and Online Student Engagement Scale (OSE). NSSE is an annual survey created and administered by Indiana University Center for Postsecondary in United State. NSSE 2008 Online Learning Experimental Items is a subcomponent of NSSE, where student engagement items are measured in online environment. Apart from that, another student engagement measurement was developed by Dixson (2010) called Online Student Engagement

Scale (OSE). A revised version of OSE has been published on September 2015, after the completion of the study.

Most of previous studies agree that blended learning facilitate student with self-regulated learning (Liebert et al., 2016; McLaughlin et al., 2014; Wanner & Palmer, 2015). Self-regulated learning directed students to be responsible in their own learning, thus declining the need of face-to-face interaction especially with the instructors (Hughes et al., 2016). Another study by Chen et al. (2014), found that the system log accessing the online platforms shows the improvements in their attendance and study effort. Another study of student engagement found that the integration of blended learning with social media software promotes student engagement, as well as encouraging them in self-regulated learning (Blaschke, 2014)

Learner outcome is one of the variables that is commonly used in the blended learning. Scholars of blended learning stated that learner outcome may be represented by many variables such as student performance and effectiveness (Drysdale et al., 2013). Previous study found that student engagement has significant relationship with satisfaction (Chen et al., 2014). Another studies also found that class participation has significant relationship with learning outcome and student interactions in one study setting (Ko et al., 2016). However, another study related with the interactive lecture in flipped classroom found that student engagement has no significant relationship with satisfaction (Md Osman, Jamaludin, & Fathil, 2016).

Therefore, the hypotheses formulated are as follows:

- H5 There is a significant difference in student engagement among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom
- H6 There is a significant relationship between student engagement and satisfaction in blended learning using flipped classroom
- H7 There is a significant relationship between student engagement and efficiency in blended learning using flipped classroom.
- H8 There is a significant relationship between student engagement and effectiveness in blended learning using flipped classroom
- H9 There is a significant relationship between student engagement and student interactions in blended learning using flipped classroom

3.4 Conceptual Framework

Based on the above discussion, the researcher draw a theoretical framework as presents in Figure 3.8 and the research framework as exhibits in Figure 3.9. The theoretical framework suggests that this study will enhance the existing variables in the quality of use concept (satisfaction, efficiencies and effectiveness) by including student engagement and student interactions. The overall framework underpinned by Luhman's System Theory that highlight in any social system, participants must interact and participate in order to ensure their sustainability. Furthermore, Model of Online Learning explains that in online education system, actors (students, instructors and content) must interact to one another to ensure the success of online learning approach.

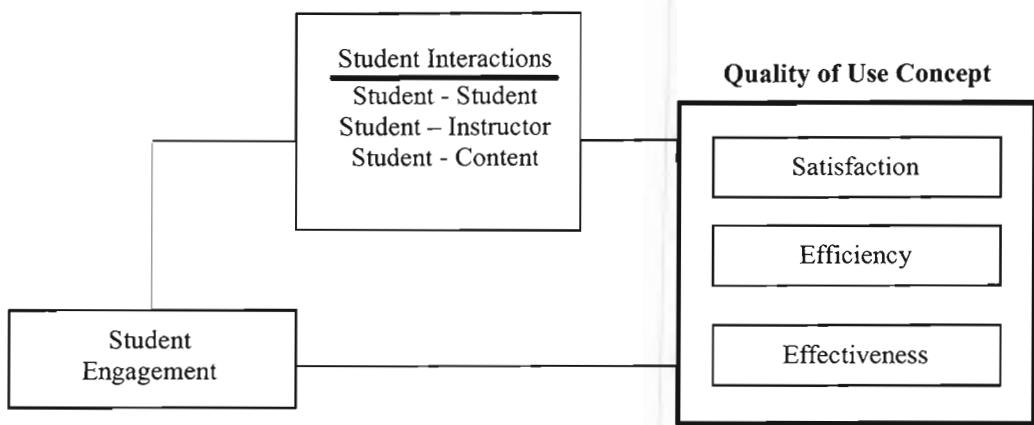


Figure 3.8
Theoretical Framework for the Study

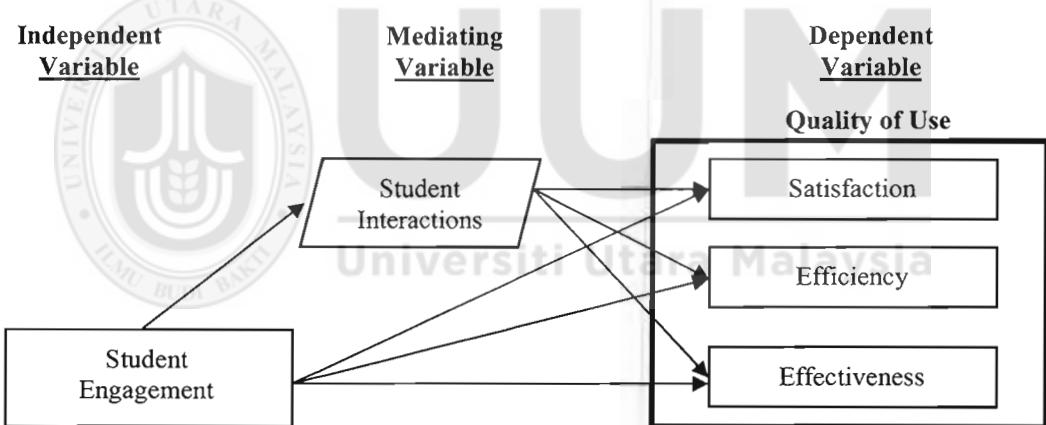


Figure 3.9
Research Framework for the Study

3.5 Summary of Hypotheses for the Study

This study was conducted to answer the following research questions. (1) What is the impact of blended learning on student engagement, student interactions and quality of use in a flipped classroom?, and (2) Does student engagement and student interactions have any relationship with quality of use in blended learning using flipped classroom? Hence, the hypotheses for this study addressed the research questions that involved two stages of data collection. Hypothesis 1 (H1) to hypothesis 5 (H5) answered research question one and hypothesis 6 (H6) to hypothesis 15 (H15) addressed research question two. See Table 3.2.

Table 3. 2
Hypotheses for the Study

Hypothesis	Variables
Stage 1: Quasi Experimental	
H1	There is a significant difference in satisfaction among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom
H2	There is a significant difference in efficiency among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom
H3	There is a significant difference in effectiveness among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom
H4	There is a significant difference in student interactions among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom
H5	There is a significant difference in student engagement among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom

Continue

Table 3. 2
Hypotheses for This Study

Hypothesis	Variables
Stage 2: Survey (Direct Path)	
H6	There is a significant relationship between student engagement and satisfaction in blended learning using flipped classroom.
H7	There is a significant relationship between student engagement and efficiency in blended learning using flipped classroom.
H8	There is a significant relationship between student engagement and effectiveness in blended learning using flipped classroom.
H9	There is a significant relationship between student engagement and student interactions in blended learning using flipped classroom.
H10	There is a significant relationship between student interactions and satisfaction in blended learning using flipped classroom.
H11	There is a significant relationship between student interactions and efficiency in blended learning using flipped classroom.
H12	There is a significant relationship between student interactions and effectiveness in blended learning using flipped classroom.
Stage 2: Survey (Mediation Analysis)	
H13	Student interactions mediate the relationship between student engagement and satisfaction in blended learning using flipped classroom
H14	Student interactions mediate the relationship between student engagement and efficiency in blended learning using flipped classroom
H15	Student interactions mediate the relationship between student engagement and effectiveness in blended learning using flipped classroom

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3.6 Summary of the Chapter

This chapter reviewed the conceptualization of concepts and theories for this study.

This chapter also highlighted the literatures and relationship between the measurement variables, theoretical framework and hypotheses for this study. There were 15 hypotheses developed to answer two main research questions: 5 hypotheses for research question one and 10 hypotheses for research question two. The following chapter discusses about research methodology related to this study.

CHAPTER FOUR RESEARCH METHODOLOGY

4.1 Research Design: Overview and Preliminary Activities

In this section, the researcher discusses about the overview and preliminary analysis for this study that includes research setting, measurement design, unit of analysis and timeline, as well as approval, consents and ethical considerations required prior to stating the actual study.

This study was conducted to address the research questions discussed in the earlier chapter: (1) What is the impact of blended learning on student engagement, student interactions and quality of use in a flipped classroom?, and (2) Do student engagement and student interactions have any relationship with quality of use in blended learning using flipped classroom? This study involved two stages. Stage one was conducted using a quasi-experimental method, while data for stage two were obtained using survey.

Prior to starting an actual study, the researcher conducted preliminary activities that involved the research setting, measurement design, unit of analysis, timeline of treatment, approvals, consents and ethical consideration related to the actual study. In the measurement design, the researcher included the explanation about the operationalization of variables and measurement for constructs used for this study (student engagement, student interactions, satisfaction, efficiency and effectiveness)

that were adapted from previous studies, pilot study and process involved in finalizing the measurement items.

Later, the researcher presents the research design for the first the first stage of data collection using quasi-experimental method. This stage was conducted to address the first research question of this study by investigating the impact of blended learning on student engagement, student interactions and quality of use in a flipped classroom. The discussion involved in this section are selection of participants, validity issues in quasi-experimental, treatments, procedure and data collection, and method of data analysis.

The second question was answered using a survey-based approach, in the second stage of this study. The researcher conducted this approach to answer the second objective of this study namely, does student engagement and student interactions have any relationship with quality of use in blended learning using flipped classroom? In this sub section, the researcher exhibits the research design that includes sampling selection, student interactions in ENT300 flipped classroom and method of data analysis. Figure 4.1 exhibits the summary of research methodology for this study.

In short, by combining two data collection approaches, the study will lead to increment of methodological rigor in confirmatory research that involve validity and reliability of this instrument. Thus will lead to the systematic discovery of causal relationships based on theory development, improved model representation and analysis techniques.

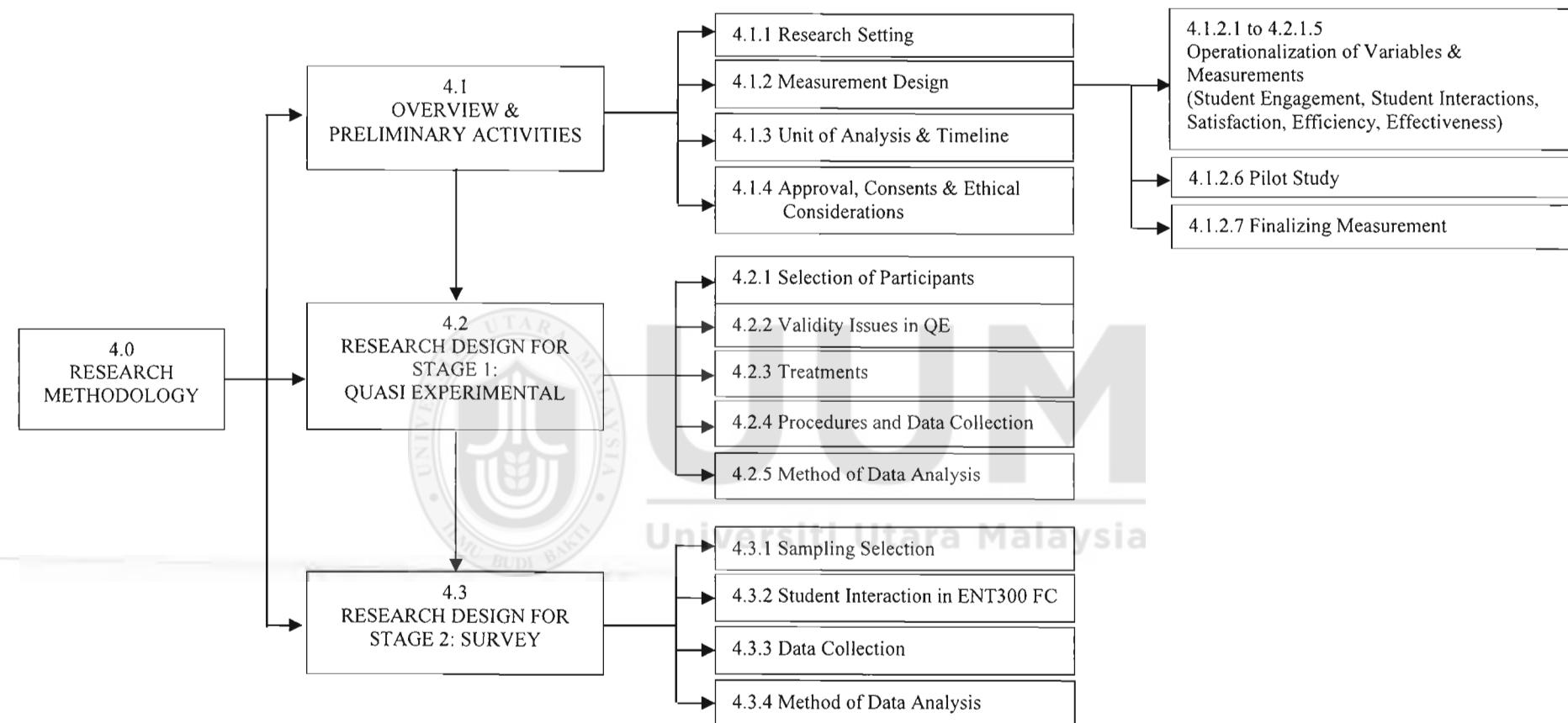


Figure 4. 1

Summary of the Research Methodology

Note: QE – Quasi Experimental; FC – Flipped Classroom

By combining these approaches, the study contributes to the increment of methodological rigor in fundamental researches, particularly which involves with developing a model for the area of blended learning. The findings of this study will lead to the systematic discovery of causal relationships based on theory development, improved model representation, as well as data analysis techniques used in the fundamental researches in blended learning (Lee, Barua, & Whinston, 1997).

4.1.1 Research Setting

Semester 20122 was the first batch that implemented the administration of the subject based on Outcome Based Education – Student Centred Learning (OBE-SCL). OBE-SCL provides a clear course design for ENT300, which consists of syllabus, student learning time, program outcomes, course outcomes, and the alignments of these outcomes with Bloom taxonomy. Indirectly these OBE-SCL documents ensured the standardization of the assessments. There are five main assessments for this course, namely (1) progress report, (2) business plan report, (3) presentation, (4) mid semester examination, and (5) final examination. Among all assessments, only final examination was handled by the Academic Affairs in Shah Alam, while other continuous assessments were conducted at UiTM Perlis

The increment of students' enrolment for this subject challenges the instructors' capabilities to handle the subject, while maintaining the quality of students' performance. Hence, Faculty of Business Management (FBM) in UiTM Perlis introduced an instructional model that is known as i-CREATE (Innovative and Creative

Young Entrepreneurs) to manage ENT300 continuous assessments by incorporating blended learning using flipped classroom approaches in the teaching and learning activities for ENT300.

Since there are various definition about online learners, the researcher decided to operationalize the definition for this study based on the definition provided by Allen, Seaman, Poulin and Straut (2016) through their publication of *Online Report Card Tracking Online Education in the United States* thorough Babson Survey Research Group. This definition has been used consistently by the said researchers for the similar publication since last thirteen years for the national reports that have been produced.

As presented in Table 4.1 online learner refers to learners that have the least face-to-face interactions whereby more than 80% of the content were delivered online. On the other hand, blended learners refer to the learners that involved in the class that blend online and face-to-face activities, where 30% to 79% of the contents and activities were conducted online. However, to those who use the technology to supply information such as course information and assignments will be called web facilitated learners. Web facilitated learners utilised up to a maximum of 30% of contents and activities online. Traditional learners refers to learners that go through the traditional learning delivered in writing or orally.

Table 4. 1
Types of Learners

% of content delivered online	Type of learners	Description
0%	Traditional	Course conducted using traditional learning, delivered in writing or orally.
1-29%	Web Facilitated	Course that uses the online technology to drive face-to-face courses. Instructors use technology such as learning management system (LMS) or to post the syllabus and assignments.
30%-79%	Blended/Hybrid	Course conduct in dual mode; online and face-to-face delivery. Some proportion of the content is delivered online where some of class activities shifted online, in order to reduce face-to-face meetings.
>80%	Online	Majority of a course is delivered online, with minimal face-to-face meetings.

Source: Allen et al., (2016)

The percentage of online interaction is determined by Student Learning Time (SLT) provided by the faculty. The contact hour for face-to-face has been reduced from 4 hours a week to 3 hours a week started from July 2012 (Semester 20122), hence the total face to face hours have been reduced from 56 hours to only 42 hours per semester. Also, there were no changes in the syllabus, which mean that contents and assessments will remain the same. These situation challenged instructors to be more creative in handling this subject. Thus, all instructors were given an option to integrate blended learning as a method of delivery in a control environment, where instructors who are interested with this method must register the subject as a blended learning subject for that particular semester. The activities related with blended subjects are monitored by blended learning unit of the university.

The researcher was notified that learning management system (LMS) or i-Learn was in the process of upgrading during the timeline of this study, therefore the researcher decided to integrate i-Learn with, social media, namely Facebook and WhatsApp. Therefore, when this study was conducted, only content space in i-Learn has been utilized intensively, and the discussion for this subject has been shifted to other platforms namely Facebook for group discussion, while, WhatsApp was used as the alternative means of communications between students and instructors.

As mentioned earlier, assessments for this subject are progress report for business plan (a group of five students), business plan report, presentation and mid-semester examination. There were two hours lectures and one other tutorial in one week, a total hour for one semester is 42 hours. Normally, lecturer focused on delivery the contents in the lecture class, and tutorial classes were used to guide students in preparing the business plan. In order to facilitate students to prepare a business plan, students are required to submit five progress reports (from week 3 until week 10), in order to ensure that students understand what needs to be done. Progress report also serves as a control document to avoid plagiarism among students. Presentation will be conducted after the submission of final report, normally in week 11.

Every semester, instructors gathered for a meeting to discuss issues related to Scheme of Work (SOW) including SLT and ENT300 subject contents, presentation, and mid-semester examination. SOW is a document that highlighted chapters to cover for each week and other activities related to this subject, such as tutorial classes, submission date for progress report and final report, date for presentation, date for mid-semester examination and distribution marks for assessments for ENT300. Once SOW was

finalized, this document was uploaded to i-Learn content space. Students were able to view this document as their schedule of activities for the subject in that semester. Students can download SOW and ENT300 contents for their reference. Apart from that, the head of department for all faculties in UiTM Perlis were notified about the date related to the activities involved, because once the date has been finalized, it cannot be changed due to the logistics and space requirements, especially for presentation and mid semester examination.

Lectures and tutorial classes were conducted in dual modalities (face-to-face and online learning). However, instructors must ensure that the online learning activities must not exceed more than 30% of 42 hours for a particular semester, as required in the syllabus and SLT. The blended learning hours for classes that involved in this study were calculated based the following equation:

$$\% \text{ online interaction} = (a/b) \times 100$$

Where

a - number of weeks exposed to online interaction
b - total weeks

Equation 4. 1
Percentage of Online Interaction

Presentation sessions were conducted in parallel sessions. This parallel session involved lecturers from other faculties, non-ENT300 students as committee members and students of ENT300 as participants. Normally a total of 12 to 22 classroom were occupied for these activities depending on the number of students, and divided into three main sessions. Information for students related to presentation, such as instruction, submission guide, check list and presentation details were uploaded to

i-Learn. Similarly, the non-ENT300 students who became the committee members were also accessed the information related to their tasks and responsibilities from i-Learn. In order to ensure the effectiveness of the presentation, the committee members were given a short briefing prior to starting the presentation session. By employing this module, the presentation sessions were reduced from three weeks to one day, lecturers from other faculties were exposed to the entrepreneurial thinking, non-ENT300 students were exposed to handling a massive presentation session and the presentation results were standardized.

Instructors also discussed about mid-semester examination together with Test Specification Table (TSU) for a particular semester to ensure the questions developed achieve the level of cognitive, affective and psychomotor as specified in the syllabus of ENT300. TSU also served as a guideline for the instructors to prepare a multiset questions with a similar complexity weightage for each set. Mid semester examination was also conducted in parallel session using two examination halls. The number of sessions depends on number of students who enrolled for the semester. One session consists of 200 to 400 students. Each session will have a different set of questions. Information about the mid semester examination sessions also disseminated through i-Learn. i-CREATE module improves the efficiency of managing mid-semester examination, as well as integrity of the question prepared for the exam.

i-CREATE, is able to measure cognitive level through the student performance and the psychomotor level through completion of their assessments. However, this instructional model is not able to measure an affective level of these students. Whereas, a quality instructional model must incorporate the affective measures as its quality dimensions

too. Therefore, this study elaborates the development of the affective elements through the quality measurement for blended learning based on ‘Quality of Use’ concept.

4.1.2 Measurement Design

The quality measurement for this study was developed based on ‘Quality of Use’ concept introduced by Nigel Bevan in 1985 through his article ‘*Measuring usability as quality of use*’. ‘Quality of use’ concept introduced satisfaction and performance in its measurement, where performance represented by effectiveness and efficiency (Bevan, 1995a). However, for this study, additional contemporaries’ variables, namely student engagement and student interactions have been introduced to improve the comprehensiveness of ‘quality of use’ model in blended learning,

This section discusses about operationalization of the variables and measurements involved in this study, pilot study, and finalized items used for this study.

4.1.2.1 Operationalization of Variable and Measurement: Student Engagement

Meyer (2014) defines student engagement as a students’ involvement in learning (such as participating in a discussion or collaborating on solving problems) that contributes to their learning and sustains their further involvement in course activities. As for this study, this variable has been operationalized as the communications among participants in order to enhance teaching and learning in flipped classroom for the ENT300 subject.

Several measurements were identified in the development of student engagement such as National Survey of Student Engagement (NSSE) and Online Student Engagement Scale (OSE). NSSE is an annual survey created and administered by Indiana University Center for Postsecondary in United State. NSSE 2008 Online Learning Experimental Items is a subcomponent of NSSE, where student engagement items are measured in online environment. Apart from that, another student engagement measurement was developed by Dixson (2010) called Online Student Engagement Scale (OSE). A revised version of OSE has been published on September 2015, after the completion of the study. OSE consists of four dimensions, namely skills, emotion, participation, and performance. Items for NSSE 2008 Online Learning Experimental Items are presented in Table 4.2 and Table for Online Student Engagement Scale (OSE) is presented in Table 4.3.

As shown in Table 4.2, items no 1, 2, and 3 listed in NSSE are not suitable for this study. This is because students were not familiar with blended learning particularly flipped classroom. Items 4a until 4j focus on ‘participation’ and ‘interactions’ between instructors and students indicating student engagement. However, for the ‘quality of use’ measurement, student interactions and student engagement were treated as separate variables. Therefore the researcher reviewed the items to ensure that items for student engagement and student interactions were not overlapped.

Table 4. 2

NSSE 2008 Online Learning Experimental Items (Chen, Lambert, & Guidry, 2010)

No	Items
1	During the current school year, how many courses have you completed in total? (Use a drop down menu for student to select from 0 to 20 or more)
2	During the current school year, about how many of these courses used the Web or Internet as the primary method to deliver course content? (Use a drop down menu for student to select from 0 to 20 or more)
3	During the current school year, about how many of your courses were conducted face-to-face but had a Web component designed to promote interaction among students and instructors? (Use a drop down menu for student to select from 0 to 20 or more)
4	In your experience at your institution during the current school year, about how often have you done each of the following? (Very often, often, sometimes, never)
a	Discussed or completed an assignment using a “synchronous” tool like instant messenger, online chat room, video conference, etc.
b	Discussed or completed an assignment using an “asynchronous” tool like e-mail, discussion board, listserv, etc.
c	Asked for help from a tutor or other students outside of required class activities.
d	Participated in discussions about important topics related to your major field or discipline..
e	Participated in course activities that challenged you intellectually.
f	Participated in a study group outside of those required as a class activity.
g	Participated in discussions that enhance your understanding of social responsibility.
h	Used your institution’s Web-based library resources in completing class assignments.
i	Participated in discussions that enhance your understanding of different cultures.
j	Used the Internet to discuss with an instructor topics you would not feel comfortable discussing face-to-face or in a classroom

Dixson (2010) has four dimensions under OSE which are skills, participation, emotional and performance. As for this study was attempted to identify student engagement through collaborative activities, therefore only dimension participation was selected. Dimension for performance was dropped because when the questionnaires were distributed to the students, they were in the week 5 to week 12 for quasi-experimental and week 10 to week 11 for survey, therefore some assessment results are not produced yet. See Table 4.3.

Table 4. 3
Online Student Engagement Scale (OSE) by Dixson (2010)

Dimensions	No	Items
Skills	1	Making sure to study on a regular basis
	2	Staying up on the readings
	3	Looking over class notes between getting online to make sure I understand the material
	4	Being organized
	5	Taking good notes over readings, PowerPoints, or video lectures
	6	Listening/reading carefully
Participations	1	Entering the online class multiple times a week
	2	Visiting or calling the instructor with questions about the material and/or assignments
	3	Emailing or posting questions when I don't understand the material and/or assignments
	4	Having fun in online chats, discussions or via email with the instructor or other students
	5	Participating actively in small-group discussion forums
	6	Helping fellow students
	7	Engaging in conversations online (chat, discussions, email)
	8	Posting in the discussion forum regularly
	9	Getting to know other students in the class
Emotional	1	Putting forth effort
	2	Finding ways to make the course material relevant to my life
	3	Really desiring to learn the material
	4	Applying course material to my life
	5	Finding ways to make the course interesting to me
Performance	1	Getting a good grade
	2	Doing well on the tests/quizzes

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After looking at overall considerations, the researcher decided to adapt a measurement developed by Dixson (2010). Only participation dimension was selected due to the arguments that this study is more interested about looking at students overall perceptions in student engagements based on practices through blended learning using flipped classroom in UiTM Perlis. The final items are presented at Table 4.4 which are included in the actual measurement.

Table 4. 4
The Final Items Representing Student Engagement for the Study

No	Items
1	I visit i-Learn multiple times a week to get access to the ENT300 online materials
2	I visit the instructor to discuss about ENT300 assignments
3	I participate actively in ENT300 group discussions
4	I help my group members and my classmates related to the ENT300 assignments
5	Outside classroom, I engage with conversation about ENT300 with my instructors through various applications (mobile application, social site network, instant messaging tools, etc.)
6	Outside classroom I actively communicate with my group members about ENT300 through various applications (mobile application, social site network, instant messaging tools, etc.)
7	Because of ENT300, I start to get to know other students in who enrolled this subject from other classes
8	Because of ENT300, I start to get to know other students in who enrolled this subject from other faculties

4.1.2.2 Operationalization of Variable and Measurement: Student interactions

Student interactions describe actions among individuals in the systems including individual interactions with other individuals, instructors and content (Bernard et al., 2009). For this study, student interactions have been operationalized as the communications between student-student, student-instructor, and student-content. Student-student refers to the interaction among students who enroll for ENT300 for a particular semester. Student-instructor interaction refers to the interactions between students who enroll for ENT300 for a particular semester with the instructor who teach them for that same semester. Student-content interaction refer to the interactions between students for a particular semester with the content and suggested link provided in blended learning environment.

Up to the point of this study, many scholars conducted studies using student interactions as their variable. However, only study by Kuo et al., (2014) that focused on three dimensions representing general interactions in education as mentioned by Anderson

(2005) namely student-student, student-instructor and student-content interactions. The original items for interactions are displayed in the Table 4.5.

Table 4. 5
Dimensions of Student Interactions by Kuo et al. (2014)

Dimensions	No	Items
Learner-Learner Interaction	1	Overall, I had numerous interactions related to the course content with fellow students
	2	I got lots of feedback from my classmates
	3	I communicated with my classmates about the course content through different electronic means, such as email, discussion boards, instant messaging tools, etc.
	4	I answered questions of my classmates through different electronic means, such as email, discussion board, instant messaging tools, etc.
	5	I shared my thoughts or ideas about the lectures and its application with other students during this class
	6	I comment on other students' thoughts and ideas
	7	Group activities during class gave me chances to interact with my classmates.
	8	Class projects led to interactions with my classmates.
Learner-Instructor Interaction	1	I had numerous interactions with the instructor during the class.
	2	I asked the instructor my questions through different electronic means, such as email, discussion board, instant messaging tools, etc.
	3	The instructor regularly posted some questions for students to discuss on the discussion board
	4	The instructor replied my questions in a timely fashion.
	5	I replied to messages from the instructor
	6	I received enough feedback from my instructor when I needed it.
Learner-Content Interaction	1	Online course materials helped me to understand better the class content
	2	Online course materials stimulated my interest for this course
	3	Online course materials helped relate my personal experience to new concepts or new knowledge
	4	It was easy for me to access the online course materials.

Student interactions for this study has been adapted from by Kuo et al., (2014). The dimensions have been maintained, however the label has been changed to student-student interaction, student-instructor interaction and student-content interaction. The final dimensions and items in student interactions are as presented in the Table 4.6.

Table 4. 6

The Final Dimensions and Items Representing Student Interaction for the Study

Dimensions	No	Items
Student-student interactions	1	Overall, I had numerous interactions related ENT300 content with fellow students.
	2	I got lots of feedback related to ENT300 course from my classmates.
	3	I communicated with my classmates about ENT300 course contents through various applications (mobile application, social site network, instant messaging tools, etc.)
	4	I answered questions of my classmates about ENT300 course content through various applications (mobile application, social site network, instant messaging tools, etc.)
	5	I shared my thoughts or ideas about the lectures and its application with other students during ENT300 class
	6	I comment on other friend's thoughts and ideas in ENT300 class
	7	ENT300 assignments led to interactions with my classmates.
Student-Instructor Interaction	1	I had numerous interactions with the instructor during ENT300 class
	2	I asked the instructor my questions related to ENT300 contents through various applications (mobile application, social site network, instant messaging tools, etc.)
	3	The instructor replied my questions in a timely fashion
	4	I replied to messages from the instructor through various applications (mobile application, social site network, instant messaging tools, etc.)
	5	I received enough feedback from my instructor to complete my assignments when I needed it.
Student-Content Interaction	1	Beside ENT300 module, online materials helped me to understand the ENT300 content better
	2	Online materials stimulated my interest for this course
	3	Online materials helped me to relate my personal experience to new concepts or new knowledge
	4	It was easy for me to access the online materials.

4.1.2.3 Operationalization of Variable and Measurement: Satisfaction

Satisfaction refers to the users' perception of comfort and acceptable to use, so that if users perceive the product as comfortable and acceptable to use, they are assumed to be satisfied (Bevan, 2009). As for this study, this variable has been operationalized as the feeling perceived by students is equal to their expectation prior to completing the subject of ENT300 using flipped classroom approach in a particular semester.

The measurement for satisfaction has been adapted from Kuo et al., (2014). Even though satisfaction has been widely used in various studies in blended learning, the

researcher decides to adapt this measurement because it is one of the latest satisfaction measures in the context of online learning. Moreover, the items listed in the measurement are suitable with the university environment. The overall items represents the direction of UiTM, particularly in entrepreneurial education as one of the compulsory subjects for student academic performance, as well as professional development. Table 4.7 exhibits the items for student satisfaction from Kuo et al., (2014).

Table 4. 7
Student Satisfaction Items by Kuo et al., (2014)

No	Items
1	Overall, I am satisfied with this class
2	This course contributed to my educational development
3	This course contributed to my professional development
4	I am satisfied with the level of interaction that happened in this course
5	In the future, I would be willing to take a fully online course again

As for this study, the researcher adapted the finalized items from Kuo et al., (2014).

The finalized items for satisfaction are presented in the Table 4.8.

Table 4. 8
The Final Items Representing Satisfaction for the Study

No	Items
1	Overall, I am satisfied with ENT300 class
2	ENT300 course contributed to my educational development
3	ENT300 course contributed to my professional development
4	I am satisfied with the level of interaction that happened in ENT300 course
5	In the future, I would be willing to take a blended learning course again

4.1.2.4 Operationalization of Variable and Measurement: Efficiency

Efficiency refers to the learning outcome or knowledge gained in relation to learning time (Renner et al., 2014). As for this study, efficiency has been operationalized as the state where the students of ENT300 for a particular semester perceived they have gained the knowledge from the flipped classroom activities for this subject.

However, little is known about measurement of efficiency for a flipped classroom. Most of efficiency items were developed to represent users' experiences when they used a particular system. At the beginning of the study, the researcher chose a dimension of performance from Online Student Engagement Scale (OSE) by Marcia Dixson (2010) to represent efficiency. However, the outcome of a meeting with the management of UiTM Perlis argued that, the items are more suitable for students who have completed the course but not for students who are currently taking the subject and not completing the subject. Therefore, the management suggested to the researcher to replace items by Dixson (2010) with suitable items that can represent this variable. Alternatively, the researcher discovered measurement by Finstad (2010). Finstad claimed this measurement as the alternative measure for usability (satisfaction, efficiency and effectiveness). The efficiencies measurements by Finstad (2010) are presented in Table 4.9. Since the measurement reflects the use of the system, hence the researcher adapted this measurement to reflect on flipped classroom for ENT300 subject. The finalized items for this variable are presented in Table 4.10.

Table 4. 9
Efficiency Items by Finstad (2010)

No	Items
1	[This system] saves me time.
2	I tend to make a lot of mistakes with [this system].
3	I don't make many errors with [this system].
4	I have to spend a lot of time correcting things with [this system].

Table 4. 10
The Final Items Representing Efficiency for This Study

No	Items
1	ENT300 flipped classroom saves my time preparing my assignments
2	ENT300 flipped classroom reduce mistakes I made in preparing my assignments
3	Flipped classroom improve my understanding of ENT300
4	Flipped classroom enhance my knowledge related to ENT300

4.1.2.5 Operationalization of Variable and Measurement: Effectiveness

Effectiveness refers to the learning outcome such as new understanding or new knowledge a person acquires when experiencing e-learning activities (Noesgaard & Ørngreen, 2015). Effectiveness for this study has been operationalized as learning outcome, such as new understanding and knowledge perceived by students who enrolled for ENT300 in a particular semester.

Normally effectiveness in blended learning or online learning was measured through the result obtained by student from a particular subject (Kauffman, 2015). However, when the researcher discussed with the faculty, few issues were raised, (1) when the actual study conducted, the result for students are not ready to be announced to students, and (2) exam results alone does not measure the acquisition of new knowledge or new understanding perceived by students. The management therefore suggested that the researcher should consider to replace this item with a more appropriate items to

represent this variable. Therefore, the researcher adapted measurement from Finstad (2010) and the original items are as presented in Table 4.11.

Table 4. 11
Effectiveness Items by Finstad (2010)

No	Items
1	[This system] allows me to accomplish my tasks.
2	I think I would need a system with more features for my tasks.
3	I would not need to supplement [this system] with an additional one.
4	[This system's] capabilities would not meet my requirements.

Since little is known about the effectiveness items to measure flipped classroom, therefore these items have been adapted to represent the effectiveness variable. The finalized items for this variable are being presented in Table 4.12.

Table 4. 12
The Final Items Representing Effectiveness for This Study

No	Items
1	Flipped classroom allow me to complete tasks related to ENT300
2	I believe I became more productive in flipped classroom for ENT300
3	It is easy for me to adapt to flipped classroom for ENT300
4	Flipped classroom meets my study requirements for ENT300

4.1.2.6 Pilot Study

Scholars such as Van Teijlingen and Hundley (2001) claimed that pilot study is an important elements to ensure the success of good research. These researchers further explained that even though pilot study is not an assurance of a success of the study, it serves as a screening of the issues and anticipated problems that may arise in the main study.

As for this study, the researcher conducted a pilot study on 14th to 15th December 2014. The inclusion criteria for this exercise was similar with the sample frame identified for the main study. The respondents were the final semester students who have completed the Fundamental of Entrepreneurship (ENT300) subjects in previous semester. The main objective of this pilot study was to access the feasibility of the primary data collection in the main research. Apart from that, this pilot study would also be used to (1) access the adequacy of research measurement, (2) assess if the research protocol is workable, (3) determine the resources required for the main study, and (4) identified the logistical problems that may arise in the main research.

Prior to conducting the pilot study, the questionnaires were reviewed by a professor, one senior lecturer, and three students who have experienced with similar setting. The changes had been made in accordance to the comments received to improve the content validity.

Once the pilot study was completed, the result was presented to the management of the university. Some issues related to the study were discussed and some adjustments were required to conform to the regulations of the university. Also, the management has been informed about the adequacy of research measurement, the research protocol, the resources required, and identified the other problems that may arise in the main study.

Table 4.13 exhibits the reliability result for the pilot test. The management raised some issues related with the measurement for efficiency and effectiveness, where some limitation may occur due to the items presented. In this regard, the researcher was advised to change the suitable measurement to overcome the limitation highlighted by

the university. Finally, there were five (5) variables involved in the main study. The result from pilot test reveals that the reliability for all variables are above 0.7 thus it is sufficient for further analysis (Peterson, 1994).

Table 4. 13
Reliability Result for Pilot Testing and Management Decisions

Variables	Sources	No of Items	Reliability	Management Review and Decision
Satisfaction	Kuo et al., (2014)	5	0.848	Retained
Efficiency	Tullis et al (2012)	1	-	Change to Finstad (2010) with total items = 4 items
Effectiveness	Dixson, (2010)	2	0.749	Change to Finstad (2010) with total items = 4 items
Student Interactions	Kuo et al., (2014)	16	0.877	Retained
Student Engagement	Dixson, (2010)	8	0.834	Retained

4.1.2.7 Finalizing Measurement for the Study

After reviewing feedback received from the management, the researcher finalized all measured items that were used later in the quasi experimental and survey for this study. Five variables involved, namely satisfaction, efficiency, effectiveness, student interactions and student engagement with 37 measurement items. Details of sources and measurements and total items involved based on variables are presented in the Table 4.14.

Table 4. 14
Finalized Items for Actual Study

Variables	Sources	No of Items
Satisfaction	Kuo et al. (2014)	5
Efficiency	Finstad (2010)	4
Effectiveness	Finstad (2010)	4
Student Interactions	Kuo et al. (2014)	16
Student Engagement	Dixson (2010)	8
Total Items		37

All items were divided into six main sections, Section A represents demographic information, Section B represents Satisfaction, Section C represents Efficiency, Section D represents Effectiveness, Section D represents Student Interactions and Section E represents Student Engagement.

All items were measured using 6-point Likert scale anchored by '1' as 'strongly disagree', '2' as 'disagree', '3' as somewhat disagree', '4' as somewhat agree', '5' as 'agree' and '6' as strongly agree. The researcher chose 6-point Likert scale in order to avoid the possibilities of response sets due to the odd scale, where respondents are confounded to a particular way of responses independently with the questions asked from the items (Lei Chang, 1994; Rennie, 1982).

4.1.3 Unit of Analysis



Previous researchers pointed out that most of the research in blended learning currently use online learning as a generic criterion for research setting in blended learning (Arbaugh, 2014). However, the impact of blended learning on variables varies depending on the subject, assessments and academic disciplines (Hanson, 2016; Liebert, Mazer, et al., 2016; Lindeman et al., 2015; Morris, 2016; O'Flaherty & Laws, 2014; Wang, 2015; Wanner & Palmer, 2015). Furthermore, previous studies also mentioned that there are limited studies of blended learning that focusing on business management, particularly entrepreneurship education (Arbaugh, 2014; Drysdale et al., 2013; Halverson et al., 2012, 2014). Also, scholars of blended learning highlighted that most of blended learning studies limit LMS as technology utilized in blended learning,

where as there are various social software that can be utilized effectively to facilitate learning activities (Halverson et al., 2012).

Therefore, the researcher identifies the inclusion of population criteria such as, (1) students who enrolled fundamental of entrepreneurship (ENT300) in UiTM Perlis in a particular semester, (2) involved with the i-CREATE instructional model, and (3) using the technologies in the teaching and learning activities (LMS, Facebook, WhatsApp). ENT300 is a university subject where every diploma students must enroll and pass, as one of the requirements of their graduation. I-CREATE is the instructional model that is developed to manage the assessments of ENT300 for UiTM Perlis. Also, i-CREATE includes several technologies (LMS, Facebook, WhatsApp) to facilitate teaching and learning of ENT300 in this university. This study was conducted in UiTM Perlis and no other campuses of UiTM because only UiTM Perlis is using i-CREATE as the instructional model (that systematically include the elements of blended learning) for this subject.

This study was conducted in two stages. The researcher used quasi experimental method for the first stage and survey for the second stage of data collection. These two methods of data collections require different method sampling selection, where participants represent sample quasi-experimental and respondents represents sample for survey.

The aim of the first objective is to investigate a significant difference between groups in student engagement, student interactions and quality of use in blended learning using flipped classroom. At this stage, the researcher tested impacts of blended learning

exposure to the studies variable. Hence, for this stage, data were collected using quasi experimental. However, quasi experimental design must conform with three namely, (1) study must consist of two comparison groups, one of which receives the experimental condition (e.g., treatment or intervention) and named the experimental group which the other receives no treatment or intervention, named as control group, (2) random assignment to the two (or more) comparison groups, (3) assessment of change in the dependent variable for both groups after the experimental condition has been received. Also, this research design must comply with the internal validity issues such as selection, where participants of this study have similar experience with flipped classroom (homogeneous) to ensure result gained from this study is not effected by their past experience. Hence, for the first stage of data collection, the inclusion criteria were students in semester 6 from Faculty of Business Management (Diploma in Business Studies and Diploma in Banking), who enrolled for ENT300 course for the semester 2015 Session 2 (Dec 2014 to Mar 2015). There were 90 participants for this stage of data collection.

The objective for the second stage of data collections is to examine whether student engagement and student interactions have relationships with quality of use variables (satisfaction, efficiency and effectiveness) in blended learning using flipped classroom. Data for this study were collected using survey. Sample for this study was selected from students who enrolled for ENT300 for the semester June to October 2015. The list of students was derived from Student Information Management System (SIMS), the student information system provided by the university from various programs namely, Diploma in Accountancy, Diploma in Accounting Information Systems, Diploma in

Geomatics Science, Diploma in Geomatics Science (Natural Resources), Diploma in Industrial Chemistry, Diploma in Planting Industry Management, Diploma in Business Studies, Diploma in Banking, Diploma in Computer Science, Diploma in Mathematical Sciences, and Diploma in Sports Studies. The researcher selected sample based on probability sampling. Firstly, the researcher retrieved students' list based on program followed by list of class using cluster sampling. Once the list was retrieved, the researcher used the ratio guideline to identify the sequence of 3rd number for random sampling. The online randomizer was used to generate the sample list based on 1:3 ratio. Finally there were 324 respondents list identified for this stage of data collection.

4.1.4 Timeline of Data Collection

In order to address the objectives of this study, the researcher employed data collection in three (3) different semester. The unit analysis of this study were students who enrolled for ENT300 subject during a specific semester of the data collection time frame and they were involved in i-CREATE instructional model. Data for pilot study, stage one and stage two were collected in three different timeline. This section discusses the participants and timeline of data collection for this study.

As mentioned, pilot study was conducted among students who completed ENT300 for the Semester 20152 (June to October 2014). These students were in Semester 6 Diploma in Mathematical Science from Faculty of Computer and Mathematical Science. For the stage one of data collection, data were obtained from students who enrolled for ENT300 for the Semester 20154 (December to April 2015). Students from Semester six Diploma in Business Studies and Diploma in Banking were selected as

the subjects representing the control groups and the treatment groups. Finally, for stage two of data collection, data were collected using survey method. Participants for this stage were students from all faculties in UiTM Perlis. Questionnaires were distributed in week 11 of the semester. Table 4.15 below presents participants and timeline of data collection for this study.

Table 4. 15
Participants and Timeline of Data Collection

Methods of Data Collection	Semester	Time of Data Collection	Participants
Pilot Study	Semester 20152 (June to October 2014)	Week 2 Semester 20152	Diploma in Mathematical Science
Stage One	Semester 20154	Week 6 – Week 12	Diploma in Business
Quasi-Experimental	(December 2014 to March 2015)	Semester 20154	Studies and Diploma in Banking
Stage Two	Semester 20162 (June to October 2015)	Week 10 – Week 11 Semester 20162	Students from all faculties who enrolled ENT300

Since this study employed two stages of data collection, there were different method of selecting participants for this study. As for the stage one, the participants were selected based on quasi-experimental design as suggested by previous scholars (Baldwin, Berkeljon, & Loewen, 2010; Campbell & Stanley, 1963; Clark & Shadish, 2007). Meanwhile for survey, the sampling frame was derived from Students Information Management System (SIMS) provided by Academic Affair UiTM. The sample was selected based on faculties followed by simple random sampling.

4.1.5 Approvals, Consents and Ethical Considerations

Prior to starting this study, the researcher informed the authorities of UiTM about the study, which consists of the Dean of Faculty of Business Management from UiTM, the Assistant Rector (Academic Affair) and the Head of Department Faculty of Business Management in UiTM Perlis. The timeline and procedures for data collection activities that comprised of pilot study, quasi-experimental and survey from December 2014 to September 2015 were presented to them.

Several concerns had been highlighted by the management. These include: (1) The researcher must ensure that every activities that involved with this study conformed to the academic rules and regulations provided by the university, (2) the performance of the students were not affected, (3) students who participated in this study must be informed about the activities, (4) participations were voluntary, and (5) data collected must be treated confidentially. Details of procedures for quasi-experimental and survey are discussed further in section 4.4 and section 4.5 respectively.

4.2 Research Design for Stage 1: Quasi Experimental

The first stage of this study was conducted to address the first objective: to investigate a significant difference between groups in quality of use in blended learning using flipped classroom. Five hypotheses tested for this stage. The result of hypotheses are presented in the chapter 5.

This study employed a quasi-experimental, non-randomized, two groups with post-test design. The researchers' assigned one group as treatment group (blended learners) and

another group as control group (web facilitated learners). This experiment was conducted from week 6 to week 12 (19th January to 6th March 2015) for the semester December 2014 to March 2015.

In this section, the researcher explains the selection of participants, validity issues, treatments, procedures and method of data analysis for quasi-experimental.

4.2.1 Selection of Participants

Previous scholars used experimental method when the aim of the study require the explanation of cause and effect related to variables used for study. In this method, researchers will control the situation so that it is free of the influence by extraneous variables because it will affect the validity of the result (Creswell, 2014). Normally, experimental is conducted using random selection of participants, however if there is a limitation related to this matter such as in education, researchers are allowed to use the intact classes without considering the randomized assignment (Clark & Shadish, 2007; Zamri & Shaari, 2009). However, the intact classes selected must be indifferent at the beginning of the study, hence researchers must ensure that the participants in these classes must be homogenous (Creswell, 2014).

Therefore for this study, several criteria have been determined to ensure the homogeneity between groups. The inclusion criteria for this study were students in semester 6 from Faculty of Business Management (Diploma in Business Studies and Diploma in Banking). These students have enrolled for ENT300 course for the semester 2015 Session 2 (Dec 2014 to Mar 2015). 90 students were involved in this study. 47 of

them were assigned as web facilitated learners and the remaining of the students (43 students) were assigned as blended learners. Prior to conducting this study, the respective students and instructors were gathered for a briefing session about the activities of the experimental process. The session also highlighted the different implementation methods of delivery control group and treatment group. This briefing session was important in order to avoid misunderstanding among students about the treatments they received at a different timeframe for similar subject. At the end, students were informed that participation in this study was voluntarily.

4.2.2 Validity Issues in Quasi Experiment

In the experiment design, the researcher examined the cause and effect among variables used in the study, where changing in cause or observe variable will effect on the response variable (Creswell, 2012). This section discusses about the validity issues related with quasi experimental and the actions the researcher had taken to handle this issue.

In experimentation research, scholars such as Kumar, Abdul_Talib, and Ramayah (2013) suggest that the researchers must abide with the stages of experimentation to ensure its validity. Three stages are involved, namely (1) the researcher must control the extraneous or cofounded factors that might contaminate the result of the study, (2) the researcher must identify the control factor and being able to manipulate this factor, and (3) the researcher must be able to measure the responsive variables after the control variable has been manipulated.

During the experimental stage, the researcher carefully set up the environment to abide by the stages proposed by previous researches. The participants were from semester six students of Diploma in Business Studies and Diploma in Banking. These Students were chosen because 70% of their subjects in their study plan are similar. Additionally, four groups were involved namely a treatment group (1 group Diploma in Business Studies and 1 group of Diploma in Banking Studies) and a control group (1 group Diploma in Business Studies and 1 group of Diploma in Banking Studies). A precedent study was applied prior to the experimentation stage to ensure that groups selected for this study were homogeneous. Data for precedent study were gathered from Student Integrated Information System provided by the university. Data involved were, (1) current semester must be students of semester six from Diploma in Business Studies and Diploma in Banking, (2) completion of pre-requisite subjects for ENT300 (Fundamental of Marketing, Fundamental of Management, Financial Management, Human Resource Management and Operation Management), and (3) Bumiputra Status. From the information gathered, all students were semester six from Diploma in Business Studies and Diploma in Banking, completed pre-requisite subjects for ENT300, and Bumiputra status.

The second stage of experimentation is that the researcher must be able to identify the control variable and able to manipulate this variable. For this study, the researcher had chosen student engagement, student interactions, satisfaction, efficiency and effectiveness as control variables, whereas the length of online interactions as manipulated variable. The hours exposed were calculated based on student learning

time (SLT) provided by the university. The interactions were made through several platforms which are Learning Management System (LMS), Facebook, and WhatsApp.

During the third stage, the researcher must be able to measure the responsive variables after the control variable has been manipulated. As for that, the researcher used adapted measurements for satisfaction (Kuo et al., 2014), efficiency (Finstad, 2010), effectiveness (Finstad, 2010), student interactions (Kuo et al., 2014)) and student engagement (Dixson, 2010). The description of the stages for experimentation and action taken are presented in the Table 4.16.

Table 4. 16

Stages for Valid Experimentation as Suggested by Kumar, Abdul_Talib, & Ramayah (2013)

Stages	Description	Actions taken
1	Control the contaminating factors	Respondents were selected from Semester 6 students of Diploma in Business Studies and Diploma in Banking. Two groups namely the treatment group and control group had been identified. Precedent study has been conducted to ensure the groups selected for this study were homogenous.
2	Manipulate the cause factor	Length of time exposed to online interaction in blended learning was used as the cause factor. This variable will be manipulated and the effect to the studied variables will be observed.
3	Measure the changes in the response variable	Changes of the response variables, student engagement, student interactions, satisfaction, efficiency and effectiveness were measured by recording the scores for treatment group and control group.

In experimentation, the researcher also need to carefully design the research so that the inferences derived from this study are the true reflection of the situation. Since experimentation require the researcher to control the environment and the setting,

therefore the validity threats requires attention from the researcher that can change the inferences derived from this experiment exercise.

The researcher like Creswell (2012) highlighted four types of validity issues that need to be considered by the researcher in preparing the experimentation for this study. Those validity threats are (1) statistical conclusion validity, (2) construct validity, (3) internal validity and (4) external validity. The following discussion will explain about how the researcher handled the threat of validity issues in this stage of this study.

For the first issue related to the statistical conclusion validity, the researcher use the independent sample t-test for parametric by confirming the assumptions as highlighted by Pallant (2010). As for the second issue related to the construct validity, the researcher had carefully selected the measurement from previous scholars. Where the final items for measurement were decided based on the pilot study. The result of reliability exhibits that all items appears to be reliable.

Another important validity issue is threat to internal validity. Creswell (2012) identified 12 types of internal validity that can be divided into three categories namely, participants, treatments and procedures. There are six type of threats of internal validity related to participants which are history, maturation, regression, selection, mortality and interaction with selections.

History. History effect refers to the additional event that may occur between the start and the end date of the experimentation. This event may influence the outcome of the study. As for this study, the researcher designed the activities related with teaching and learning based on the scheme of work for ENT300 in accordance to the academic

calendar for December 2014 to April 2015. These activities have been presented and approved by the university committee. Once the committee approved, the planning had been presented to the groups (control and treatment) that involved with this study. Since the experimentation was conducted in the same semester, therefore the history effect can be eliminated for this study.

Maturation. Maturation effect refers to the situation where the cause and effect relationship is contaminated by the effect of the passage of time. This study was conducted in 7 weeks in a particular semester of one academic calendar. Therefore the effect of passage of time is eliminated. The passage of time related to this study refers to the knowledge that students may acquire during their studies in a particular semester. However, the experimentation timeline started from the 6th week until 12th week of the academic calendar. During this time, students were busy completing their assignments, hence interaction among students between groups were minimal. In experimentation, less interactions between students from treatment and control group contribute to less contamination of maturation effect to the outcome of the study.

Regression. Normally scores recorded from individuals will regress toward the mean over time. Hence, choosing an extreme score for selection of participants may influence the outcome of the study. One of the ways to reduce this problem is to eliminate those who have extreme score from participating in the experiment.

Selection. There are possibility that people factors have an effect on the study, such as the experience participants may have prior to the setting of the experiments. As for this study, the researcher chose final semester students from Faculty of Business

Management, thus all of these students already have similar exposure on blended learning. Besides, the precedent test had been conducted to confirm homogeneity.

Mortality. Mortality effect refers to the dropped out during the experimentation. As for this study, the researcher started at the Week 6 of the academic calendar, because by Week 5 students must validate their subjects. Once validation process was completed, students must take and complete all registered subjects for the semester, hence the mortality effect could be eliminated.

Interaction with selections. Interaction with selections refers to the condition where the threats of internal validity (history, maturation, regression and mortality) have interact with selection of participants of the experiment. For this study, the experiment was conducted during week 6 to week 12 of one academic calendar, hence the issue of interactions between history, maturation, regression and mortality toward selection of participants could be reduced.

The second category of internal validity is related to the treatments. There are four concerns related to treatments namely diffusion of treatments, compensatory equalization, compensatory rivalry, and resentful demoralization.

Diffusion of treatments. Diffusion of treatments refer to a situation between control groups and treatments groups, where these group must be separated as much as possible. As for this study, the diffusion of treatments between groups were controlled based on the tutorial classes. Tutorial face to face classes were conducted at different time and Facebook groups created differently for interactions between student-student, student-content and student-instructor. These approaches were used as the researcher

believed it was easier for her to control the diffusion of treatments between groups and information shared are different from one group to another.

Compensatory equalization. The experimental treatment must be equally distributed among groups, hence the group that involved may gain benefit from the treatment. In order to apply this situation, the researcher used two groups namely the treatment group and the control group in order to differentiate if the treatment had impacts on the students.

Compensatory rivalry. Compensatory rivalry refers to the conditions where the control group feel like they are left behind and try hard to perform at their best. As for that, the researcher reduced this threat by ensuring that groups are not aware of the treatments received through online interactions. Besides, all groups received similar information and the only difference was the modality of students in getting the information. The control group received information from traditional classroom, while the treatment group received it through online interactions.

Resentful demoralization. One of the challenges faced by experimentation process is that the participants in the control group faced demoralization because they assumed that their group was not being treated equally as the treatment groups. As for that, the treatment given to the treatment group had been replicated to the control group after the duration of experimentation, to ensure their understanding prior to final examination.

The last category of threat of internal validity is the threat that related with procedures, which are testing and instrumentation.

Testing. Testing effects relate with the possibilities that the participants are familiar with the questions if the testing need to be conducted more than one time. However, for this study, the testing was conducted using post-test, therefore the testing effect is not relevant to this study.

Instrumentation. This effect due to the changes of the instrument over times. As for this study, only one post-test had been conducted, therefore the effect of changes of instrumentation was avoided. Furthermore, the measurement for this study had been finalized through pilot study.

Experimentation is also exposed to the threats of external validity. Threat to external validity involved with generalization of this study. There are three threats of external validity: (1) interaction of selection and treatment, (2) interaction of setting and treatment, and (3) interaction of history and treatment. Firstly, interaction of selection and treatment refers to inability to generalize beyond the groups in the experiment. Secondly the interaction of setting and treatment refer to an inability to generalize from the setting where the experiment conducted and replicated it to another setting in another study. Lastly, interaction of history and treatment happens when the researcher tries to generalize findings to past and future situations. The researcher understands these restrictions in experimentation. Because of that, the researcher continued this experimentation with a survey as the second stage of the whole study to cater the issue of generalization on treatment, setting and replication of this study.

4.2.3 Treatments

This study combines several platforms (applications) to facilitate online interactions in blended learning environment namely, learning management system (i-Learn), social network site (Facebook), and mobile application (WhatsApp) to encourage student interactions among contents, students and instructors.

For quasi-experimental, the researcher used the exposure of online interactions as the manipulated variable. This interaction consists of three dimensions namely; (1) student-student interaction, (2) student-instructor interaction and (3) student-content interaction.

In student-student interactions, it is impossible for instructor to trace one individual student to another student who interacted regarding this subject. However, through Facebook page, the researcher found several conversations that reflect student-student interaction. One student asked the instructor about ways to determine the retail price for their product. Before the instructor was able to address this issue, their classmate have started to point out another issues that need to be considered prior to determine the suitable price for their product. Their discussions were based on the knowledge from their face-to-face class. Figure 4.1 also includes the translation of the discussion among students.

The second type of interaction is student-instructor interactions. For this interaction, the researcher categorized into (1) one-to-many interaction that refers to interaction between an instructor with many students, (2) one-to-one interaction that refers to

interaction between an instructor with one student and (3) dissemination of information such as announcements.



Nijera Amira
January 20

Madam kalu nk markup harga lbh mahal dr pasaran xpa kan? sbb kami 1st mover gel wash herbs. blh kan?

Like Comment

Fariza Husna, Hanisah Halim and 2 others like this. Seen by 17

Nur Dayana Rosli Klu kita mark up blh.. x jadi mahal sgt ke.. sbb kita kn jual dkat retailer n wholesaler... bkan ker nanti diaorang akan markup lagi harge tu

January 20 at 5:30pm Like 1

Nijera Amira Sbb substitute competitors price rm 19.90 so kitaorg igt nk mark up tgg skit. berbaloi dgn ingredient yg kitaorg letak dlm produk

January 20 at 5:33pm Like

Bia Zulkifli n..kami shower gel..ingredient dia byk lg

January 20 at 5:40pm Like 1

Bia Zulkifli bukn la markup byk.. skit ja dr yg asal

January 20 at 5:41pm Like 1

Nur Dayana Rosli Ouhh.. but la..try kira mom yg madam ckap dlm klas tdi.. kak bia punya total suma brapa.. lpas target madam tdi

January 20 at 5:44pm Like 1

Bia Zulkifli 1.2m

January 20 at 5:44pm Like 1

Student 1: *Madam, kalu nak markup harga lbh mahal dr psaran xpa kan?... sbb kami 1st mover gel wash herbs.. blh kan?*

(Madam, is it okay if we decide to mark-up our price higher than market price?.. because we have first mover advantage. We can, right?)

Student 2: *Klu kita mark up lbih.. x jadi mahal sgt ke.. sbb kita kn jual dkat retailer n wholeseller.. bkan ker nanti diaorang akan markup lagi harge tu?*

(If we markup at higher price, don't you think our product price will be a little expensive.. because we are selling to retailer and wholeseller.. these intermediaries will mark-up the price more?)

Student 1: *Sbb substitute competitors price RM 19.90 so kitaorg igt nk mark up tgg skit.. berbaloi dgn ingredient yang kitaorg letak dalm produk?*

(Because price of our substitute products is RM19.90, therefore we plan to markup a bit high due to the ingredient we used in this product)

Student 3: *n.. kami shower gel.. ingredient dia byk lg..*

(and.. we produce shower gel.. we use many ingredients in preparing this product)

Student 3: *bukn la markup byk.. skit ja dari asal*

(besides, we do not mark up much.. only a little from our substitute product)

Student 2: *Ouh.. ikut la.. try kira mcm yg madam ckap dlm kelas tdi.. kak bia punya total suma brapa... lpas target madam tadi?*

(Oh! It is up to you. Try to calculate based on what madam had discussed in class. By the way, what is your total population? Has the total achieve the value madam mentioned in class?)

Student 3: *1.2m*

(1.2 million)

Figure 4. 2

Example of Student-Student Interactions from Facebook and It's Translation

The student-instructor interaction in Facebook exhibits in Figure 4.2. This discussion is a continuous discussion from Figure 4.1. At this point, the instructor responded to the student question about the suitable retail price. Student 1 gets confused with the decision to identify the retail price for their product, as their competitors were selling at RM19.90. However, the instructor asked about the section of assignment the student 1 was referring to. The student responded that the section was 6.8.2.1 Cost Based Pricing, the sub-section of price strategy. The instructor guided Student 1 by informing her that, for this sub-section, students must wait for the calculation from Operation section to get the cost per unit, where the calculation for cost based pricing technique must be mark-up based on cost involved in producing one unit of product. Student 1 confirmed her understanding on price for her product.



Figure 4.3
Example of Student-Instructor Interaction from Facebook and It's Translation
Continue

Student 1: *Madam, .. tlg sat.. pasal harga nie..*
(Madam, please help us explaining about price)

Student 1: *dkt luar jual 100 gm sabun buku herba RM19.90?*
(Our competitors selling a unit of herbal soap for RM 19.90)

Instructor: *ni section mana tahn.. bg headline sikit*
(Which section you are referring to?)

Student 1 : *6.8.2.1 cost based pricing.. harge seunit produk kami..*
(6.8.2.1 Cost Based Pricing.. price per unit for our product)

Instructor: *yg tu tunggu sat sampai operation dapat cost per unit*
(for that that section, you must wait until you complete your calculation price per unit in Operation)

Student 1: *uh.. ok.. tapi kalau harga produk kami.. mahal dari yang ada kat pasaran.. xpa kan?*
Naek sikit
(Oh! Okay. But if our product price higher than our competitors' price.. is it okay.. if the price a bit higher)

Instructor : *Ok*
(Okay)

Student 1 : *tq madam*
(Thank you madam)

Instructor : *tapi harga bukan ke nak kira lagi.. kira ok la tu*
(We do not calculate our price yet)

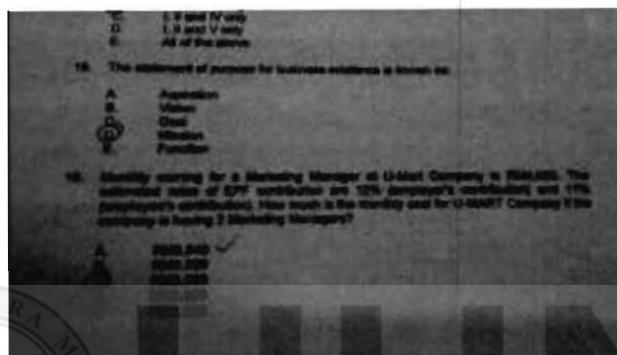
Figure 4.3 (Continued)

Example of Student-Instructor Interaction from Facebook and its Translation

The above conversation clearly indicated that sometimes students just require some clarification from instructor for clarity in order to proceed with their assignments. This simple instruction and confirmation from instructor in responding to their problems increased students' understanding in preparing their assignments, thus translate to a better performance in their study.

Most of the time, student used WhatsApp for personal communication between instructor and student. Figure 4.3 is an example of student interaction using WhatsApp. This student contacted the instructor about the monthly cost of a company based on an EPF contribution given that there are two marketing managers. She got confused because her calculation gave different answer as compared to her friends' answer. Details of conversation as in the Figure 4.3

30/3/15 11:16 : +60 17-537 1561: Salam
 30/3/15 11:16 : +60 17-537 1561: Madam, ni atika dari group a
 (Madam, I am Atika from Group A)
 30/3/15 11:16 : Noraini NH: Salam to u too
 (Salam to you too)
 30/3/15 11:16 : Noraini NH: Yup.. wassap?
 (Yes, anything?)
 30/3/15 11:17 : +60 17-537 1561: Nak tanya kalau pengiraan EPF untuk marketing manager tak
 payah tambah caruman pekerja ke?
 (I want to ask about the calculation for EPF for Marketing Manager, do I need to
 include employee contribution to the calculation?)
 30/3/15 11:18 : +60 17-537 1561: Dia just tambah caruman majikan je
 (Just add empoyer contribution only?)
 30/3/15 11:18 : Noraini NH: Ikut la awak nak kira apa?
 (It depends on what do you want to caculate?)



30/3/15 11:18 : +60 17-537 1561: Saya kira dapat a, tp diorang cakap jawapan c
 (I calculate my answer is A, but my friend said the answer is C)
 30/3/15 11:20 : Noraini NH: 8960
 (The answer should be RM8960)
 30/3/15 11:20 : Noraini NH: Y?
 (Why?)
 30/3/15 11:20 : Noraini NH: Naper awak kira dapat A
 (How do you calculate to get A as your answer?)
 30/3/15 11:22 : +60 17-537 1561: Saya tambah caruman pekerja dan majikan sekali. $440+480= 920$.
 Tambah gaji 4000, total 4920. Then saya darab 2
 (I add employee contribution and employer contribution together: RM440+RM480
 = RM920. Plus salary RM4000, therefore total RM4920. Then multiply by 2 (2
 managers))
 30/3/15 11:24 : Noraini NH: Nope.. naper tambah caruman pekerja. Soalan tanya cost to company
 (No. Why should you add employee contribution. The question is about the cost to
 the company)
 30/3/15 11:26 : Noraini NH: Caruman pekerja ditolak dari gaji pekerja. Caruman majikan tambahan
 yang majikan kena buat. Jadi costnya gaji + caruman majikan
 (Employee contribution was deducted from the employee's salary. Only employer
 contribution and employees' salary are considered as cost to the company)

Figure 4. 4
Example of Student-Instructor Interaction from WhatsApp and It's Translation
 Continue

30/3/15 11:28 : +60 17-537 1561: Oh kira nya kalau dia tanya cost to employee baru tambah dua2, xperasan company tu
(Oh.. meaning if the question ask to calculate cost to employee only add employees' contribution. I overlooked about information related to the company)

30/3/15 11:28 : Noraini NH: Haaaa.... tu la x baca soalan btul2..
(You need to be careful when reading exam questions)

30/3/15 11:29 : +60 17-537 1561: Baik madam. Takuttt
(Yes Madam. I am so afraid about the exam)

30/3/15 11:29 : Noraini NH: Ala.. ok.. in sha allah.. baca soalan btul2
(It is okay, just read the questions carefully)

30/3/15 11:30 : +60 17-537 1561: Baik madam
(Yes madam)

30/3/15 11:31 : Noraini NH: Good luck..

30/3/15 11:32 : +60 17-537 1561: Tq madam.
(Thank you madam)

Figure 4.3 (Continued)

Example of Student-Instructor Interaction from WhatsApp and It's Translation

Third type of student-instructor interaction was about the dissemination of information from an instructor to students. Figure 4.4 is the illustration of reminders for students about the submission deadline and the folder they need to submit with their documents. By having these reminder, the students are reminded about the important date for submissions or other information related to this subject for the respective groups.

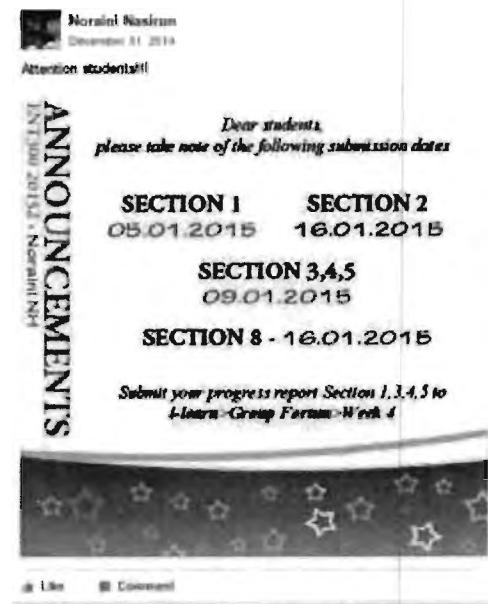


Figure 4.5

Example of Student-Instructor Interaction : Dissemination of Information from Instructor

The last type of student interactions is student-content interaction. The main reference of the content for this subject is the Learning Management System (LMS) known as i-Learn, provided by the university. Since this subject was registered as a blended learning for a particular instructor, the instructor will receive notification about the performance of instructor every time she logged in the system. Figure 4.5 presents the notification from the system related to the subject registered with the blended learning. These instructor has been registered as blended learning instructor since 2013. The notification involved details related with the file uploaded, forum involved, or any activities related to the subject.

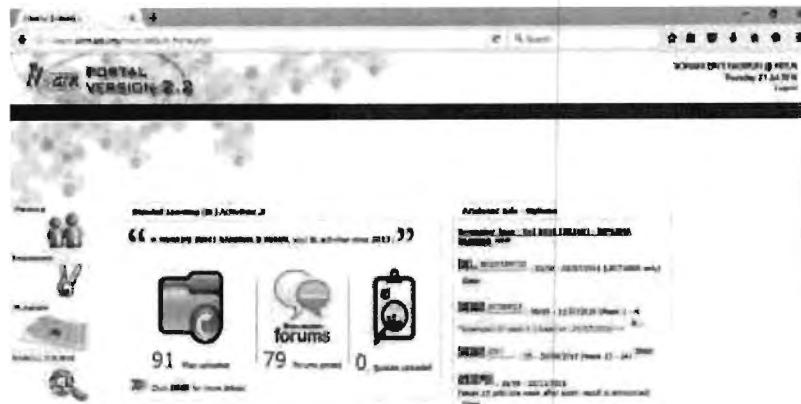


Figure 4.6
Notification Received by Instructor Who Registered for Blended Learning

In the course content, the instructor is allocated space to upload information related to the subject such as power point slide (PPT slide), course outline (scheme of work and guideline about the subject), guideline about preparing the assignment (Abstract, BP (Business Plan) outline template, Financial (FIN)), information about presentation (iCreate Feb 2015, iCreate Mar 2015) and results of presentation. By having this workspace, students can get access to the information needed to assist them in their study for the whole semester. Figure 4.6 exhibit Content Provided by Instructor for Fundamentals of Entrepreneurship in i-Learn.

At the same time the social site network (Facebook) was used as a complement to LMS. For example in Figure 4.7, the student submitted their progress report to Facebook due to the connection problems with LMS.

Figure 4.7
Content Provided by Instructor for Fundamentals of Entrepreneurship in i-Learn

Universiti Utara Malaysia

Amin Ahmad
January 5

madam Noraini Nasirun ...sorry saya tersubmit 2 file ke team. saya upload
kat sini as backup tq

Like Comment

Affizan Zaharudin likes this. Seen by 25

Noraini Nasirun ok.. no problem
January 5 at 9:27 am · Like

Amin Ahmad Ok madam.. thanks
January 5 at 11:01 am · Like

Write a comment...

Amin Ahmad uploaded a file
January 5

Document

Download Preview Upload Revision

Like Comment

Seen by 25

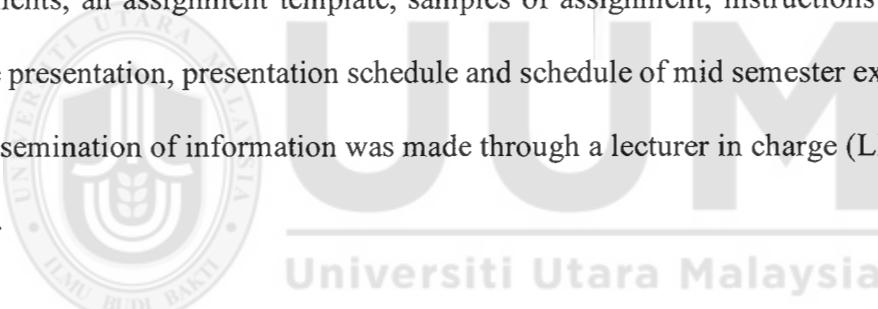
Write a comment...

Figure 4.8
Example of Student-Instructor Interaction : Information from Student

This section has elaborated the types of interaction between student-student, student-instructor and student-content. These interactions provided multiple ways for student's interactions in blended learning through flipped classroom approach.

4.2.4 Procedures and Data Collection

Students in the flipped classroom (control group and treatment group) accessed online contents provided by the instructors from i-Learn (Learning Management System). The online contents uploaded were scheme of work (SOW), a document that highlighted activities related to this subject for 14 weeks, lecture notes, a guideline to prepare assignments, an assignment template, samples of assignment, instructions on how to prepare presentation, presentation schedule and schedule of mid semester examination. The dissemination of information was made through a lecturer in charge (LIC) for this subject.



This stage focused on the differences between the treatment group (blended learners) and the control group (web facilitated learners) in 'quality of use' in blended learning based on different online exposure to the respective students. For both classes, number of hours exposed are differed based on the Equation 4.1. Number of online interactions based for blended learners' class was 43% and web facilitates' class was 15%. The online interactions were calculated based on the intervention made during the treatment timeline.

For both classes, lectures of two hours per week were conducted in the face-to-face mode. Only some of tutorial classes were conducted using online classes. Up to week

5, all lectures and tutorials were conducted using face-to-face mode. Students only visited i-Learn to get information related to this subject. The quasi experimental started in week 6 in order to avoid mortality effect, such as students withdrawing themselves from participating in the study before the study end.

In week 6, a precedent test (homogeneity test) was conducted to gain the information about the homogeneity of groups to avoid selection bias effect. The experimental briefing was conducted to ensure students and instructors understand the importance to strictly follow the procedure related to this study, in order to avoid the contamination effect to the results. At the same time instructor who involved in blended learners' class started to prepare a Facebook page in order to facilitate the flipped classroom activities.

All classes were conducted using face-to-face mode for both classes.

The intervention for online discussion started at week 7, for the treatment group. While the tutorial class for control group was conducted using a traditional face to face mode. The topic discussed was based on scheme of work provided by lecturer in charge. The reason behind this setting was to observe and record student interactions based on different mode. The researcher observed the intensity of discussion made online and during face to face session, the understanding of concepts in entrepreneurship and their progress in completing their business plan.

In week 8, tutorial for both classes was conducted using face-to-face mode because the researcher believed that students in the treatment group need time to adapt themselves to the new way of learning. These students must have the sense of belonging, even though with the absence of the face to face interactions with their instructor.

The second intervention for online discussion applied in the week 9, for the treatment group. The tutorial class for control group was conducted using a traditional face to face mode. Once again, the researcher observed the intensity of discussion made online and during face to face session, the understanding of concepts in entrepreneurship and their progress in completing their business plan.

In week 10, tutorials were conducted using face-to-face discussion for each assignment's groups and online discussion. In week 11, tutorial classes were conducted using online discussion and the dissemination of information about the presentation were made through i-learn. Presentations were conducted in a parallel session.

A post- test measurement, that consists of 37 items were distributed at the end of face-to-face tutorial class for blended learners group and web facilitated group in week 12.

Details of activities of flipped classroom for this stage is presented in Table 4.17.

Table 4. 17
Activities of Flipped Classroom in Quasi Experimental

Week	Descriptions	Activities	
		Treatment Group (Blended Learners)	Control Group (Web Facilitated)
1 to 5	Class list was finalized after Week 5 Tutorial class for both groups was conducted in face-to-face class	Registration and add-drop session tutorial Face-to-face class	
6	Precedent test measured using background information. Tutorial class for both groups were conducted in face-to-face class		Experimental briefing & precedent test tutorial in Face-to-face class
7	Tutorial class were conducted differently between groups	Tutorial using online discussion (1 hour)	Tutorial in Face-to-face mode (1 hour)
8	Tutorial class for both groups were conducted using face-to-face mode		Tutorial in face-to-face mode
9	Tutorial class were conducted differently between groups	Tutorial using online discussion (1 hour)	Tutorial in face-to-face mode (1 hour)

Continue

Table 4. 17 (Continued)
Activities of Flipped Classroom in Quasi Experimental

Week	Descriptions	Activities	
		Treatment Group (Blended Learners)	Control Group (Web Facilitated)
10	Tutorial class for both groups were conducted using consultation face-to-face (20 minutes for each assignment group) and online discussion for both groups	Tutorial using consultation and online discussion (3 hours)	
11	Presentation of business plan were conducted centralized for ENT300 students enrolled for this semester.	Online discussion and presentation of business plan (3 hours)	
12	Post-test was employed using similar measurement that has been finalized by the researcher. Tutorial class for both groups were conducted using face-to-face mode	Post-test tutorial in face-to-face mode	

4.2.5 Method of Data Analysis

All data collected were coded in SPSS. A preliminary analysis was conducted in order to ensure that the results obtained were valid. The preliminary analysis include screening for missing values, univariate outliers, multivariate outliers, normality, and multicollinearity. Later, a comparison of descriptive analysis between groups were conducted in order to obtain the mean and standard deviation values for items and variables measured. In order to test hypotheses formulated earlier, the researcher compared the significant difference between two groups using independent t-test. Effect size for all variables was also presented. Details of the result will be explained in Chapter 5.

4.3 Research Design for Stage 2: Survey

The second stage of this study was conducted to address the second objective: to develop a model for quality of use measurement in blended learning using flipped classroom. Ten hypotheses tested for this stage. The result of hypotheses are presented in the chapter 5.

For the second stage of this study, the researcher employs a cross-sectional study to evaluate the blended learning structure that was designed for the ENT300 subject as suggested by Creswell (2014). This survey was conducted in the week 10 to week 11 (24th July to 04th August 2015) for the semester June to October 2015.

In this section, the researcher also presents the sampling selection, the student interactions in the ENT300 flipped Classroom, data collection and method of data analysis.

4.3.1 Selection of Respondents

Sample for this study was selected from students who enrolled for ENT300 for the semester June to October 2015. The list of students was derived from Student Information Management System (SIMS), the student information system provided by the university. There were 899 students who enrolled for that semester and participated in the i-CREATE module for this subject. These students were diploma students from various programs namely, Diploma in Accountancy, Diploma in Accounting Information Systems, Diploma in Geomatics Science, Diploma in Geomatics Science (Natural Resources), Diploma in Industrial Chemistry, Diploma in Planting Industry

Management, Diploma in Business Studies, Diploma in Banking, Diploma in Computer Science, Diploma in Mathematical Sciences, and Diploma in Sports Studies. Number of students that involved was decided based on the schedule suggested by Krejcie and Morgan (1970). For the total population of 899, thus 269 sample size was required to represent this population (for 900 samples). The total number of sample represents by 1:3 ratio, thus the researcher used this ratio as the guideline for random sampling.

The researcher selected sample based on probability sampling. Firstly, the researcher retrieved students' list based on program followed by list of class using cluster sampling. Once the list was retrieved, the researcher used the ratio guideline to identify the sequence of 3rd number for random sampling. The researcher used online randomizer to generate the sample list based on 1:3 ratio. Finally there were 324 list of respondent generated to represent seven programs for this study.

4.3.2 Student Interactions in ENT300 Flipped Classroom

Student interactions in the ENT300 flipped classroom for this semester refers to the three dimensions namely; (1) student-student interaction, (2) student-instructor interaction and (3) student-content interaction. However, for this stage, the online exposure was approximately from 7% to 10% (3 hours to 4 hours) made through Learning Management System.

Figure 4.8 exhibits the information about the list of content provided by the instructor through LMS, list of content, checklist presentation, template and instruction to

students. Figure 4.9 presents the instruction on presentation for ENT300. By having this information, students were aware of the preparation for the presentations.

AKRANI BINTI HASRUL @ HIRLI
Tuesday 25.4.2016
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PORTAL VERSION 2.2

myCourses > FUNDAMENTALS OF ENTREPRENEURSHIP (ENT300)

ENT300 > List of Course Content (ENT300)

LOCATION: ENT300 > SYAZWANI YA (PERLIS)

View

1. PRESENTATION MATERIALS

2. CREDIT PRESENTATION

3. TUTORIAL

4. INSTRUCTION FOR STUDENT

Members

Print

Print Preview

Print

INSTRUCTION FOR STUDENT

INSTRUCTION FOR STUDENTS

PREPARATION

1. Poster

Each group must present your project using e-poster presentation (soft copy). Only one (1) page poster will be used for presentation. For poster details, please refer to i-CREATE template.

However, students are advised to prepare one (1) printed poster as the

Figure 4. 9
List of Content Provided by Instructor for Fundamentals of Entrepreneurship in i-Learn

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Tuesday 25.4.2016
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PORTAL VERSION 2.2

myCourses > FUNDAMENTALS OF ENTREPRENEURSHIP (ENT300)

ENT300 > View Content (5)

LOCATION: ENT300 > SYAZWANI YA (PERLIS) > INSTRUCTION FOR STUDENT

INSTRUCTION FOR STUDENTS

PREPARATION

1. Poster

Each group must present your project using e-poster presentation (soft copy). Only one (1) page poster will be used for presentation. For poster details, please refer to i-CREATE template.

However, students are advised to prepare one (1) printed poster as the

Figure 4. 10
Sample Content Provided by Instructor for Fundamentals of Entrepreneurship in i-Learn

4.3.3 Data Collection

This study was conducted to address the second research objective, to develop a model for quality of use measurement in blended learning using flipped classroom. Data were collected from week 10 to week 11 (24th July to 04th August 2015) for the semester June to October 2015. This time frame was chosen because the students had completed their assignments and were ready for presentation. Furthermore, this timeline must be aligned with the post-test quasi-experiment in the stage one of data collection.

Questionnaires were administered to the students based on the list generated from Student Information Management System (SIMS). There were 324 students involved in this study. The researcher firstly notified the instructors about this exercise through email. Schedule of data collection was distributed in the Week 8 and presented to the head of department for endorsement. Later the researcher visited the classroom and distributed the questionnaires 15 minutes before the lecture session was over. The researcher did not face any major problems related with data collection.

4.3.4 Method of Data Analysis

All data collected were coded in SPSS. A preliminary analysis was conducted for the second stage of data collection, in order to ensure the results obtained were valid. The preliminary analysis include screening for missing values, univariate outliers, multivariate outliers, normality, and multicollinearity.

The data were then analyzed using SmartPLS. A two steps approach was applied which are measurement model and structural model. During measurement model, three assessments were involved: indicator reliability, internal consistency and validity. Different types of validities were tested, namely convergent validity and discriminant validity. For the assessment of structural model, the steps involved were collinearity, coefficient of determination, structural path coefficient, predictive relevance and effect size. Finally, the mediation test was applied. Details of data analysis is presented in Chapter 5.

4.4 Summary of the Chapter

This chapter focuses on the research methodology applied in order to answer the research questions. This study was conducted in two stages, stage 1 using quasi-experimental, while the second part of the study was conducted using survey. The research design for both stages also discussed. Finally, this chapter outlined the method of data analysis to answer hypotheses formulated earlier.

CHAPTER FIVE **DATA ANALYSIS AND FINDINGS**

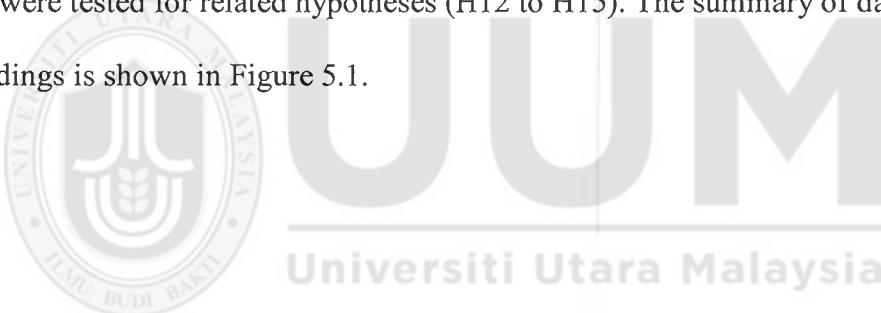
5.1 Introduction

This chapter discusses about the data analysis and findings of this study. There are five variables involved in this study, namely satisfaction, efficiency, effectiveness, student interactions and student engagement. This study comprises of two (2) stages of data collection namely stage one that used quasi experimental method and stage two used survey method. The presentation of the data analysis and finding will be made based on these stages of data collection.

For the first stage of data collection, the researcher included the preliminary analysis, profiles of participants, descriptive analysis and hypotheses testing. The preliminary analysis involved are missing value, univariate outlier; multivariate outlier; normality and multicollinearity. The profile of participants exhibits the demographic factors related with the participants who are involved in this study. The descriptive analysis presented are mean and standard deviation for all variables for this study and the comparison of means and standard deviation between group involved, namely blended learners and web facilitated learners. This subsection also exhibits the results of hypotheses testing for this stage (H1 to H5).

Furthermore, the second stage of data collection, consists of this subsection namely, preliminary analysis, profiles of respondents, assessment of models, assessment of measurement model, assessment of structural model and testing mediating effect. The

profile of respondents shows the demographic factors of the respondents. Data were analyzed using SmartPLS3. The assessment model section explains the two types of model assessment involved for data analysis which are assessment of measurement model and assessment of structural model. Assessment of measurement model involved steps related with the reliability and validity issues (indicator of reliability, internal consistency reliability, convergent validity, and discriminant validity). Once the measurement model achieved its reliability and validity, further assessment were conducted. The assessment of structural model involved are multi-collinearity testing, coefficient determination (R^2), model path coefficient (hypotheses testing for H6 to H11), predictive relevance (Q^2) and effect size for r^2 and q^2 . Finally, the mediating effects were tested for related hypotheses (H12 to H15). The summary of data analysis and findings is shown in Figure 5.1.



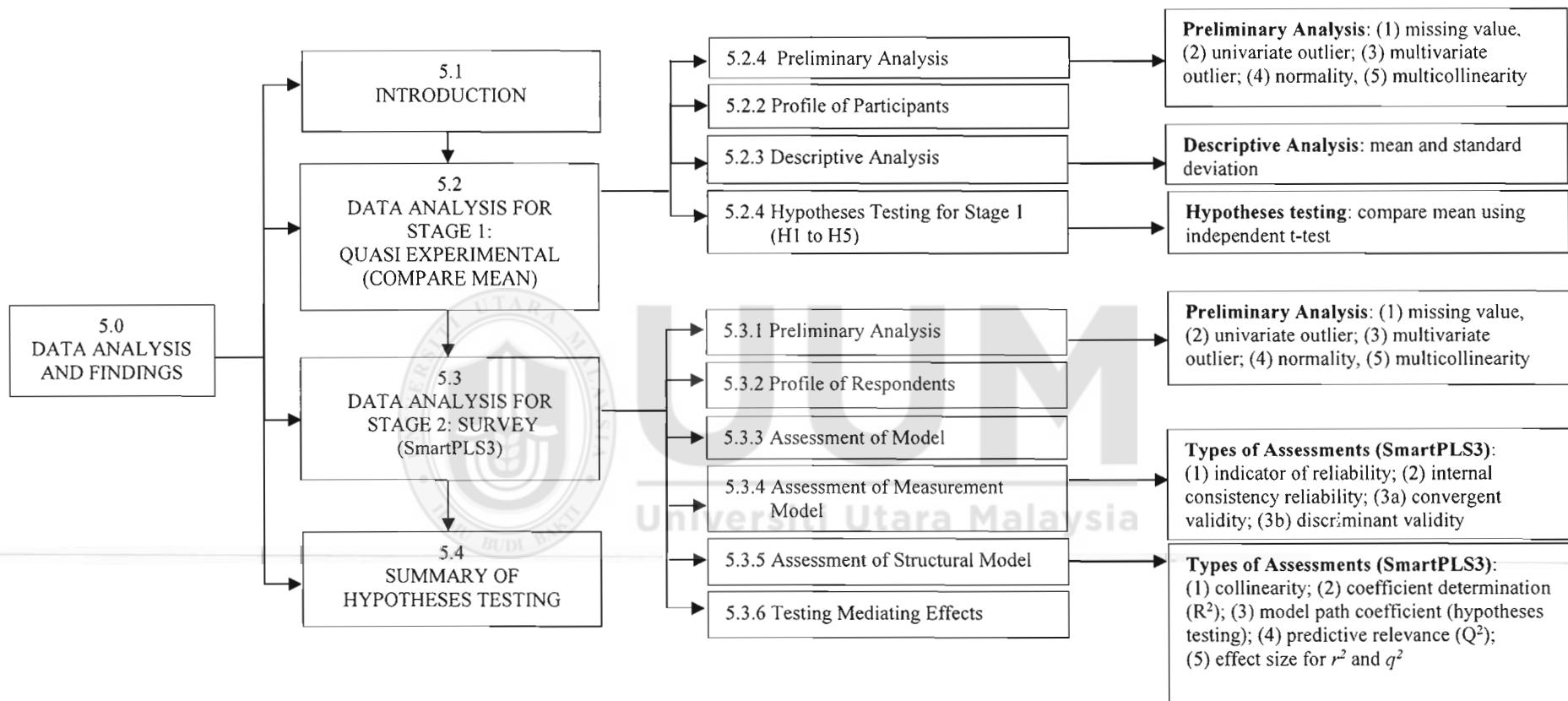


Figure 5.1
Summary of the Data Analysis and Findings

5.2 Data Analysis and Findings for Stage 1: Quasi-Experimental

This section consists of analysis for stage one – quasi experimental. The analysis involved namely, preliminary analysis, profile of participants, descriptive analysis and hypothesis testing.

5.2.1 Preliminary Analysis

A total of 105 student were involved in this stage of data collection. Responses were collected and coded into SPSS. There were no missing value reported for this set of data. The outlier's analysis eliminated a total of 14 cases; 13 cases for univariate outliers and 1 case of multivariate outliers, leaving only 91 cases qualified for further analysis. All variables are normally distributed. The value of variance inflation factors (VIF) of each predictors reported as below 10 indicated that items are free of multicollinearity issue (Hair, Black, Babine, & Anderson, 2010; Sarstedt, Ringle, Smith, Reams, & Hair, 2014).

5.2.2 Profiles of Participants

Table 5.1 presents a profile of respondents for this stage. The result indicates that a majority of participants is female (48%) and all students are 20 years old. A majority of students were from Diploma in Business Studies (54.9%) and majority participants belongs to web facilitated class (52.7%).

Table 5. 1
Profile of Respondents for Quasi Experimental

No	Demographic Factors	Frequency (N)	Percentage (%)
1	Gender		
	Male	20	22.0
	Female	71	78.0
	Total	91	100
2	Age (years old)		
	20	91	100
	Total	91	100
3	Program		
	Diploma in Business Studies (BM111)	50	54.9
	Diploma in Banking (BM112)	41	45.1
	Total	91	100
4	Type of Classroom		
	Blended Learner	43	47.3
	Web Facilitated	48	52.7
	Total	91	100

5.2.3 Descriptive Analysis

Table 5.2 below exhibits descriptive analysis for measurable items of this study by comparing two groups namely blended learner group and web facilitated group. Data for these items were obtained using six point Likert scale ranging from strongly disagree to strongly agree. From the table, it can be seen that mean of all items for blended learner group are higher (4.86 to 5.58) while compared to web facilitated group (4.44 to 5.31) and standard deviation values are lower (0.545 to 0.833) while compared to web facilitated group (0.627 to 1.233). Only one item, which is student engagement1 reported that mean of blended learner group is lower (4.51) as compared to web facilitated group (4.54). However the standard deviation of blended learner group is lower (0.827) than web facilitated group (1.091).

Table 5. 2

Descriptive Analysis for Items in this Study for Blended Learner and Web Facilitated

Model Construct	Measurement Item	Types of Learners			
		Blended Learner (N=43)		Web Facilitated (N=48)	
		Mean	Std Dev	Mean	Std Dev
Satisfaction	Satisfaction1	5.58	.626	4.73	1.233
	Satisfaction2	5.35	.720	4.98	.699
	Satisfaction3	5.19	.764	4.83	.753
	Satisfaction4	5.56	.666	4.85	.989
	Satisfaction5	5.14	.675	4.75	.863
Efficiency	Efficiency1	5.23	.684	4.81	.762
	Efficiency2	5.28	.766	4.75	.758
	Efficiency3	5.09	.781	4.83	.859
	Efficiency4	5.26	.658	4.81	.842
Effectiveness	Effectiveness1	5.37	.578	4.94	.783
	Effectiveness2	5.05	.815	4.75	.729
	Effectiveness3	5.07	.737	4.65	.863
	Effectiveness4	5.05	.615	4.85	.684
Student Interactions	Student-Student1	5.53	.667	4.85	.714
	Student-Student2	5.49	.631	4.73	.765
	Student-Student3	5.58	.626	5.19	.790
	Student-Student4	5.35	.686	4.75	.812
	Student-Student5	5.05	.688	4.73	.792
	Student-Student6	4.86	.833	4.44	.712
	Student-Student7	5.42	.626	5.10	.627
	Student-Instructor1	5.42	.626	4.77	.831
	Student-Instructor2	5.47	.667	4.67	.930
	Student-Instructor3	5.35	.613	4.60	.962
	Student-Instructor4	5.09	.750	4.63	.937
	Student-Instructor5	5.58	.545	4.92	.942
	Student-Content1	5.44	.548	4.67	.975
	Student-Content2	5.14	.560	4.69	.993
	Student-Content3	5.19	.664	4.73	.869
	Student-Content4	5.16	.721	4.65	1.021
Student Engagement	Engagement1	4.51	.827	4.54	1.091
	Engagement2	5.33	.680	4.92	.942
	Engagement3	5.44	.629	5.23	.778
	Engagement4	5.58	.545	5.31	.689
	Engagement5	5.37	.725	5.00	.875
	Engagement6	5.47	.631	5.08	.767
	Engagement7	5.23	.782	4.92	.710
	Engagement8	5.02	.771	4.75	.786

Table 5.3 exhibits the descriptive analysis for mean and standard deviation of variables in this study for blended learner group and web enhancer group. The mean for blended learner group ranges from 5.13 to 5.36, reported higher than mean for web facilitated group, which ranges from 4.76 to 4.97 respectively. The standard deviation for blended learner group reported lower with the range between 0.370 to 0.530, when compared with web facilitated group that reported the value ranging from 0.580 to 0.699.

At this stage of the study, the main interest is on the understanding if the online treatment exposed provide effects to the group involved prior to starting the actual study. The effect size analysis must be conducted to ensure that the subjects included in this study have sufficient power to accept null hypothesis and to avoid Type II error, that related with the possibility of concluding of no effect of a variable to another variables, when the effect is actually exists (Sullivan & Feinn, 2012). As for that, the researcher used Cohen's d value to calculate effect sizes for this study. Cohen's d value was calculated using the equation in Equation 5.1. Cohen's d value for this study exhibited in Table 5.3. Three variables have medium effects from online exposure namely efficiency, effectiveness and student engagement. Another two variables, satisfaction and student interactions reported to have a large effect of online exposure to the variables.

Table 5. 3
Descriptive Analysis and Effect Size for Variables in this Study

	Types of Learners					
	Blended Learner (N=43)		Web Facilitate (N=48)		Effect Size	
	Mean	Std Dev	Mean	Std Dev	Cohen's d	Effect Size
Satisfaction	5.36	.481	4.83	.699	0.88	Large
Efficiency	5.21	.550	4.80	.699	0.65	Medium
Effectiveness	5.13	.530	4.80	.670	0.55	Medium
Student interactions	5.32	.370	4.76	.580	1.15	Large
Student Engagement	5.24	.381	4.97	.596	0.54	Medium

$$d = M_1 - M_2 / s$$

Where $M_1 - M_2$ - different of mean for groups involves
 s - standard deviation for any group involved

Interpretation of Cohen's d value for effect size by Sullivan & Feinn (2012)

- 0.2 – Small
- 0.5 – Medium
- 0.8 – Large
- 1.3 – Very Large

Equation 5. 1

Equation for Cohen's d and Interpretation of Cohen's d Value

Further descriptive analysis was conducted for variables of this study. Mean value for all variables reported as above mid-point ranging from 4.96 to 5.10 and standard deviation reported from 0.522 to 0.663. Alpha value for all variables, satisfaction (0.816), efficiency (0.856), effectiveness (0.857), student interactions (0.926) and student engagement (0.816) reported above 0.80.

Table 5. 4
Descriptive Analysis for Variables in this Study

	Overall (N=91)		
	Mean	Std Dev	Alpha
Satisfaction	5.08	.659	0.816
Efficiency	5.00	.663	0.856
Effectiveness	4.96	.628	0.857
Student interactions	5.10	.522	0.926
Student Engagement	5.02	.565	0.816

5.2.4 Hypotheses Testing for Stage 1

Independent t-test analysis was conducted to measure the significant different between two groups, blended learner group and web facilitated group towards online activities exposed in the flipped classroom.

The result indicates that there is a significant difference in the score of blended learner group and web facilitated group of online activities in flipped classrooms, $t (89) = 4.194$, $p = 0.00$. Similar result was also reported for efficiency and effectiveness that shows a significant difference between the studied group, $t (88) = 3.147$, $p = 0.002$ and $t (88) = 2.673$, $p = 0.009$ for the respective variables. Student interactions also indicate a significant difference between type of learners in flipped classroom, $t (89) = 5.452$, $p = 0.000$. Also student engagement shows significant difference between groups, $t (89) = 2.592$, $p = 0.011$. The result is displayed in Table 5.5.

Table 5. 5
Independent t-test Results for Web Enhancer Learners and Blended Learners

Hypothesis	Variables	Levene's Test for Equality of Variance		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
H1	Satisfaction	5.533	.021	4.194	89	.000***
H2	Efficiency	1.404	.239	3.147	87.574	.002**
H3	Effectiveness	0.807	.372	2.673	87.709	.009**
H4	Student Interactions	11.427	.001	5.452	89	.000***
H5	Student Engagement	5.204	.025	2.592	89	.011*

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Based on the above analysis, it can be concluded that all hypothesizes for stage 1 are accepted and presented in the Table 5.6.

Table 5. 6
Hypotheses Results for Stage 1

Hypothesis	Variables	Results
H1	There is a significant difference in satisfaction among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom	Supported
H2	There is a significant difference in efficiency among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom	Supported
H3	There is a significant difference in effectiveness among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom	Supported
H4	There is a significant difference in student interactions among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom	Supported
H5	There is a significant difference in student engagement among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom	Supported

For the first stage of this study, the researcher investigated whether significant difference between online exposure through online activities in flipped classroom has a significant difference between the treatment group (blended learners group) and the control group

(web facilitated group). The results indicated that online activities in flipped classroom have a significant difference between blended learner group and web facilitated group for the studied variables, namely satisfaction, efficiency, effectiveness, student interactions and student engagement. In the later section, the researcher will presents data analysis for a second stage of data collection.

5.3 Data Analysis and Findings for Stage 2: Survey

This section consists of analysis for stage two – cross sectional research using survey method. The analysis consists of three main steps namely, (1) the assessment of measurement model, (2) the assessment of structural model and (3) the hypothesizes testing for mediation analysis. Prior to the reporting the analysis, the researcher presents the profiles of respondents who participated in this study.

5.3.1 Preliminary Analysis

A total of 324 student were involved in this stage of data collection using a cross sectional research. The questionnaires were distributed to the students who enrolled ENT300 for the Semester 2 2014/2015. Responses were collected and coded into SPSS. There were no missing value reported for this set of data. The outlier's analysis eliminated a total of 43 cases; 24 cases for univariate outliers and 19 cases of multivariate outliers, leaving only 281 cases qualified for further analysis. All variables are normally distributed. The value of variance inflation factors (VIF) of each predictors reported as below as 10 indicated that items are free of multicollinearity issue (Hair, Black, Babin, & Anderson, 2010; Sarstedt, Ringle, Smith, Reams, & Hair, 2014).

5.3.2 Profiles of Respondents

From 281 respondents, majority of the respondents were female represented by 200 students (71.2%) and male 81 students (28.8%). Most of the students were 20 years old (73.7%) and the highest respondents were from Diploma in Planting Industry Management (18.1%). Apart from the information obtained from this survey, the researcher would like to highlight that all respondents are Malay with Bumiputra status. Details of the demographic information is presented in the Table 5.7.

Table 5. 7
Demographic Factors for Stage 2 Data Collection using Survey-based Method

No	Demographic Factors	Frequency (N)	Percentage (%)
1	Gender		
	Male	81	28.8
	Female	200	71.2
	<i>Total</i>	281	100
2	Age (years old)		
	20	207	73.7
	21	62	22.1
	22	9	3.2
	23	2	0.7
	25	1	0.4
	<i>Total</i>	281	100

Continue

Table 5. 7 (Continued)
Demographic Factors for Stage 2 Data Collection using Survey-based Method

No	Demographic Factors	Frequency (N)	Percentage (%)
3	Program		
	AC110 Diploma in Accountancy	22	7.8
	AC120 Diploma in Accounting Information Systems	12	4.3
	AP120 Diploma in Geomatics Science	19	6.8
	AP122 Diploma in Geomatics Science (Natural Resources)	13	4.6
	AS115 Diploma in Industrial Chemistry	7	2.1
	AT110 Diploma in Planting Industry Management	51	18.1
	BM111 Diploma in Business Studies	24	8.5
	BM119 Diploma in Banking	42	14.9
	CS110 Diploma in Computer Science	27	9.6
	CS143 Diploma in Mathematical Sciences	18	6.4
	SR113 Diploma in Sports Studies	47	16.7
	<i>Total</i>	<i>281</i>	<i>100</i>

5.3.3 Assessment of Models

In order to achieve the objectives for this stage, the researcher employed Partial Least Squares Structural Equation Modeling (PLS-SEM) method of analysis through SmartPLS version 3.0. The choice of using SmartPLS as compared to Covariance Based Structural Equation Model (CB-SEM) such as AMOS, was based on the suggestion by previous scholars (Anderson & Gerbing, 1988; Hair, Hult, Ringle, & Sarstedt, 2014; Hair, Ringle, & Sarstedt, 2013; Sarstedt, Ringle, Smith, Reams, & Hair, 2014), because the aim of this study is to develop a ‘quality of use’ framework by focusing on identifying the constructs that explained the influence to the exogenous chose for this study. Whereas, CB-SEM such as AMOS is more suitable for theory testing, theory confirmation, or comparison of alternative theories (Hair et al., 2014).

Furthermore, SmartPLS offers bootstrapping and blindfolding procedures. This study employed a bootstrapping procedure based on 281 cases and 500 samples, to identify the significance level for loadings and path coefficients. Moreover, this study employed

a blindfolding procedure to identify the strength of relationship for hypotheses tested in this study.

In evaluating and reporting the result, this study follows a guideline provided by Hair, Hult, Ringle and Sarstedt (2014). Hence, The analysis assesses of two main parts which are measurement model (outer model) and structural model (inner model) (Wong, 2013). The measurement model is used to evaluate the reliability and validity of the model (framework) and the structural model, through the bootstrapping procedure, is used to conduct the hypothesis testing. Furthermore the analysis of structural model produced the effect size and predictive relevance values of the constructs in the study.

5.3.4 Assessment of Measurement Model

All measurement in the model are reflective measured constructs. Prior to starting the analysis, the researcher must ensure the estimates in the path-modelling is normal. The result indicates that the algorithms converged after Iteration 6 thus confirming that the estimation is normal (Hair et al., 2014; Wong, 2013). The measurement model assessment will follow guideline provided by Hair et al., (2014) and study by Sarstedt et al., (2014). Those assessments are (1) indicator reliability, (2) internal consistency reliability, and (3) validity which includes (a) convergent validity, and (b) discriminant validity. Later, the researcher discusses the steps of analysis involved in the assessment of measurement model.

Step 1: Assessment of Indicator Reliability

Firstly, the researcher examined the loading indicator for items of all variables involved in this study. As mentioned by Hair et al., (2014, p107), the indicators for outer loadings should be higher than 0.708, however loadings between 0.40 and 0.70 should be considered for deletion if the deletion increases the value of composite reliability (CR) or average variance extracted (AVE). Loadings more than 0.70 shows that the construct explains more than 50% of the indicator's variance (Sarstedt et al., 2014). For the second stage of this study, only one item was deleted due to the low outer loading and to improve the AVE of the construct. The loading values for all items are presented in the Table 5.8.

Step 2: Assessment of the Internal Consistency Reliability

The next step of the assessments is the internal consistency reliability. In PLS-SEM internal consistency reliability were evaluated using composite reliability (CR) (Sarstedt et al., 2014). The internal consistency or composite reliability for reflective model should be higher than 0.7 (Hair, Ringle, & Sarstedt, 2011). Results from this study reveal that value for composite reliability are 0.888 (Satisfaction), 0.912 (Efficiency), 0.921 (Effectiveness), 0.929 (Student interactions) and 0.898 (Student Engagement). Student interactions consists of three dimensions, and the composite reliability are 0.897 (student-student interaction), 0.904 (student-instructor interaction) and 0.929 (student-content interaction). This results demonstrated that all variables

have high level of internal consistency reliability. Table 5.8 below presents the composite reliability for the studied variables.

Step 3a: Assessment of Convergent Validity

Validity assessment for reflective measurement model are evaluated using convergent and discriminant validity. Convergence validity is measured using average variance extracted. Result for this study exhibit that the value for AVE of the measured variables were 0.615 (Satisfaction), 0.722 (Efficiency), 0.745 (Effectiveness), and 0.525 (Student Engagement) respectively. As for student interactions dimensions, the AVE are 0.593 (student-student interaction), 0.653 (student-instructor interaction) and 0.767 (student-content interaction). Based on Fornell and Larcker (1981), if the value for AVE for constructs were above 0.5, therefore the convergent validity for constructs is adequate, even though the value of the constructs are more than 50% due to error. Details of AVE values are also presented in the Table 5.8.

Table 5.8
Results Summary of Measurement Model

Latent Variable	Indicator	Loading	Composite Reliability	AVE	Discriminant Validity
Satisfaction	Satisfaction1	0.771	0.888	0.615	Yes
	Satisfaction2	0.852			
	Satisfaction3	0.817			
	Satisfaction4	0.723			
	Satisfaction5	0.751			
Efficiency	Efficiency1	0.795	0.912	0.722	Yes
	Efficiency2	0.868			
	Efficiency3	0.875			
	Efficiency4	0.858			
Effectiveness	Effectiveness1	0.807	0.921	0.745	Yes
	Effectiveness2	0.872			
	Effectiveness3	0.882			
	Effectiveness4	0.888			
Student interactions					
<i>Student-Student</i>	InteractSS1	0.791	0.897	0.593	Yes
	InteractSS2	0.808			
	InteractSS3	0.784			
	InteractSS4	0.762			
	InteractSS5	0.768			
	InteractSS6	0.702			
<i>Student-Instructor</i>	InteractSI1	0.767	0.904	0.653	Yes
	InteractSI2	0.805			
	InteractSI3	0.836			
	InteractSI4	0.862			
	InteractSI5	0.766			
<i>Student-Content</i>	InteractSC1	0.871	0.929	0.767	Yes
	InteractSC2	0.909			
	InteractSC3	0.89			
	InteractSC4	0.831			
Student Engagement	Engagement1	0.673	0.898	0.525	Yes
	Engagement2	0.75			
	Engagement3	0.747			
	Engagement4	0.709			
	Engagement5	0.755			
	Engagement6	0.664			
	Engagement7	0.764			
	Engagement8	0.728			

^A Composite reliability (CR) = (square of the summation of the factor loadings)/ {(square of the summation of the factor loadings) + (square of the summation of the error variances)}

^B Average variance extracted (AVE) = (summation of the square of the factor loadings)/ {(summation of the square of the factor loadings) + (summation of the error variances)}

Step 3b: Assessment of Discriminant Validity

Discriminant validity for this model was measured using Fornell-Larcker and cross loading values for items in the measurement model as suggested by Hair et al. (2014) .

This technique suggests that the variance extracted estimates should be greater than the squared correlation estimate indicate that for any two constructs (when compared with the correlation values from row and Column) need to be larger than square root of AVE.

If the values represent by any result confirms with these criteria, therefore the framework developed reach its discriminant validity, hence quality for further analysis.

Table 5.9 below exhibits Fornell-Larcker criterion.

The square root of AVE values represented by value on the diagonal and the non-diagonal elements represent the latent variable correlations (LVC). It can be seen that all the square root of AVE values were higher than LVC, except for correlation value for Student Engagement and Student interactions, that reported as 0.747 and the squared AVE is 0.711. Hence the cross loading items for measurement model was examined to ensure its discriminant validity.

Further discriminant validity analysis for this model is examined using cross loadings table (Hair et al., 2014). This condition occurs when the variable tested is a higher order construct (HOC) consists of multiple dimension that is known as lower order construct (LOC); for this study the dimensions represented by student-content interaction, student-student interaction and student-content interaction. Table 5.10 indicated that the values for items that represented student engagement and student interactions are

higher than the values of cross loadings for other variables, therefore, this model has achieved its discriminant validity (Hair et al., 2014).

Table 5. 9
Discriminant Validity: Fornell-Larcker Criterion

	(1)	(2)	(3)	(4)	(5)	Convergent Validity met?
(1) Efficiency	0.850					Yes
(2) Effectiveness	0.753	0.863				Yes
(3) Student interactions	0.587	0.659	0.711			Yes
(4) Satisfaction	0.529	0.589	0.621	0.784		Yes
(5) Student Engagement	0.459	0.539	0.747	0.573	0.724	Yes

Table 5. 10
Discriminant Validity: Cross Loading for Measurement Model

	Satisfaction	Efficiency	Effectiveness	Student Interaction	Student Engagement
Satisfaction1	0.771	0.454	0.431	0.472	0.467
Satisfaction2	0.852	0.429	0.504	0.522	0.480
Satisfaction3	0.817	0.427	0.491	0.522	0.484
Satisfaction4	0.723	0.366	0.383	0.449	0.375
Satisfaction5	0.751	0.396	0.494	0.464	0.433
Efficiency1	0.439	0.795	0.572	0.497	0.376
Efficiency2	0.394	0.868	0.623	0.477	0.379
Efficiency3	0.462	0.875	0.664	0.521	0.402
Efficiency4	0.500	0.858	0.697	0.498	0.401
Effectiveness1	0.522	0.647	0.807	0.493	0.426
Effectiveness2	0.488	0.625	0.872	0.610	0.480
Effectiveness3	0.540	0.670	0.882	0.585	0.516
Effectiveness4	0.490	0.662	0.888	0.578	0.434
Student-Student1	0.529	0.453	0.561	0.730	0.531
Student-Student2	0.518	0.454	0.536	0.732	0.533
Student-Student3	0.408	0.334	0.413	0.675	0.490
Student-Student4	0.410	0.366	0.437	0.669	0.494
Student-Student5	0.463	0.377	0.460	0.690	0.504
Student-Student6	0.385	0.403	0.459	0.671	0.459
Student-Instructor1	0.468	0.446	0.514	0.707	0.544
Student-Instructor2	0.433	0.377	0.466	0.717	0.548
Student-Instructor3	0.380	0.401	0.464	0.695	0.519
Student-Instructor4	0.395	0.393	0.428	0.743	0.539
Student-Instructor5	0.352	0.431	0.453	0.681	0.501

Continue

Table 5. 10 (Continued)
Discriminant Validity: Cross Loading for Measurement Model

	Satisfaction	Efficiency	Effectiveness	Student Interaction	Student Engagement
Student-Content1	0.452	0.474	0.458	0.724	0.547
Student-Content2	0.502	0.466	0.479	0.744	0.548
Student-Content3	0.497	0.474	0.473	0.761	0.595
Student-Content4	0.405	0.393	0.422	0.721	0.601
Engagement1	0.436	0.304	0.344	0.499	0.673
Engagement2	0.491	0.360	0.400	0.624	0.750
Engagement3	0.394	0.296	0.341	0.509	0.747
Engagement4	0.412	0.323	0.370	0.490	0.709
Engagement5	0.455	0.372	0.478	0.635	0.755
Engagement6	0.307	0.315	0.406	0.489	0.664
Engagement7	0.402	0.356	0.392	0.532	0.764
Engagement8	0.402	0.321	0.375	0.516	0.728

Once the assessment of measurement model completed, the later section presents the assessment of structural model.

5.3.5 Assessment of Structural Model

Section 5.3.4 indicated that the measurement model had been confirmed as reliable and valid, therefore this section focuses on assessment of the structural model, followed by the hypothesis testing. The assessment conducted based on guideline provided by Hair et al., (2014) and study by Sarstedt et al., (2014). The steps involved were (1) assessment of collinearity, (2) assessment of coefficient of determination (R^2), (3) assessment of structural model path coefficients (4) assessment of predictive relevance, and (5) assessment of effect sizes. Below are the steps involved for the assessment of structural model?

Step 1: Assessment of Collinearity

In order to assess the collinearity the researcher assesses it using collinearity diagnostics in linear regression based on tolerance value and variance inflation factor (VIF). As mentioned by Hair et al., (2014) (p.186), a potential collinearity problem occurs when the tolerance value of 0.20 or below and a VIF value of 5 and higher. The researcher uses steps proposed by Wong (2016). For this model, there are three variables, satisfaction, efficiency and effectiveness as dependent variables because there are paths pointing towards them. As for that, the researcher run 3 sets of linear regression to obtain the VIF values for the respective variables. Table 5.11 presents the VIF values for three sets of dependent variables, satisfaction efficiency and effectiveness. The values for all sets reported less than 5 indicates that there is no collinearity issues for each sets of predictor variables. The value of VIF are similar because the input to these endogenous variables (satisfaction, efficiency and effectiveness) from similar exogenous variables (student engagement and student interactions) indicating that those values are correct.

Table 5. 11
Collinearity Assessment

First Set		
Variables	VIF	Collinearity Problem? (VIF>5?)
Student interactions	2.249	No
Student Engagement	2.249	No
Dependent Variable: Satisfaction		
Second Set		
Variables	VIF	Collinearity Problem? (VIF>5?)
Student interactions	2.249	No
Student Engagement	2.249	No
Dependent Variable: Efficiency		

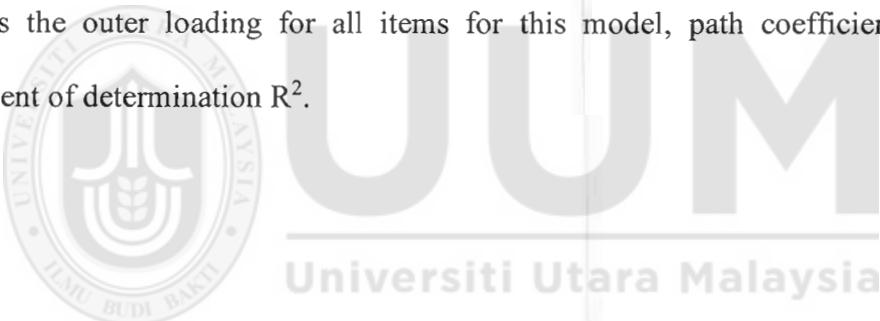
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Table 5. 11 (Continued)
Collinearity Assessment

Variables	Third Set	
	VIF	Collinearity Problem? (VIF>5?)
Student interactions	2.249	No
Student Engagement	2.249	No
Dependent Variable: Effectiveness		

Step 2: Assessment of Coefficient of Determination (R^2)

Next, the researcher performed the assessment of coefficient of determination (R^2), where the assessment coefficient of determination R^2 is one of the major part of the evaluation for structural model. Figure 5.2 displays a PLS Path Model Estimation that includes the outer loading for all items for this model, path coefficient and the coefficient of determination R^2 .



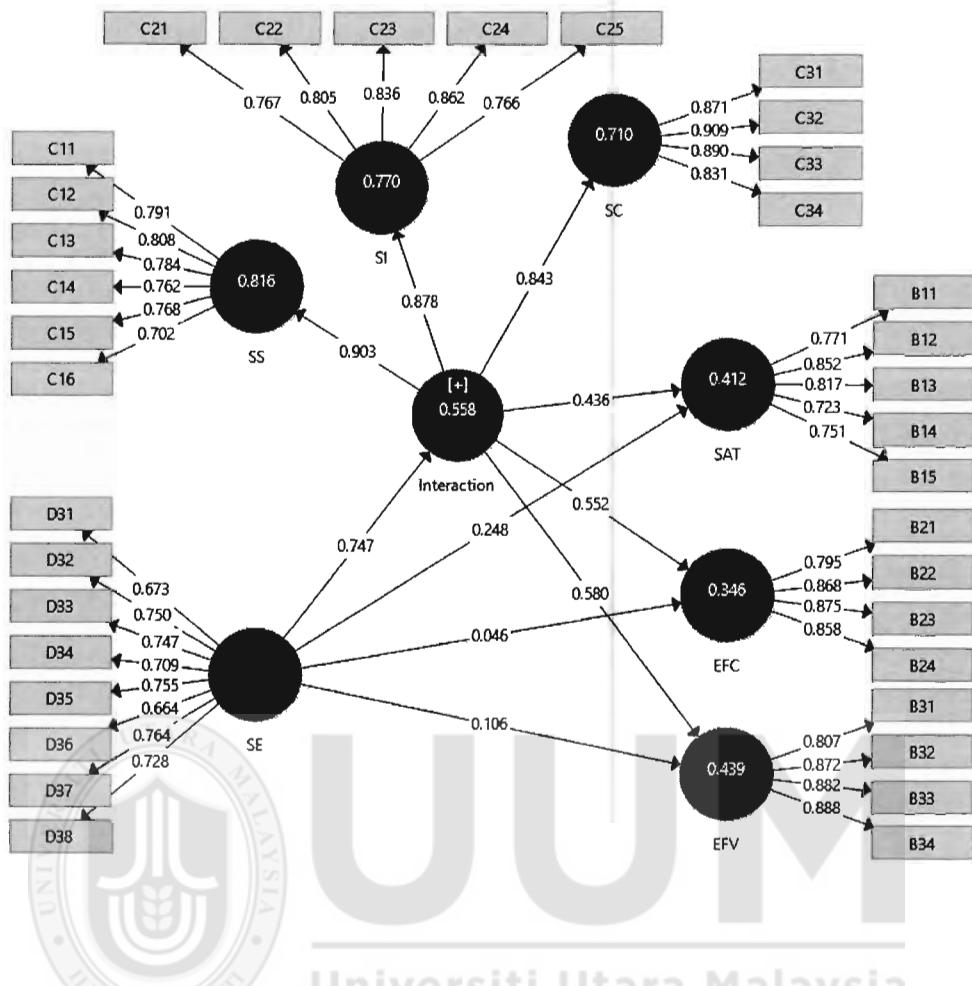


Figure 5.2

PLS Path Model Estimation Diagram

Note: SE – Student Engagement; Interaction – Student interactions; SS – Student-Student Interaction; SI-Student-Instructor Interaction; SC-Student Content Interaction; SAT-Satisfaction; EFC-Efficiency; EFV-Effectiveness

This model is a reflective model where only one variable, student interactions that consists of three dimensions namely, student-student interaction, -student-instructor interaction and student-content interaction. Other variables involved in this study are satisfaction, efficiency, effectiveness, and student engagement.

Hair et al., (2014) provides guideline for the value of R^2 of 0.25, 0.5 and 0.7 are often interpreted as weak, moderate and strong coefficient of determination. For this model,

student engagement is able to explain 55.8% the variance of student interactions. This model estimation also shows that student interactions and student engagement are found jointly explain 41.2% for satisfaction, 34.6% of efficiency and 43.9% of effectiveness. This model in Figure 5.1 also shows that the higher order construct (HOC), Student interactions has strong relationship with its lower order construct (LOC), student-student interaction (0.816), student-instructor interaction (0.770) and student-content interaction (0.710). This result clearly indicates that the LOC (student-student interaction, student-instructor interaction and student-content interaction) are highly correlated with HOC, student interactions and each LOC are able to explain more than 50% of its variance.

Step 3: Assessment of Structural Model Path Coefficients

Once the assessment of coefficient of determination was conducted, the researcher assesses the path coefficient for structural model. The researcher used bootstrapping procedure draws 281 cases and 500 samples to identify the significance level for loadings and path coefficients. Figure 5.3 exhibits a path coefficient values and p values for the model. Clearly, only two direct path that show p-value result more than 0.05 thus indicating the direct paths is not significant. Other direct paths shows that p-values for other direct path equal to .000, those paths are significant.

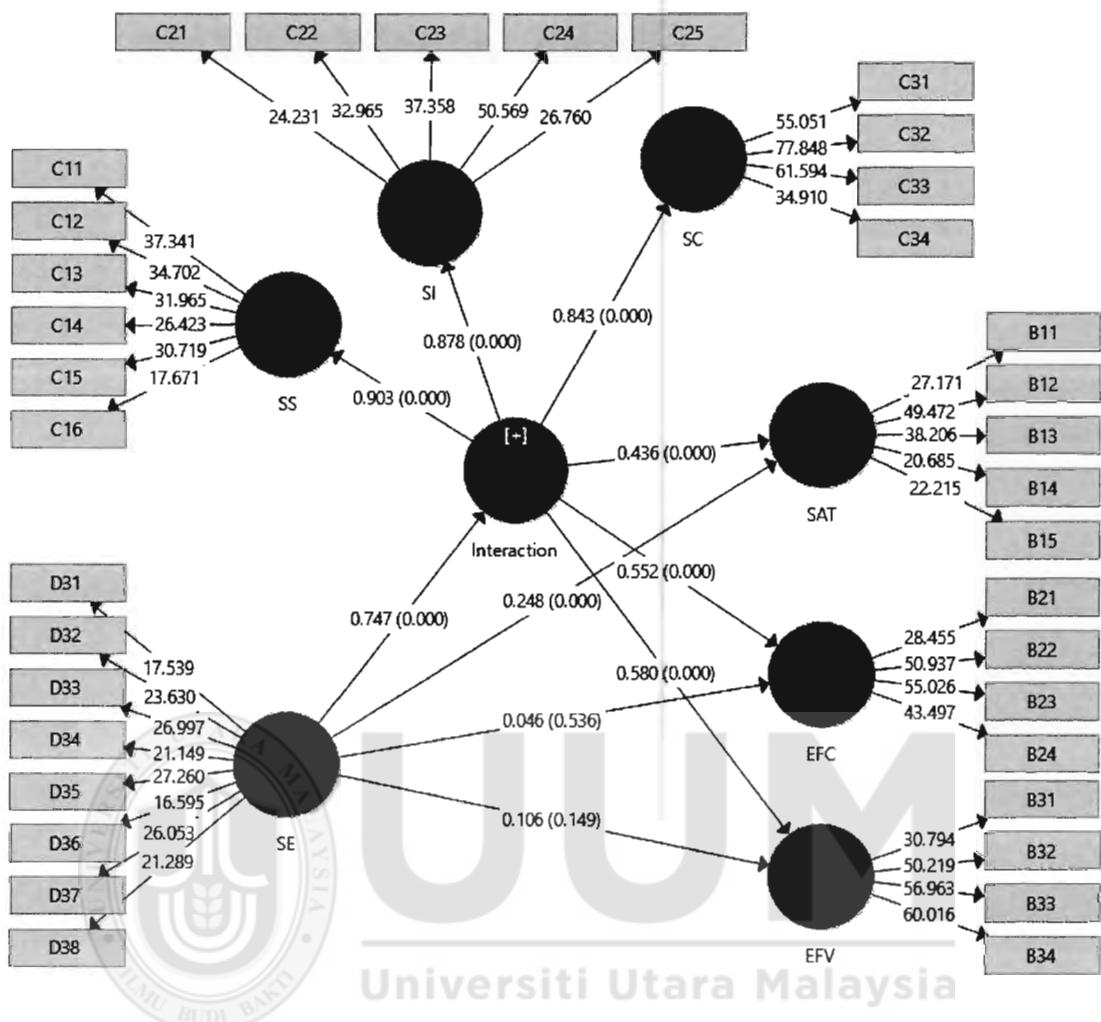


Figure 5.3
PLS Structural Model Path Coefficient and p-Values

Note: SE – Student Engagement; Interaction – Student interactions; SS – Student-Student Interaction; SI-Student-Instructor Interaction; SC-Student Content Interaction; SAT-Satisfaction; EFC-Efficiency; EFV-Effectiveness

Details of path coefficient is presented in the Table 5.12. The most commonly critical values used to identify the significant level of t-vales for two tails are 1.65 (significance level = 10%), 1.96 (significance level = 5%), and 2.57 (significance level = 1%) (Ramayah, 2014). From the table, it can be seen that the t-value for Student Engagement

→ Efficiency and Student Engagement → Effectiveness are reported as 0.619 and 1.447 respectively, below 1.65, indicating that these paths are not significant.

Table 5. 12
Significance Testing Results of the Structural Model Path Coefficient

Hypothesis	Relationship	Path Coefficients	t Values ⁺	p Values	Decision
H6	Student Engagement → Satisfaction	0.248	3.712	0.000	Supported
H7	Student Engagement → Efficiency	0.046	0.619	0.536	Not Supported
H8	Student Engagement → Effectiveness	0.106	1.447	0.149	Not Supported
H9	Student Engagement → Student Interactions	0.747	26.821	0.000	Supported
H10	Student Interactions → Satisfaction	0.436	6.555	0.000	Supported
H11	Student Interactions → Efficiency	0.552	7.428	0.000	Supported
H12	Student Interactions → Effectiveness	0.580	8.727	0.000	Supported

⁺ Commonly used critical values for two-tailed test are 1.65 (significance level = 10%), 1.96 (significance level = 5%), and 2.57 (significance level = 1%)

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Step 4: Assessment of Predictive Relevance

At this stage, the researchers performed an assessment of Stone-Geisser's predictive relevance (Q^2) as guided by Hair et al., (2014). This assessment is important because it is able to confirm if the data points of indicators of endogenous construct in the reflective measurement can be predicted accurately. The researcher uses the blindfolding procedure. It can be seen that this model has good predictive relevance for all of the endogenous variables. In order for the model to have a predictive relevance, the Q^2 values must be more than 0 (Chin, 1998, 2010). For this model, the Q^2 values reported more than 0 for all endogenous variables where the highest value is

Effectiveness (0.321) and the lowest value is Efficiency (0.246). Summary of the result for Coefficient of Determination (R^2) and Predictive Relevance (Q^2) is presented in the Table 5.13.

Table 5. 13
Results of Coefficient of Determination (R^2) and Predictive Relevance (Q^2)

Endogenous Latent Variables	R^2	Q^2
Student interactions	0.558	0.276
Satisfaction	0.412	0.250
Efficiency	0.346	0.246
Effectiveness	0.439	0.321

Step 5: Assessment of Effect Sizes f^2 and q^2

Researchers are advised to perform the assessment of effect size for coefficient of determination R^2 using f^2 and effect size for predictive relevance Q^2 using q^2 (Hair et al., 2014). As for that, the researcher present the analysis for effect sizes, (1) effect sizes f^2 and (2) effect sizes q^2 .

Assessment 1: Effect sizes f^2

Effect size for R^2 , f^2 refer to the observation of changes in R^2 value after an exogenous variable omitted from the model (Hair et al., 2014). This value will be translated as small (0.02), medium (0.15) and large (0.35) (Hair et al., 2014). The value of f^2 has been calculated based on the following equation, Equation 5.2.

$$f^2 = (R^2_{\text{include}} - R^2_{\text{exclude}}) / (1 - R^2_{\text{include}})$$

Interpretation of f^2 effect size by Hair et al. (2014)

- 0.02 – Small
- 0.15 – Medium
- 0.35 – Large

Equation 5. 2

Equation for Calculation of f^2

Since there are three variables that can act as endogenous latent variables, therefore the calculation will be separated based on 3 endogenous variables, satisfaction, efficiency and effectiveness. The summary of the results is presented in the Table 5.14. Overall, student interactions able to give higher effect (medium) on endogenous variables, satisfaction, efficiency and effectiveness while compared to student engagement. While student engagement gives small effect for satisfaction and effectiveness, and no effect toward efficiency.

Table 5. 14
Results of effect sizes f^2

Endogenous Variable	Exogenous Variable	R^2_{Include}	R^2_{exclude}	f^2	Decision
Satisfaction		0.414			
	Student Engagement		0.385	0.049	Small
	Student interactions		0.333	0.138	Medium
Efficiency		0.346			
	Student Engagement		0.345	0.002	No effect
	Student interactions		0.211	0.206	Medium
Effectiveness		0.440			
	Student Engagement		0.434	0.011	Small
	Student interactions		0.295	0.259	Medium

Assessment 2: Effect sizes q^2

Effect size for predictive relevance Q^2 , q^2 refer to the observation of changes in predictive relevance Q^2 value after an exogenous variable omitted from the model (Hair et al., 2014). This value will be translated as small (0.02), medium (0.15) and large (0.35) (Hair et al., 2014). The value of q^2 has been calculated based on the following equation, Equation 5.3.

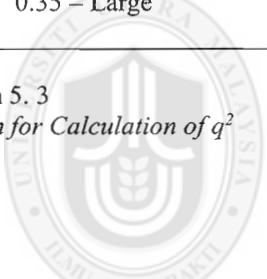
$$q^2 = (Q^2_{\text{include}} - Q^2_{\text{exclude}}) / (1 - Q^2_{\text{include}})$$

Interpretation of q^2 effect size by Hair et al. (2014)

- 0.02 – Small
- 0.15 – Medium
- 0.35 – Large

Equation 5.3

Equation for Calculation of q^2



Since there are three variables that can act as endogenous latent variables, therefore the calculation will be separated based on 3 sets, namely satisfaction, efficiency and effectiveness. The summary of the results is presented in the Table 5.15. For satisfaction, both exogenous variables give small effects toward the endogenous variables. Student engagement does not have any effect size of predictive relevance towards efficiency and effectiveness, while student interactions has a medium effect size of q^2 for both endogenous variables.

Table 5. 15
Results of effect sizes q^2

Endogenous Variable	Exogenous Variable	Q^2 Include	Q^2 exclude	q^2	Decision
Satisfaction		0.25			
	Student Engagement		0.234	0.021	Small
	Student interactions		0.198	0.069	Small
Efficiency		0.246			
	Student Engagement		0.246	0.000	No effect
	Student interactions		0.147	0.131	Medium
Effectiveness		0.32			
	Student Engagement		0.319	0.001	No effect
	Student interactions		0.21	0.162	Medium

5.3.6 Testing Mediating Effects

In order to test the mediating effects for this model, the researcher refers to mediator analysis steps proposed by Hair et al., (2014), as presented in Figure 5.4.

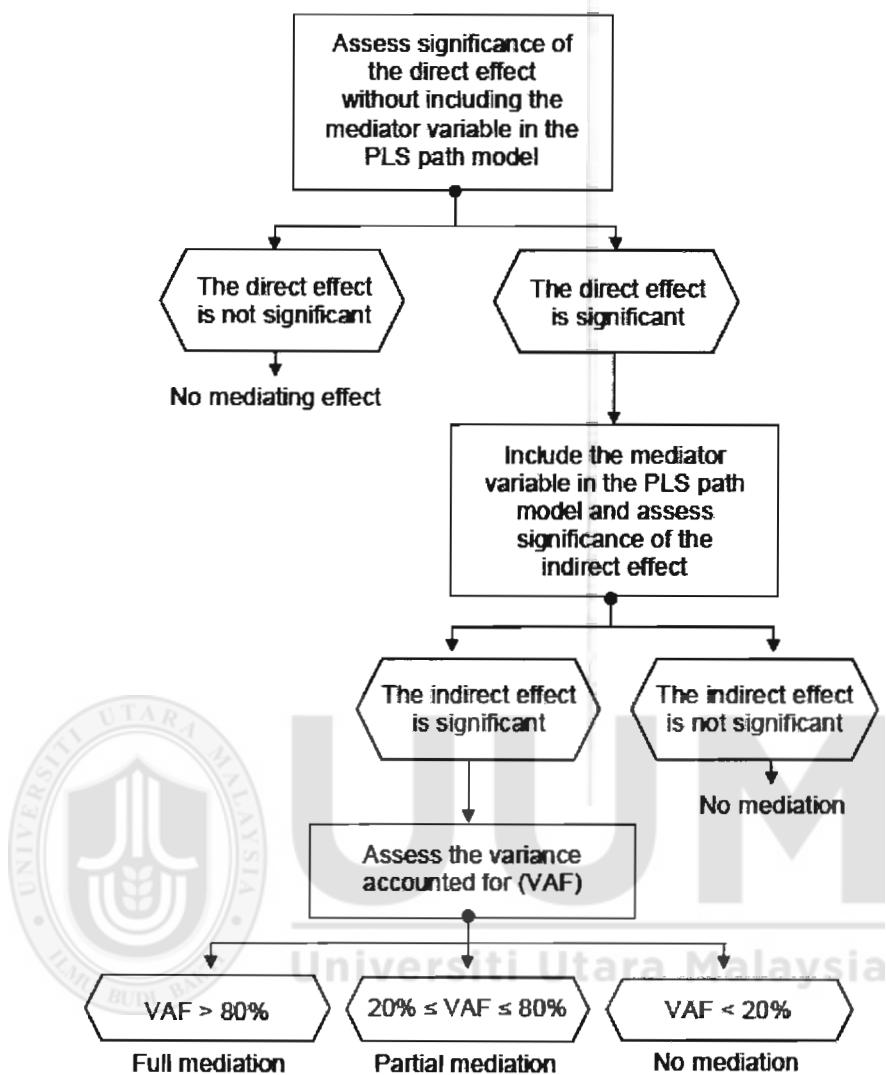


Figure 5.4
Mediator Analysis Procedure by Hair et al., (2014)

Firstly, the model has been tested without mediator. The result indicated that all direct paths are significant. Secondly, the researcher included the mediator and the indirect effect value and total effect value captured. All indirect effect appear significant. Result is presented in the Table 5.16. In order to test the magnitude of mediation, the researcher calculated the Variance Accounted for (VAF) value. The result indicated that student

interactions has partial mediation effect on the Student Engagement → Satisfaction. However, student interactions has full mediation effect on Student Engagement → Efficiency and Student Engagement → Effectiveness respectively. Therefore, H13, H14 and H15 for this study are supported. See Table 5.17.



Table 5. 16
Mediator Analysis for Direct and Indirect Effects

Hypothesis	Relationship	Direct Effect (Exclude Student interactions)			Indirect Effect (Include Student interactions)			Total Effect (Include Student interactions)		
		Path Coefficients	t Values	p Values	Path Coefficients	t Values	p Values	Path Coefficients	t Values	p Values
H13	Student Engagement → Satisfaction	0.574	12.768	0.000	0.325	6.204	0.000	0.573	13.127	0.000
H14	Student Engagement → Efficiency	0.459	9.091	0.000	0.413	8.387	0.000	0.459	9.535	0.000
H15	Student Engagement → Effectiveness	0.540	11.646	0.000	0.433	8.296	0.000	0.539	11.889	0.000

⁺ VAF = indirect effect/total effect
 where total effect = direct effect + indirect effect

Table 5. 17
Variance Accounted For (VAF) and Hypothesis Testing

Hypothesis	Relationship	Variance Accounted For (VAF)			Decision
		Value ⁺	% VAF	Type of Mediation	
H13	Student Engagement → Satisfaction	0.567	56.7	Partial Mediation	Supported
H14	Student Engagement → Efficiency	0.900	90.0	Full Mediation	Supported
H15	Student Engagement → Effectiveness	0.803	80.3	Full Mediation	Supported

⁺ VAF = indirect effect/total effect
 where total effect = direct effect + indirect effect

5.4 Summary of Hypotheses Testing

This study consist of two stages: stage 1 using causal research and data were obtained using quasi experimentation, while stage 2 using cross sectional study and data were collected using survey. Five hypotheses were tested in the Stage 1 and 10 hypotheses were tested in the Stage 2. The summary of hypotheses presented in the Table 5.18 below.

Table 5. 18
Hypotheses Results for the Study

Hypothesis	Variables	Results
Stage 1: Quasi Experimental		
H1	There is a significant difference in satisfaction among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom	Supported
H2	There is a significant difference in efficiency among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom	Supported
H3	There is a significant difference in effectiveness among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom	Supported
H4	There is a significant difference in student interactions among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom	Supported
H5	There is a significant difference in student engagement among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom	Supported
Stage 2: Survey (Direct Path)		
H6	There is a significant relationship between student engagement and satisfaction in blended learning using flipped classroom.	Supported
H7	There is a significant relationship between student engagement and efficiency in blended learning using flipped classroom.	Not Supported
H8	There is a significant relationship between student engagement and effectiveness in blended learning using flipped classroom.	Not Supported
H9	There is a significant relationship between student engagement and student interactions in blended learning using flipped classroom.	Supported

Continue

Table 5. 17 (continue)
Hypotheses Results for Stage 1 and Stage 2

Hypothesis	Variables	Results
H10	There is a significant relationship between student interactions and satisfaction in blended learning using flipped classroom.	Supported
H11	There is a significant relationship between student interactions and efficiency in blended learning using flipped classroom.	Supported
H12	There is a significant relationship between student interactions and effectiveness in blended learning using flipped classroom.	Supported
Stage 2: Survey (Mediation Analysis)		
H13	Student interactions mediate the relationship between student engagement and satisfaction in blended learning using flipped classroom	Supported
H14	Student interactions mediate the relationship between student engagement and efficiency in blended learning using flipped classroom	Supported
H15	Student interactions mediate the relationship between student engagement and effectiveness in blended learning using flipped classroom	Supported

5.5 Summary of the Chapter

This chapter presents the results of this study. This study involved 2 stages of data collection and tested 15 hypotheses: five hypotheses for stage 1 and 10 hypotheses for stage 2. All hypotheses for stage 1 are supported. In the second stage two of hypotheses that involved the direct effect of variables; Student Engagement → Efficiency and Student Engagement → Effectiveness reported as insignificant. However, later these paths have full mediation effects by student interactions.

Overall, a measurement that consists of 37 items was tested at the stage 1, five items for satisfaction, four items for efficiency, four items for effectiveness, 16 items for student interactions (dimensions: student-student interaction – 7 items; student-instructor – 5 items; student-content interaction – 4 items), and eight items for student

engagement. In the stage 2, one item from student interactions from student-student interactions was dropped due to low loading.

In the following chapter, the researcher discusses about the results of this study. Conclusions and recommendation also will be presented.



CHAPTER SIX

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

In this chapter, the researcher presents the recapitulation of this study, discussions for research objective 1 and research objective 2, significance of the study (theoretical, methodological and managerial implication), limitation, suggestions for future research and conclusions.

6.2 Recapitulation of the Study

The aim of this study is to develop the ‘quality of use’ measurement in blended learning using flipped classroom approach. The researcher developed the research model based on the quality of use concept introduced by Nigel Baven (1995b). The quality of use original model included three main variables, namely satisfaction, efficiency and interaction. From the reviews of past literatures, the researcher identifies two additional variables, namely student interactions and student engagement. Moreover, this study was underpinned by Luhmann’s System Theory, Model of Online Learning and Social Learning Theory: Groups Nets and Sets. The conceptualization of these theories supports the inclusion of student interactions and student engagement in the quality of use model.

Past literatures identified that blended learning generally can be divided into three stages namely (1) awareness, (2) adoption and (3) mature implementation. Scholars of

blended learning suggested that the development of research in blended learning must conformed to the progressive stages in blended learning. Based on the development in blended learning in Malaysia, it is suggested that level of implementation of blended learning in Malaysian universities is at the second stage, where the course design for all programs conform to the Malaysian quality standard provided by MOHE. At this second stage, universities struggle with important issues such as the instructional model to support the blended learning including the suitable activities and content to facilitate learning. Also, universities need to decide on the platforms and other infrastructure such as internet connection and laboratories to support the teaching and learning activities.

Because of these struggles, the research methodology for this stage mostly involved with the design of instructional model, the design of educational tools, experimenting the optimal blend between online and traditional learning, a qualitative research to gauge the understanding of blended learning in a particular environment, or a mix method that combines any of the above methods. Therefore, at the second stage, it is very difficult for researchers to conduct a research that is related to the development of the framework for blended learning or quality measures for the said environment. Moreover, past literature leads to the conclusion that research related with the development of framework and quality measure can only be conducted at the third stage of blended learning implementation. At this stage, the instructional model for a particular subject to be researched has achieved its maturity, hence the result obtained from this setting is valid to answer the needs of studies in the blended learning area.

Revisiting the study objectives, this study was conducted to answer the following research questions. (1) What is the impact of blended learning on student engagement,

student interactions and quality of use in a flipped classroom?, and (2) Does student engagement and student interactions have any relationship with quality of use in blended learning using flipped classroom?

Data were gathered from students who enrolled for the subject ENT300 from UiTM (Perlis) for two consecutive semesters because this study involved two stages. Each stage answers one research question. This study measured five main variables, namely satisfaction, efficiency, effectiveness, student interactions and student engagement. The stage one of this study was conducted to answer the first research question using a quasi-experimental, non-randomized, two groups with post-test design. This method was conducted to ensure that the exposure of online learning give impacts on five measured variables, thus confirming that the research setting complies with the adoption stage of blended learning implementation. 105 students were involved in the quasi-experiment, where these students were divided into treatment group (blended learner) and control group (web facilitated leaner). The researcher carefully designed the research setting to ensure this study was not contaminated by the extraneous variables while the study was conducted, thus avoiding the threat of internal and external validity. A procedure was designed and presented to the management of UiTM (Perlis) for approval. This experimentation was conducted from week 5 to week 12 of academic calendar for the Semester 20154 (December 2014 to March 2015). There were 37 items used to measure quality of use and the measurement was distributed as the post-test of the experiment.

Data for first stage of this study were analyzed using independent t-test, in order to test the differences of online exposures between two groups. Responding to the first

research question, are there any differences between treatment group and control group in quality of use in blended learning using flipped classroom, the findings of this stage supported all hypotheses formulated. This result implies that online exposures in flipped classroom was able to increase the satisfaction, efficiency, effectiveness, student interactions and student engagement among students. This result also confirms that this research setting achieve the adoption level of blended learning implementation, therefore this study can be proceed to the second stage.

With regards to the second research question, data were collected using a cross-sectional study to in order to develop a quality of use model in blended learning using flipped classroom. This survey was conducted in the week 10 to week 11 (24th July to 04th August 2015) for the semester June to October 2015 using 37 items measurement from the first stage. 324 students were involved in this study, however only 281 responses were qualified for further analysis. Data were analyzed using two step approach in SmartPLS. During the data analysis, one item was dropped from student interactions due to low loading, leaving on 36 valid items for the measurement in this stage. 10 hypotheses were involved with seven hypotheses testing the direct effect and three hypotheses testing the moderation effects. The finding demonstrates that only two direct effect were not significant namely student engagement to efficiency and student engagement to effectiveness. However through the mediation analysis, the finding reported that student interactions mediates these two insignificant paths, which implies student engagement requires the presence of student interactions in order to achieve a significant relationship with efficiency and effectiveness. This finding further reported that student interactions partially mediate the relationship between student engagement

and satisfaction. Overall, the result of this study indicates that the model developed for this study is able to demonstrate the quality of use in blended learning using flipped classroom. The section below will discuss about the finding of this study.

6.3 Discussions

The results of this study will be discussed based on hypotheses formulated in the earlier chapter. The researcher prepared discussions for this study based on research objectives. The first research objective was addressed by the stage one of this study that includes five hypotheses (H1 to H5). The second research objective of this study was addressed by the second stage of the study that involved hypotheses (H6 to H15). The following sections present the discussions about the results gained from this study.

6.3.1 Research Objective 1

The first objective of this study is to investigate a significant difference between treatment group and control group in quality of use in blended learning using flipped classroom. In order to achieve the first objective, the researcher conducted a causal research through quasi experimental method. For this stage, the researcher divided the participants of this study into two groups, known as treatment group (blended learner group) and control group (web facilitated group). The online activities exposed to participants had been identified as the treatment for this study. Five variables were tested to identify the significant difference between blended learner group and web facilitated group, namely satisfaction, efficiency, effectiveness, student interactions and student engagement. The discussions for the first stage of this study were made based

on the variables tested. The discussion starts with the first variable, satisfaction. The discussion below is elaborated on results of the study based on the hypotheses developed earlier.

6.3.1.1. The Difference in Satisfaction between Blended Learner Group and Web Facilitated Group

This section elaborated on the results of this study for the first research question based on the hypothesis stated below:

H1 There is a significant difference in satisfaction among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom

The analysis from this study revealed that blended learners group is more satisfied with the subject conducted using flipped classroom in the blended learning environment.

Students are satisfied with the blended learning using flipped classroom (by integrating three platforms to support learning) for this subject, where the mean reported for blended learner group was higher than web facilitated group. For this study, the researcher integrated three main platforms in the flipped classroom; Learning Management System (LMS) known as i-Learn, Facebook and WhatsApp. Previous researchers had conducted research using these platforms; LMS (Kabassi et al., 2016), Facebook (Hew, 2011) and WhatsApp (Mohamed Amin Embi, 2014) in their online learning. Some of the previous researchers using one platform in their study (Hew, 2011; Kabassi et al., 2016) and some of them combined more than one platform, such

as WhatsApp and LMS in one study (Mohamed Amin Embi, 2014). A study about satisfaction in blended learning in Greek found that blended learning provided benefits to students, however, students were not satisfied with the platform (LMS) provided by the university to support the blended learning because the platform used was not enhanced with the a good quality of educational materials.

Entrepreneurship education was able to inculcate students' educational and professional development in the area. As such, students who have entrepreneurial thinking expressed clear motivations and inclination of having their own ventures in the future (Hong, Hong, Cui, & Luzhuang, 2012). For this study, the result revealed that students in the flipped classroom for ENT300 subjects believe this subject contributes to their education and professional development since the mean values for blended learner group was reported higher while compared with web facilitated group.

The online discussion allowed students to discuss openly about their assignment topics with their friends and instructor at the same time. Indirectly, this situation increased the confidence level among students because their ideas had been discussed and agreed by respective parties. Even though some students did not participate directly in the discussion, the notification from the platform used in this study (Facebook) showed that, other students observed and understood what they need to address to rectify the problems they are facing. This communication between parties involved in the environment is a very important to determine the level of satisfaction among students in blended learning (Yusoff et al., 2015). This can be seen through the mean value for satisfaction with interaction in the flipped classroom, where students who are exposed

more to the online activities showed higher mean while compared to their counterpart group that had less exposure to the online activities.

Students who are familiar with blended learning will continue to use the technology to supplement the traditional coursework (Kabassi et al., 2016). Similarly for this study that students were satisfied with the flipped classroom for ENT300 is expected to using this technology in the future where mean value for blended learner group reported higher than web facilitated group.

Overall, results from the independent t-test analysis reveals that there is a significant difference in satisfaction between blended learner group and web facilitated group in blended learning environment. Previous study conducted by Campbell et al. (2008) found that there is a significant difference in satisfaction between students who are involved in the online activities such as online discussion as compared to the conventional activities. This study extends the finding from previous scholars, where the longer online activities exposed to participants promotes satisfaction in the online learning environment. Furthermore, online activities improved students relationship with other participants in the environment (Campbell et al., 2008), in which, this relationship is a very important factor in determining the level of satisfaction among students in blended learning (Yusoff et al., 2015). Additionally, the Cohen's effect size value suggested a large significance effect of efficiency among students in blended learning. The result postulated that the duration of online activities exposed to participants in blended learning affected satisfaction among students. Hence, H1 is supported.

6.3.1.2. The Difference in Efficiency between Blended Learner Group and Web Facilitated Group

The section elaborated on the results of this study for the first research question based on the hypothesis stated below:

H2 There is a significant difference in efficiency among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom

The analysis from this study revealed that blended learners group is more efficient with the subject conducted using flipped classroom in the blended learning environment.

Through online activities provided in the blended learning platforms, students were able to improve their understanding on their tasks given through discussions, as well as from the mistakes made by other friends. It could be seen that the longer online activities exposed to the students, the more online discussions made by students. The benefits not only to those who participated in the activities, but also to those who observed the conversation. By reviewing the conversions in the online activities, students in blended learner group were able to make self-reflection of their own assignments, if they had similar issues as their friends, they were able to rectify the issues and corrected the mistakes they made in their assignments. In the online activities, there were students who were willing to help other friends in clarifying some problems even with the absent of the instructor (instructor not active). Students who were able to explain the concept or clarifying the problems normally had better understanding about the contents of the subject. Since the number of online discussions reported higher among blended learner

group, it can be said that students acquired more knowledge related to this subject not only through communication with the instructor but also through peers support from their friends.

Hence, this group was able to reduce their mistakes in preparing their assessments and adhered to the requirement in the submission of the assessments. The result of this study shows that flipped classroom was beneficial to students for all items of efficiency (saving their time and reducing their mistake in preparing assignments, improving their understanding and enhancing knowledge), where mean for blended learner group reported higher than web facilitated group.

As overall result for efficiency, students from blended learner group reported more efficient in blended learning for ENT300 using flipped classroom than web facilitated group. Also, the mean value for efficiency items of blended learner groups reported higher mean while compared to the control group. Result from the independent t-test analysis revealed that there is a significant difference in efficiency between blended learner group and web facilitated group in blended learning environment, where the Cohen's effect size value suggested a medium to large significance effect of online activities exposed to efficiency of students in blended learning.

Previous scholars in blended learning such as Jahnke (2010) found that, students in this environment were able to improve their understanding through online discussion. These students were able to rely on peer support for confirmation of information and clarification of their problem, even with the absence of the instructor at a particular time. Once the instructor was available, the instructor was able to confirm if the

information was accurate or required further explanation. Another scholar such as Chaberek-Karwacka and Malinowska (2015) found that some advantages of the online learning that it save students' time to prepare their assessment and makes the learning for the subject easier thus reducing mistake in preparing their assessments or misconception about some topics in the related subjects in blended learning. With this regards, this result of this study suggested that the duration of online activities exposed to participants in blended learning effected efficiency among students in flipped classroom, therefore, H2 is supported.

6.3.1.3. The Difference in Effectiveness between Blended Learner Group and Web Facilitated Group

The section elaborated on the on results of this study for the first research question based on the hypothesis stated below:

H3 There is a significant difference in effectiveness among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom

The result indicated blended learner group is more effective than control web facilitated group in blended learning using flipped classroom.

For this study, students were given scheme of work as their study guideline for this subject. The scheme of work was equipped with the due dates for the assessments. During the first stage of this study (quasi experimental), students were confirmed with the due date and there was no late submission reported. However, student from blended

learner groups showed more concern and are aware of what need to be done in a particular time as compared to the web facilitated group. This situation similar with previous researchers who found that students in online learning use the online platforms not only for discussion, but also for confirmation of information related to their subject (Jahnke, 2010), hence students were aware of what need to be done such as requirements for submission of their assignments.

Students in the blended learner group also are more active in online discussion even sometimes none of them knows the answer, in fact there were many cases where the discussion made in the online platforms continued to the face to face class. Consequently, the classes of blended learner group were more productive and very active with discussions. As pointed out by Smith et al., (2009) productive discussion was not about knowing the answer or not, but it was about allowing those who involved to voice out their idea, and indirectly improving their understanding. Previous studies shows that discussion will make students more productive in both face to face classrooms (Jahnke, 2010; Kiviniemi, 2014), as well as online platforms (Kabassi et al., 2016; Ronald et al., 2005)

Students who were involved in this study belong to the millennial generation. It was known that millennial generation was easily adaptable to technology and are very competence with the information and communication technology devices (Islam et al., 2010). Those students did not have any problems adapting with the platform introduced in the flipped classroom. Besides those students were at the semester six (final semester students), and familiar with the LMS provided with the university to facilitate their learning in their past semesters. What made the difference of participating in the online

activities between the blended learner group and web facilitated group, was the activities planned by the instructors (intervention of this study) during the timeline of the experiment. Once the experiment is over, the instructor replicated what had been missed by web facilitated group to avoid the issue of internal in the quasi experimental (Creswell, 2012). Students who were involved were easily adapted to the new platforms introduced to them. Finally, students also agree that content and communication made through online platforms met their study requirements for this subject, ENT300.

At the end the overall result for effectiveness, students from blended learner group reported more effective in blended learning for ENT300 using flipped classroom than web facilitated group. Similarly, the mean value for all effectiveness items of blended learner groups reported higher mean while compared to the other group. Result from the independent t-test analysis revealed that there is a significant difference in effectiveness between blended learner group and web facilitated group in blended learning environment, with Cohen's effect size suggested a medium to large significance effect of online activities exposed to students in blended learning. The similar finding was reported by Kiviniemi (2014) where blended learning group had significant different in effectiveness between blended and traditional learning, where Cohen's effect size was reported as medium. Another study by Eryilmaz (2015) also found a significant difference between online learning and blended learning environment among students who participated in their studies. Therefore H3 supported.

6.3.1.4. The Difference in Student interactions between Blended Learner Group and Web Facilitated Group

The section elaborated on the results of this study for the first research question based on the hypothesis:

H4 There is a significant difference in student interactions among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom

The result indicated blended learner group has significant difference with web facilitated group in blended learning using flipped classroom.

Student interactions for this study were examined based on three types of interactions, namely student-student, student-instructor and student-content interactions as proposed by Moore (1989). For this study, the student-student interactions were observed through Facebook. Students interact with other students such as posted messages, gave ideas and opinions related to the lectures and assignment related to the subjects. For this type of interaction, the result revealed that mean for blended learner groups were reported higher than web facilitated group. The result indicated that online flipped classroom improve student-student interactions, whether it is online and face to face. Previous scholars in blended learning found that, student-student interaction was able to rely on peer support for clarity regarding the contents and confirmation related to their problem even if the instructor was not online at a particular time (Wah et al. 2014). Another scholar such as Chaberek-Karwacka and Malinowska (2015) found that the online discussion provides advantages because it saves students' time to prepare their

assessment, and reduces mistake in preparing their assessments or misconception about some topics in the related subjects in blended learning.

As for student-instructor interactions, the integration of three platforms were made. Instructor used LMS to provide content related to the subject. Facebook was used for online discussions and dissemination of information. Whereas, WhatsApp was used for one to one interaction between student and instructor for personal communication related to the subject. The result of this study revealed that, mean for all items related to student-instructor relationship were reported higher for blended learner group while compared with web facilitated group. An interesting result from a study by Hughes et al. (2016) showed that flipped classroom made face to face interaction with instructors outside classroom was less favorable, yet the performance of students was increased. Previous researcher also suggested that team-based learning in flipped classroom environment could be applied for large students groups with small group instructors (Morris, 2016). Besides, he also claimed that this strategy can be applied for any academic subject in a similar situation. A similar result also reported that pairing experienced instructors with the new instructors in flipped classroom is able to improve the feeling of teachers' presence, thus improving their cognitive presence in the classroom (Kim et al., 2014).

For the last type of interactions, student-content, the main platform used was i-Learn, the LMS provided by the university to facilitate students in their teaching and learning activities especially for blended learning. Instructor uploaded to the space content provided by the LMS and students were able to visit this platform to get the content for this subject. Besides lecture notes, the instructor used LMS to provide additional

information, especially those related with preparation of the final report. The result of this study exhibits that mean value for all items related to student-content interactions were higher among blended learner groups as compared to the web facilitated group. Previous scholars found that content that has been delivered effectively help students customized their learning needs by learning at their own pace (Lindeman et al., 2015). Furthermore, a well-managed content was able to increase a meaningful learning among students (Mohamed Amin Embi & Hamat, 2014).

Overall, a blended learning platforms increased the interactions between student-student, student-instructors and student-content among blended learner group were higher than web facilitated group. Moreover, the mean value for all student interactions items of blended learner groups reported higher mean while compared to the other group. Result from the independent t-test analysis discovered that there is a significant difference in student interactions between blended learner group and web facilitated group in blended learning environment. The Cohen's effect size suggested a large significance effect of online activities exposed to students in blended learning. This result refined a study by Kakosimos (2015), where blended learning groups have significant different in effectiveness between blended and traditional learning, and Cohen's effect size was reported as medium. Therefore, H4 is supported.

6.3.1.5. The Difference in Student Engagement between Blended Learner Group and Web Facilitated Group

The section elaborated on the on results of this study for the first research question based on the following hypothesis:

H5 There is a significant difference in student engagement among treatment group (blended learner group) and control group (web facilitated group) in blended learning using flipped classroom

The result exhibited that blended learner group has significant difference in student engagement with web facilitated group in blended learning using flipped classroom.

Student engagement plays an important role in the blended learning environment. For this study, engagement was measured based on the behavior shown by students while taking the blended learning subject, such as visiting LMS multiple times a week to access online material. As mentioned by previous scholars, students who engaged with blended learning activities always visited and view the digital content such as video demonstration in order to increase their understanding (Hughes et al., 2016). This situation was also proven by study in blended learning using system log, that found students showed improvement in their class attendance and study effort (Chen et al., 2014). Also, students who are engaged were more prepared prior to coming to class (Hanson, 2016; Nural Azhan & Mohd Saman, 2014).

Students who engaged with blended learning activities always participate in peers' discussions, either in face to face or online discussion. The finding from this study stated that mean for student who participated and shared ideas with peers are higher among blended learner group as compared to the web facilitated group. Clearly, many scholars reported that students in flipped classroom participated in the discussion and shares their ideas (Alias et al., 2014). Probably this situation happen because students have sense of belonging and equal opportunity to participate, as these feelings were

important to sustain student engagement (Man & Kian, 2014), thus increasing confident among them (Raihanah, 2014). However, there was a study in flipped classroom that found that peers communication may influence the teaching and learning that applied peer evaluation technique, where it created distrust among them and led to sabotage, indicating that students were not ready with this new pedagogy approach (Hao, 2016).

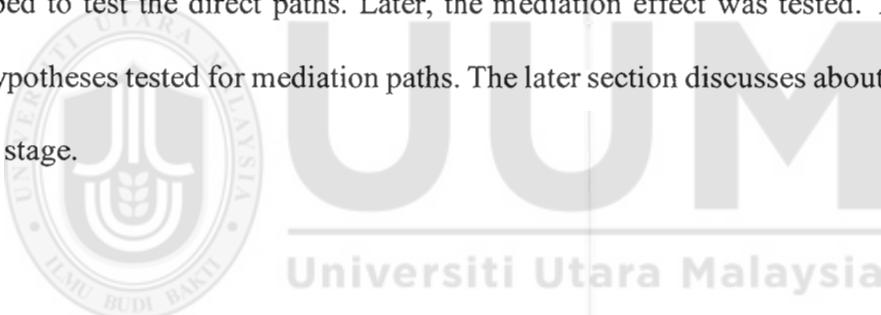
It is not deniable that instructors' competency is very important in blended learning, as it foster the student engagement among students. This study revealed that mean for students in blended learner group were higher than web facilitated group in terms of communication with instructors related to ENT300. Instructors who were competent were able to inculcate confidence among students to empower their learning, had a good relationship with students, as well as able to monitor them closely (Raihanah, 2014). As for that, students were more prepared to their assessments related to their subject (Liebert al., 2016). Students also did not hesitate to share their knowledge and experiences with their instructors for matters related with their content (O'Flaherty & Laws, 2014).

Based on the above discussions, it can be concluded that a blended learning platforms increased the student engagement in their learning environment. Moreover, the mean value for student engagement items of blended learner groups reported higher mean while compared to the control group. Result from the independent t-test analysis revealed that there is a significant difference in student engagement between blended learner group and web facilitated group in blended learning environment. The Cohen's effect size suggested a medium effect of online activities exposed to students in blended learning. This result refined a study by Baeppler et al. (2014), where blended learning

groups has significant difference in effectiveness between blended and traditional learning, and Cohen's effect size was reported as large. Therefore, H5 is supported.

6.3.2 Research Objective 2

The second objective of this study is to develop a model for quality of use measurement in blended learning using flipped classroom. In order to achieve the second objective, the researcher conducted a cross sectional research through survey method. Five variables were tested to identify the direct path, namely satisfaction, efficiency, effectiveness, student interactions and student engagement. Seven hypothesizes were developed to test the direct paths. Later, the mediation effect was tested. There were three hypotheses tested for mediation paths. The later section discusses about the results for this stage.



6.3.2.1. The Relationship between Student Engagement and Satisfaction

The section explained on the on results of this study for the second research question based on the hypothesis stated below:

H6 There is a significant relationship between student engagement and satisfaction in blended learning using flipped classroom

The result for this study revealed that student engagement has significant relationship with satisfaction. Furthermore, the bootstrapping of 500 procedure reported that the effect size for coefficient of determination, r^2 was small, and the blindfolding procedure revealed that the effect size for predictive relevance, q^2 was also small. Hence H6 is supported. This result indicated that even though the direct path between student engagement and satisfaction was significant, this variable gave a small effect on the variance explained of satisfaction and a small effect on predictive relevance of satisfaction. Therefore H6 is supported. For this study, student engagement was measured through the students' participation in teaching and learning activities in flipped classroom for ENT300 subject. This study confirmed that students who participated in the activities related to their subject will be more satisfied with their learning. Furthermore, the assessment (business plan) for this subject requires collaboration efforts from team members.

The significant result in this study implies the importance of student engagement to predict satisfaction in blended learning using flipped classroom. The reviewers of blended learning have established the importance of this variables to promote learning

(Henrie et al., 2015) which claimed that measuring of student engagement is an important indicator for students to achieve their learning outcome. This finding has been supported study by Chen et al. (2014), that found that student engagement has significant relationship with satisfaction. However, this finding contradicts with the previous result by Md Osman et al. (2016) which stated that student engagement was not significant to the satisfaction. The mix results reported by previous studies indicates that this study area is still new, therefore result produced may vary from one research setting to another research setting.

6.3.2.2. The Relationship between Student Engagement and Efficiency

The section explained on the on results of this study for the second research question based on the hypothesis stated below:

H7 There is a significant relationship between student engagement and efficiency in blended learning using flipped classroom.

This study reveals that student engagement does not have a significant relationship with efficiency. The bootstrapping of 500 procedure reported that the effect size for coefficient of determination, r^2 was very small, and the blindfolding procedure revealed that the effect size for predictive relevance, q^2 was also very small. Therefore, H7 in this study is not supported. For this study, student engagement, was measured based on the participation of students in the blended learning environment. While for efficiency, it was measured through various items such as saving time in preparing the

assignments, reduce mistakes while preparing assignment, and improve understanding and enhancing knowledge among students. This insignificant result indicates that student engagement does not provide any effect on the efficiency of ENT300 subject among students in the flipped classroom.

The finding of this study contradicts with the previous studies which found that student participation in discussion increased the learning outcome among student (Ko et al., 2016). The insignificant finding would appear to provide mixed result on the relationship between student engagement and efficiency in the flipped classroom. However, this insignificant result is not surprising because study by Chen et al. (2014) found that flipped classroom was not suitable for passive students. Furthermore, some students misunderstood about the commitments they have to make in blended learning classroom, especially when they treated the online learning as a complement of traditional classroom (Hanson, 2016). Another situation that made students to refuse to engage in flipped classroom is that the designed activities were not effective, because there were no tools to learn how to use the content (Wah et al., 2014).

6.3.2.3. The Relationship between Student Engagement and Effectiveness

The section explained the results of this study for the second research question based on the hypothesis stated below:

H8 There is a significant relationship between student engagement and effectiveness in blended learning using flipped classroom

The result of study also reveals that student engagement does not have a significant relationship with effectiveness. The bootstrapping of 500 procedure reported that the effect size for coefficient of determination, r^2 was very small, and the blindfolding procedure revealed that the effect size for predictive relevance, q^2 was also very small. Hence, H8 is not supported. Effectiveness was measured based on items related to task completion, more productive, easy to adapt to this new pedagogy method and meet the study requirements for ENT300 subject. However, this study offers an insignificant result where student engagement shows no relationship with the effectiveness among students in the flipped classroom.

The findings of this study demonstrate a contrast result with previous research that reported that student engagement was related with student learning in the flipped classroom (McLaughlin & Rhoney, 2015). Another study by Ko et al., (2016) also found that student participation in discussion increased the learning outcome among student. On the other hand, study by Hao and Lee (2016) found that student engagement related closely with flipped learning instruction, where the role of instructors is important in order to ensure the participation among student in the activities planned to promote learning. Furthermore, the relevant content provided by instructors (Wah, et al., 2014) and the attractiveness of content (Alsagof et al., 2014) are also another important issues that require attention from blended learning providers in order to promote student engagement.

6.3.2.4. The Relationship between Student Engagement and Student Interactions

The section explained the results of this study for the second research question based on the hypothesis stated below:

H9 There is a significant relationship between student engagement and student interactions in blended learning using flipped classroom

The result for this study revealed that student engagement has significant relationship with satisfaction. Furthermore, the bootstrapping of 500 procedure reported coefficient of determination, R^2 was 0.558, and the blindfolding procedure revealed that the Q^2 was 0.276. Hence H9 is supported. This result indicated that the direct path between student engagement and student engagement was significant, therefore H9 is supported. For this study, student engagement was measured through the students' participation in teaching and learning activities in flipped classroom for ENT300 subject. This study confirmed that students who are engaged in the activities related to ENT300 subject appear to interact more in the flipped classroom environment.

The findings in this study validates previous works by O'Flaherty and Laws (2014) that reported that students who engaged in blended learning activities were able to share their knowledge with other students and tutors in the flipped classroom. Another study by Alias et al. (2014) demonstrated that students who shared information with other students were motivated for self-regulated learning. A similar finding was also reported through system log where in flipped classroom, students are more engaged and they maintain the relationship with their instructors (Razali & Kamarudin, 2014). This

situation exists because these students belong to millennial generation, and in line with the finding which indicates that flipped classroom is suitable to teach and learn for this generation (Wanner & Palmer, 2015).

6.3.2.5. The Relationship between Student Interactions and Satisfaction

The section elaborated on the on results of this study for the first research question based on the hypothesis stated below:

H10 There is a significant relationship between student interactions and satisfaction in blended learning using flipped classroom.

The result for this study revealed that student interactions has significant relationship with satisfaction. Furthermore, the bootstrapping of 500 procedure reported that the effect size for coefficient of determination, r^2 was medium, and the blindfolding procedure revealed that the effect size for predictive relevance, q^2 was very small. Hence H10 is supported. For this study, student interactions was measured based on student-student, student-instructor and student-content in teaching and learning activities for ENT300 subject. This study exhibits that students who are interacted in the activities related to their subject reported more satisfied with their learning.

The result of this study is consistent with previous researches that found that student interactions has significant relationship with satisfaction (Kuo et al., 2014; Sun et al., 2008). However based on details reviews of literatures, mix results were reported at the dimension levels. For example some studies reported that student were more satisfied

with student-content interactions (Hughes et al., 2016), while another studies found that student prefer traditional class as compared to the flipped classroom (Hanson, 2016). As for student-student interaction, previous studies found that this dimension was not significant with satisfaction (Kuo et al., 2013; Moore, 1989). On the other hand, student-instructor showed a consistent result where most of research on blended learning reported to have a significant relationship with satisfaction (Kuo & Belland, 2016; Kuo et al., 2014). Therefore, it can be concluded that student interactions is an important variable for flipped classroom environment. However, more studies are required to ensure the optimal interactions in order to increase the satisfaction among students.

6.3.2.6. The Relationship between Student Interactions and Efficiency

The section elaborated the results of this study for the first research question based on the hypothesis stated below:

H11 There is a significant relationship between student interactions and efficiency in blended learning using flipped classroom.

The result of this study revealed that student interactions has significant relationship with efficiency. Furthermore, the bootstrapping of 500 procedure reported that the effect size for coefficient of determination, r^2 was medium, and the blindfolding procedure revealed that the effect size for predictive relevance, q^2 was small. Hence

H11 is supported. For this study, the result reveals that students who interacted in the related activities related to their subject are more efficient with their learning.

The significant result of this study implies that student interactions is one of the important factors that determine efficiency among students in flipped classroom. As claimed by Jahnke (2010) students in flipped classroom were able to rely on peer supports for confirmation of information related to content and clarification of their problem, even with the absence of the instructor. The online discussion facilitates student to be responsible with their own learning. Another study by Chaberek-Karwacka and Malinowska (2015) verifies that online discussion save students' time to prepare their assessment with less mistakes in preparing their assessments. Apart from that, students appreciated the online discussion related to content as it clarifies issues related to the subject (Wah, Ing, et al., 2014). As such, students appreciated positive and constructive comments from instructors, especially if they get them immediately after posting hence students' were able to complete their assessments with confidence (Wah, Ing, et al., 2014). As mentioned by Demetriadis and Pombortsis (2007), a student-instructor interactions is very important in order to attain deeper understanding of the content related to the course.

Moreover, it is also for student-content interaction, where students can view the content multiple time in order to gain their understanding on the related topic (Alias et al., 2014). Hence, a clear instructions must be prepared (Salam et al., 2014) in order to avoid confusion among students to interact and complete their assessment (Alias et al., 2014). The above findings suggested that student interactions impacts efficiency among students who are involved in this learning environment. However, more attention is

required for the blended learning provider such as the well-managed course content and clear instruction in order to facilitate students to utilize flipped classroom efficiently.

6.3.2.7. The Relationship between Student Interactions and Effectiveness

The section elaborated the results of this study for the first research question based on the hypothesis stated below:

H12 There is a significant relationship between student interactions and effectiveness in blended learning using flipped classroom.

The result of this study revealed that student interactions has significant relationship with effectiveness. Moreover, the bootstrapping of 500 procedure reported that the effect size for coefficient of determination, r^2 was medium, and the blindfolding procedure revealed that the effect size for predictive relevance, q^2 was also medium. Hence H12 is supported. This study demonstrates that students who interacted in the activities in ENT300 flipped classroom were effective with their learning.

Flipped classroom allows content to be delivered to students effectively because students were able to customize the pace of learning to their learning needs (Kakosimos, 2015). For example, digital contents offer a good reference for students to improve their understanding because they are able to view it as many times as they like in order to improve their understanding (Alias et al., 2014). Furthermore, students who were involved in this study belong to the millennial generation, this generation is easily adaptable to technology and are very competent with the information and

communication technology devices (Islam et al., 2010). Hence, those students did not have any problems adapting with the platform introduced in the flipped classroom. This also has been verified by Hughes et al. (2016) that reported students in flipped classroom showed less favorable to the traditional face to face session as compared to the online session. In contrasts, Hanson (2016) revealed that students in their study prefer traditional classes as compared to online session. One plausible explanation is that flipped classroom is also affected by the academic discipline, because these studies were conducted in different areas namely nursing (Hanson, 2016) and pharmacy (Hughes et al., 2016).

The significant result also proposes that students in flipped classrooms were more active in online discussion even sometimes none of them knows the answer. Consequently, the classes of blended learner group were more productive and very active with discussions. As pointed out by Smith et al., (2009) productive discussion was not about knowing the answer only, but it was about allowing those who are involved to voice out their idea, and indirectly improves their understanding. Previous studies show that discussion will make students more productive in both face to face classrooms (Jahnke, 2010; Kiviniemi, 2014), as well as online platforms (Kabassi et al., 2016; Ronald et al., 2005). Therefore, student interactions plays an important role in order to improve effectiveness among students. Flipped classroom encourages students to be more productive in discussion, facilitates tasks related with assessment and meets the study's requirement for millennial generation,

6.3.2.8. Student Interactions as Mediator

The section elaborated the results of this study for the first research question based on the hypothesis stated below:

- H13 Student interactions mediate the relationship between student engagement and satisfaction in blended learning using flipped classroom.
- H14 Student interactions mediate the relationship between student engagement and efficiency in blended learning using flipped classroom.
- H15 Student interactions mediate the relationship between student engagement and effectiveness in blended learning using flipped classroom.

Very limited studies reported that student interactions as the mediator to satisfaction, efficiency and effectiveness. Most of the previous studies reported that this variable is able mediate the learner outcome (Hu et al., 2015; Ko et al., 2016) Moreover, the reviews in blended learning classified student performance, satisfaction and effectiveness as learning outcomes (Halverson et al., 2014), where performance is regarded as effectiveness and efficiency in the context of use (Bevan, 1995a). Hence, for the purpose of the discussion, the researcher grouped the satisfaction, effectiveness and efficiency as learning outcome.

Also, for student interactions, little studies have applied the terminology of student interactions in blended learning environment. Most studies used the dimensions of student interactions such as student-faculty interaction as the representative of student interactions (Hu et al., 2015; Ko et al., 2016). Meanwhile, scholar such as Meyer (2014)

argued that instructors could also be a representation of faculty or faculty members in academic setting. Therefore, for this discussion, student-faculty interaction was treated as student interactions in blended learning environment.

The mediation testing for current study found that student interactions partially mediate the relationship between student engagement and satisfaction. In the earlier part of the discussion, this study reported that student engagement was significantly related with satisfaction, hence, overall result indicated that even though student engagement was significant with satisfaction, student interactions was able to mediate this direct relationship. This result suggested that, the more student engaged in the ENT300 subject, the higher the satisfaction. However, with the presence of interactions, the higher level of satisfaction was reported among students in this learning environment. This result confirmed a qualitative study by Man and Kian (2014) that reported students who engaged in blended learning experienced the feeling of belonging to the community, equal opportunity to participate in activities of teaching and learning and able to communicate with instructors in the online environment. Furthermore, this study verified the results of earlier study that found that student interactions mediates the relationship between class participation and learning outcome (Ko et al., 2016), the class participation also represents the behavior dimension of student engagement (Henrie et al., 2015). Therefore, H13 is supported.

This study also presented that student interactions fully mediated the relationship between student engagement and efficiency and student engagement with effectiveness. In the earlier results of this study, it was presented that the relationship between student engagement and efficiency and student engagement with effectiveness was not

significant. Hence, this results indicated that student engagement required student interactions, namely student-student, student-instructor and student-content, in order to ensure that students achieve efficiency and effectiveness in the flipped classroom.

One plausible explanation for these significant results is that students in flipped classroom were likely to engage with the teaching and learning activities when they believed that interaction with peers, instructors and content provided benefits to their learning. Through online discussion for example, students were able to clarify their understanding related to the content, as well as conforming with some issues related to the assignments (Jahnke, 2010). Student interactions also reduced the dependency on face to face meeting with instructor to facilitated students' learning. However, students appreciated quick responses from instructor in order to proceed with their assignment, especially when students need to clarify on steps required or approval from instructor in order to proceed to the next steps of their assignment. Moreover, scholars from blended learning found that student interactions fully mediated the relationship between student engagement and learning outcome (Hu et al., 2015). Hence H14 and H15 are supported.

6.4 Implication of the Study

This section discusses the theoretical, methodological and managerial implication of this study.

6.4.1 Theoretical Implication

Past literatures identify that little studies of blended learning focus on the development of the development of the framework for blended learning. Hence, this study was conducted as a call to contribute to the development of a framework that was underpinned by related theories.

Education is very different from other social system because it has several components that required a lot of attention at one time. These important components are the student performance (effectiveness and efficiency) and satisfaction of learning experience during the tenure as students regardless of any methods of teaching delivery (Vanderstraeten, 2003). Hence, these components, particularly satisfaction and effectiveness reported as the highest topic of studies in technology mediated environment (Arbaugh, 2014; Drysdale et al., 2013; Halverson et al., 2012, 2014). Hence, from a theoretical perspective, this study offers a quality framework based on quality of use concept proposed by Nigel Baven (1995b) where user perspective can be measured based on satisfaction and performance, where performance was represented by efficiency and effectiveness. Through the research setting for this study, the context of use had been translated as the blended learning using flipped classroom for the entrepreneurship education. From past literatures, the researcher identifies two more variables that are suitable for this framework namely student interactions and student engagement (Drysdale et al., 2013; Halverson et al., 2012, 2014). These variables have been anticipated to provide a contribution for the framework development in the blended learning environment using flipped classroom. The findings of this study verify that the combination of the studies variables in one model is able to demonstrate the

quality of use framework for the blended learning area, particularly flipped classroom. This framework answer the call of blended learning issue related with development of the quality framework for this area (Arbaugh, 2014; Drysdale et al., 2013; Halverson et al., 2012, 2014).

Second, this study has empirically explained Luhmann's System Theory, through its binary situation, where in order for students to be active in the education system, students have a choice whether the students get themselves engaged or not engaged in the teaching and learning activities related to the subjects they are taking at a particular semester (Kihlstrom, 2011); Arbaugh, 2014; Drysdale et al., 2013; Halverson et al., 2012, 2014). Luhmann's System Theory further explained that, in order for participants in a social system to survive, they must interact with other participants in that social system (Drysdale et al., 2013; Halverson et al., 2012, 2014; (Vanderstraeten, 2003). The result of this study recognizes the need for interactions in the blended learning environment using flipped classroom, where student engagement need student interactions as mediator to their learning outcome. The large effect size reported for coefficient of determination for the direct path between student engagement to student interactions and student interactions to endogenous variables (satisfaction, efficiency and effectiveness) verifies the importance of these variables in explaining the quality framework in blended learning. Results of this study provide the answer to issues related with developing the research or quality framework that accompanied by the empirical studies (Halverson et al., 2012). The finding further explain the direct relationship and mediation effects of studies variables based on the research framework, which explains the behavior of these variables in the research setting.

Third, a finding of this studies also confirms the importance of student interactions in the blended learning environments (Arbaugh, 2014; Drysdale et al., 2013; Halverson et al., 2012, 2014). This study verifies three dimensions of student interactions as proposed by Model of Online Learning (Anderson & Garrison, 1998). Since the unit of analysis for this study was student, therefore only three main dimensions had been included namely, student-student, student-instructor and student-content (Kuo et al., 2014, 2016). The result of this study confirms that student interactions that consist of three dimensions were able to explain the satisfaction, efficiency and effectiveness among students. Some interesting findings reported in this study are, student interactions fully mediate the relationship between student engagement and efficiency, as well as student engagement and effectiveness. Student interactions also partially mediate the relationship between student engagement and satisfaction. This finding matches with the issue raised by blended learning scholars who pointed out that this area require a specific theory to support its development as the academic discipline (Arbaugh, 2014; Drysdale et al., 2013; Halverson et al., 2012, 2014). Even though this study does not produce a specific theory, it explains empirically the importance of variables involve such as student interaction and how it affects the learning outcome in technology mediated environment such as blended learning.

Fourth, another contribution on the theoretical implication from this study is the inclusion of Social Learning Theory: Groups Nets and Sets introduced by Dron and Anderson in 2014 to explain the research setting. This theory has been included because this is one of the learning theories that focus on the presence of social software as medium of communication. For this study, this theory has been conceptualized to

explain the research setting and how the interactions happen in the flipped classroom for ENT300 subjects. This study also highlighted how the connectivity through social network supports the student interactions to promote learning, particularly when the assessment requires collaboration effort to complete. Therefore, this finding support the need of theory to explain the blended learning area (Arbaugh, 2014; Drysdale et al., 2013; Halverson et al., 2012, 2014). The inclusion of this theory in the study compliments the need of the comprehensive theory to underpin the research related with the technologies available such as software media, particularly in the context of blended learning in education.

Finally, this study contributes to the development of quality framework for blended learning (Halverson et al., 2012). The framework for this study consists of three endogenous variables namely satisfaction, efficiency and effectiveness. Among all of these endogenous variables, efficiency is the least variable given by previous scholars. This study offers an interesting finding when student interactions and student engagement were included in the framework. Currently, student engagement has been classified as a new variable explored in the area of blended learning. However, scholars of blended learning believed that student engagement is an important variable to be included in the development of quality framework. Similarly, student interactions, has been highlighted as one of the important variables in blended learning. For this study, student interactions has been positioned as exogenous, endogenous and mediating variable. The finding implies that student interactions is one of the vital variables because it gives a huge effect in variance explained and predictive relevance to the model. This framework has been tested and achieved it reliability and validity.

Furthermore, the selected variables were proven to have impacts on blended learning before they were tested in the quality framework. Hence, based on the result of the study, all studies variables are qualified to represent quality variables for blended learning setting, and contribute to the issue related with the development of quality framework in the area (Halverson et al., 2012).

Overall, it can be concluded that this study contributes to the existing knowledge related to the implementation of blended learning using flipped classroom by providing an insight from Malaysian's perspective.

6.4.2 Methodological Implication

Scholars of blended learning argue about the methodology used in the research setting of blended learning, among them are the selection of quality variables, the use of generic online learning as research setting and fidelity of blending in the flipped classroom (Arbaugh, 2014; Graham et al., 2013; Halverson et al., 2014). Furthermore, scholar such as (Arbaugh, 2014) suggests that flipped classroom is a suitable approach of blended learning for classroom setting.

Therefore, this study was conducted using the flipped classroom at the first stage through quasi-experimental to ensure that variables selected for this study have the impacts with the length of blended learning exposure (fidelity of blending) in the flipped classroom among entrepreneurship education students. Quasi experimental is suitable to determine the cause and effect (causal research), of a manipulated variable to the studies variable (Ginns & Ellis, 2007). The findings of this study show that all

variables reacted to fidelity of blending, where all variables shows significant difference between the treatment and control groups. Hence, the stage of this study confirms that all studies variables are qualified to become the quality variables to be tested in the conceptual quality framework. This finding support the needs of confirming the suitable quality variable in blended learning, particularly in the tertiary level of education (Drysdale et al., 2013; Halverson et al., 2014).

For the second stage, the researcher developed a conceptual framework based on quality of use concept. Apparently, this conceptual quality framework was able to demonstrate the quality of use in blended learning using flipped classroom in similar research setting as the stage 1. By using this multi method approach, this study offers not only a comprehensive framework, but also variables that are truly impacted by the blended learning activities and which represents a quality of use model in the research setting. This finding also contribute to a call from blended learning scholars who stressed out the importance of having a specific framework and variables for blended learning (Arbaugh, 2014; Drysdale et al., 2013; Halverson et al., 2012, 2014). The findings and conclusions made from this study will serve as a guideline and comparison for future researchers in conducting their study in this area.

6.4.3 Managerial Implication

The conclusion drawn from past literatures identifies the role the management can play in order to foster the implementation of blended learning in the Malaysia universities. The researcher concluded that majority of universities in Malaysia are currently at the level of adoption of blended learning. At this stage, it is very important for the

management to design an instructional model that is suitable for the course to be blended (Zainuddin et al., 2016). A well-managed course design allows students to understand what needs to be done, thus increase their motivation to learn, to engage and to interact in the learning environment (Mohamed Amin Embi & Hamat, 2014; Lindeman et al., 2015). This study proves the importance of having an effective course design in blended learning. This study was conducted using an instructional model known as i-CREATE to manage a fundamental of entrepreneurship (ENT300). Hence, this study provides the guideline required to ensure the success of blended learning, particularly in flipped classroom. Furthermore, previous study revealed that no flipped classroom is identical and more challenges are faced by instructors who handle the large classroom because of difficulties in handling large group discussion simultaneously (Hao, 2016). Instructors must therefore ensure that the online content provided in the flipped classroom must be relevant and suitable for students, at the same time meet the requirement of the course design, in order to ensure the success of flipped classroom (Hao, 2016).

Previous study like Hao (2016), claimed that large classroom is difficult to handle because the simultaneous discussion requires attention at the same time. From reviews of flipped classroom, the researcher found that this approach has been applied in various disciplines such as social studies (Wanner & Palmer, 2015), medical and nursing (Hanson, 2016; Liebert, Mazer, et al., 2016; Lindeman et al., 2015; Morris, 2016; O'Flaherty & Laws, 2014), information technology (Wang, 2015), engineering (Kakosimos, 2015) and education (Hao, 2016). None of the study that was conducted in the area of business management. Hence, this finding verifies that flipped classroom

not only suitable for small classroom, but also large enrollment for business subject such as ENT300. Hence, this study contributes to the flipped classroom literature that, it is possible to manage a large classroom in business management too. However, managing large classroom require different strategy of implementation. One of the strategies is team-based teaching that combines the experienced instructors and newcomers' instructors help to manage the subject more effectively and efficiently (Kim et al, 2014). Combining past literatures and the finding for this study, it can be concluded that flipped classroom is suitable for subjects from various disciplines and this study also suggest that this approach is suitable for various scale of class enrollment.

The finding of this study also supports the issue highlighted by blended learning scholars related to the technologies utilized at the platforms in blended learning (Halverson et al., 2012). Majority of previous researches in flipped classroom use LMS or other software provided by universities to conduct blended learning (Hanson, 2016; Liebert, Mazer, et al., 2016; Lindeman et al., 2015; Morris, 2016; O'Flaherty & Laws, 2014; Wang, 2015; Wanner & Palmer, 2015). However, not all universities have capabilities to provide optimal infrastructures to support the blended learning activities. Therefore, this study proves that, blended learning can be implemented by incorporating social network software as a medium of interactions between student, instructor and content. Previous study revealed that no flipped classroom is identical (Hao, 2016). However, instructors must ensure that the online content provided in the flipped classroom must be relevant and suitable for students, at the same time meets the requirement of the course design, regardless of medium they used in their flipped

classroom (Hao, 2016). Clearly, the technologies combined in this study appear to be suitable to the research setting, thus provide a contribution to the literature of blended learning for management and business disciplines.

6.5 Limitations of the Study

This study has the number of limitations. Firstly, the research in blended learning is classified as contextual based research, where the research must be conducted in the context of a particular subject with a well-planned instructional model, particularly with the percentage of online interactions exposed to student through activities teaching and learning for the subject. The blended learning study also requires a comprehensive course design that spelled out the level of cognitive, affective and psychomotor the need to be achieved by students. Furthermore, the rubrics, test specification table and student learning time, syllabus and lesson plan must be highlighted precisely to assist the instructors in their teaching activities for this subject. Given that, this study has been conducted for student who enrolled ENT300 in UiTM Perlis and participate in i-CREATE instructional model only, hence the results do not permit the generalization beyond this research setting. The ENT300 subject has been equipped with a comprehensive information such as level of cognitive, affective and psychomotor that need to be achieved by students, rubrics, test specification table, student learning time, syllabus and lesson plan. Furthermore, through the instructional model for ENT300 (i-CREATE), the instructors were able to measure the impact on blended learning in the implementation of flipped classroom for the subject. If the study needs to be conducted at other campuses even for the same subject, the researcher must ensure that the instructional model needs to be adapted to the need of the study prior to starting the

research. Furthermore, duplicating this model to other setting such as training in organization may lead to the discovery of other variables that contributes to the quality of implementation in blended learning using flipped classroom.

Second, the study that involves blended learning at universities was constrained by the academic calendar, therefore, it constitutes limited resources to accommodate the situation. Hence, some modification of research design is required to ensure the research can be conducted to answer the research questions. For this study, the modification of research design for the first stage was made. In addition, there was unexpected event that requires the modification of the research design. At the beginning, this study planned to be conducted using a quasi-experimental, non-randomized, two groups with pre-test and post-test design. However, the pre-test was not valid because of the adjustment of academic calendar due to flood in Kelantan at the end of December 2014 to early January 2015. Hence, the research design had been changed to a quasi-experimental, non-randomized, two groups with post-test only design. The researcher recorded that the communication happened in the flipped classroom to ensure the online activities planned for teaching and learning have some effect to the targeted groups. Therefore, future studies may need to carefully design the research by taking considerations of time and resources required to accommodate the academic calendar. The alternative research design should be considered, if the modification is needed.

6.6 Suggestions for Future Studies

This study employs a multi method of quantitative studies. Past literatures leads to conclusion that five variables namely satisfaction, efficiency, effectiveness, student interactions and student engagement used in this study are important in the blended learning setting. However, more quality variables may be discovered through quantitative research for blended learning using flipped classroom. Furthermore, different research setting may lead to a specific quality variables. Hence, future research may consider to extend this quality of use model by adding more quality variables, where the suitable variables may be discovered through qualitative research. Also, future researchers should consider a longitudinal study, as this type of research is able to develop a stability of quality variables to be used in developing a new quality framework in this area.

This study also points out several important variables that require further investigation, namely efficiency, student interactions and student engagement. Efficiency is one of the quality variables that has not been mentioned as the important variables in blended learning. However, efficiency shows that it is an important factors to be included in the quality framework. Hence, more future studies need to include efficiency as a tested variable. This study also demonstrates that student interactions is the most important variable that need to be considered in the blended learning. Past literatures found that student interactions may lead to the successful implementation of blended learning. Therefore, future studies need to discover the possibility of additional dimensions for student interactions. This study also includes student engagement as the exogenous variable in this model. Student engagement can be considered as new variable in the

blended learning setting. For this this study, student engagement only related with behavioral engagement, hence more dimensions of student engagement must be included and validated to ensure the comprehensiveness of this variable.

6.7 Conclusions

This study has outlined a quality of use model for blended learning using flipped classroom. The researcher developed the model based on the quality of use concept introduced by Nigel Baven (1995b). Moreover, this study was underpinned by Luhmann's System Theory, Model of Online Learning and Social Learning Theory: Groups Nets and Sets. The conceptualization of these models theories supports the inclusion of five quality variables namely satisfaction, efficiency, effectiveness, student interactions and student engagement in the quality of use model.

Past literatures identified that blended learning generally can be divided into three stages namely (1) awareness, (2) adoption and (3) mature implementation. Scholars of blended learning suggested that the development of research in blended learning must be conformed to the progressive stages in blended learning. Therefore, this study was conducted in two stages to ensure that the model developed conformed with stages of implementation of blended learning.

The result from first stage implies that online exposures in flipped classroom was able to increase the satisfaction, efficiency, effectiveness, student interactions and student engagement among students. This result also confirms that this research setting achieved the adoption level of blended learning implementation, therefore this study can be proceed to the second stage. The finding from second stage demonstrates that

only two direct effects that were not significant namely student engagement to efficiency and student engagement to effectiveness. However through the mediation analysis, the finding reported that student interactions mediates these two insignificant paths, which implies that student engagement requires the presence of student interactions in order to achieve a significant relationship with efficiency and effectiveness. This finding further reported that student interactions partially mediate the relationship between student engagement and satisfaction. Overall, student engagement explains 55.8% of variance of student interactions. Furthermore, a combination of student engagement and student interactions explains 41.2% of variance in satisfaction, 34.6% of variance in efficiency and 43.9% of variance in effectiveness.

Therefore, it can be concluded that student engagement is a strong predictor to explain student interactions. This study also established the importance of student interactions in mediating the relationship between student engagement and endogenous variables. The result of this study highlights significant contributions to the theoretical, methodological and management context. Finally, this study has outlined the limitations of the study and suggestion for future research as a concluding remark.

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LIST OF APPENDIX

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APPENDIX A

Measurement



QUALITY OF USE MEASUREMENT IN BLENDED LEARNING USING FLIPPED CLASSROOM

SECTION A: BACKGROUND INFORMATION

Student ID : _____

Student's Name : _____

Gender : _____

Age : _____ years old

Program (eg AC110) : _____

ENT300 Group (eg RAC1105A) : _____

ENT300 Lecturer : _____

Final Grade ENT300 : _____ (Please leave blank)

SECTION B: 'QUALITY OF USE' WITH ENT300 CLASS

B1	SATISFACTION	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
		1	2	3	4	5	6
1	Overall, I am satisfied with this ENT300class	1	2	3	4	5	6
2	ENT300 course contributed to my educational development	1	2	3	4	5	6
3	ENT300 course contributed to my professional development	1	2	3	4	5	6
4	I am satisfied with the level of interaction that happened in ENT300 course	1	2	3	4	5	6
5	In the future, I would be willing to take a blended learning course again	1	2	3	4	5	6

		Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
B2	EFFICIENCY						
1	ENT300 flipped classroom saves my time preparing my assignments	1	2	3	4	5	6
2	ENT300 flipped classroom reduce mistakes I made in preparing my assignments	1	2	3	4	5	6
3	Flipped classroom improve my understanding of ENT300	1	2	3	4	5	6
4	Flipped classroom enhance my knowledge related to ENT300	1	2	3	4	5	6

		Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
B3	EFFECTIVENESS						
1	Flipped classroom allow me to complete tasks related to ENT300	1	2	3	4	5	6
2	I believe I became more productive in flipped classroom for ENT300	1	2	3	4	5	6
3	It is easy for me to adapt to flipped classroom for ENT300	1	2	3	4	5	6
4	Flipped classroom meets my study requirements for ENT300	1	2	3	4	5	6

SECTION C: INTERACTIONS WITH ENT300 CLASS

		Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
C1	STUDENT-STUDENT INTERACTIONS						
1	Overall, I had numerous interactions related ENT300 content with fellow students.	1	2	3	4	5	6
2	I got lots of feedback related to ENT300 course from my classmates.	1	2	3	4	5	6
3	I communicated with my classmates about ENT300 course contents through various applications (mobile application, social site network, instant messaging tools, etc.)	1	2	3	4	5	6

C1	STUDENT-STUDENT INTERACTIONS						
		Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
4	I answered questions of my classmates about ENT300 course content through various applications (mobile application, social site network, instant messaging tools, etc.)	1	2	3	4	5	6
5	I shared my thoughts or ideas about the lectures and its application with other students during ENT300 class	1	2	3	4	5	6
6	I comment on other friend's thoughts and ideas in ENT300 class	1	2	3	4	5	6
7	ENT300 assignments led to interactions with my classmates.	1	2	3	4	5	6

C2	STUDENT-INSTRUCTOR INTERACTIONS						
		Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
1	I had numerous interactions with the instructor during ENT300 class	1	2	3	4	5	6
2	I asked the instructor my questions related to ENT300 contents through various applications (mobile application, social site network, instant messaging tools, etc.)	1	2	3	4	5	6
3	The instructor replied my questions in a timely fashion	1	2	3	4	5	6
4	I replied to messages from the instructor through various applications (mobile application, social site network, instant messaging tools, etc.)	1	2	3	4	5	6
5	I received enough feedback from my instructor to complete my assignments when I needed it.	1	2	3	4	5	6

C3	STUDENT-CONTENT INTERACTIONS						
		Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
1	Beside ENT300 module, online materials helped me to understand the ENT300 content better	1	2	3	4	5	6
2	Online materials stimulated my interest for this course	1	2	3	4	5	6
3	Online materials helped me to relate my personal experience to new concepts or new knowledge	1	2	3	4	5	6
4	It was easy for me to access the online materials.	1	2	3	4	5	6

SECTION D: STUDENT ENGAGEMENT WITH ENT300 CLASS

D	STUDENT ENGAGEMENT	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
1	I visit i-Learn multiple times a week to get access to the ENT300 online materials	1	2	3	4	5	6
2	I visit the instructor to discuss about ENT300 assignments	1	2	3	4	5	6
3	I partipate actively in ENT300 group discussions	1	2	3	4	5	6
4	I help my group members and my classmates related to the ENT300 assignments	1	2	3	4	5	6
5	Outside classroom, I engage with converstion about ENT300 with my instructiors through various applications (mobile application, social site network, instant messaging tools, etc.)	1	2	3	4	5	6
6	Outside classroom I actively communicate with my group members about ENT300 through various applications (mobile application, social site network, instant messaging tools, etc.)	1	2	3	4	5	6
7	Because of ENT300, I start to get to know other students in who enrolled this subject from other classes	1	2	3	4	5	6
8	Because of ENT300, I start to get to know other students in who enrolled this subject from other faculties	1	2	3	4	5	6

THANK YOU

APPENDIX B
Result for Stage 1 of Data Collection



Introduction

The result for the Stage 1 of the study consist of (1) descriptive analysis for items based on five constructs (satisfaction, efficiency, effectiveness, student interactions and student engagement) that belong to the blended learner group and web facilitated group, (2) descriptive analysis for constructs and (3) independent t-test

Result 1a

Descriptive analysis for items based on five constructs (Satisfaction, Efficiency, Effectiveness, Student Interactions and Student Engagements) for blended learner group.

Descriptive Statistics

	N	Mean	Std. Deviation
Satisfaction1	43	5.58	.626
Satisfaction2	43	5.35	.720
Satisfaction3	43	5.19	.764
Satisfaction4	43	5.56	.666
Satisfaction5	43	5.14	.675
Efficiency1	43	5.23	.684
Efficiency2	43	5.28	.766
Efficiency3	43	5.09	.781
Efficiency4	43	5.26	.658
Effectiveness1	43	5.37	.578
Effectiveness2	43	5.05	.815
Effectiveness3	43	5.07	.737
Effectiveness4	43	5.05	.615
InteractSS1	43	5.53	.667
InteractSS2	43	5.49	.631
InteractSS3	43	5.58	.626
InteractSS4	43	5.35	.686
InteractSS5	43	5.05	.688
InteractSS6	43	4.86	.833
InteractSS7	43	5.42	.626
InteractSI1	43	5.42	.626
InteractSI2	43	5.47	.667
InteractSI3	43	5.35	.613
InteractSI4	43	5.09	.750
InteractSI5	43	5.58	.545
InteractSC1	43	5.44	.548
InteractSC2	43	5.14	.560
InteractSC3	43	5.19	.664
InteractSC4	43	5.16	.721

Descriptive Statistics

	N	Mean	Std. Deviation
SE Participation1	43	4.51	.827
SE Participation2	43	5.33	.680
SE Participation3	43	5.44	.629
SE Participation4	43	5.58	.545
SE Participation5	43	5.37	.725
SE Participation6	43	5.47	.631
SE Participation7	43	5.23	.782
SE Participation8	43	5.02	.771
Valid N (listwise)	43		

Result 1b

Descriptive analysis for items based on five constructs (Satisfaction, Efficiency, Effectiveness, Student Interactions and Student Engagements) for web facilitated group.

Descriptive Statistics

	N	Mean	Std. Deviation
Satisfaction1	48	4.73	1.233
Satisfaction2	48	4.98	.699
Satisfaction3	48	4.83	.753
Satisfaction4	48	4.85	.989
Satisfaction5	48	4.75	.863
Efficiency1	48	4.81	.762
Efficiency2	48	4.75	.758
Efficiency3	48	4.83	.859
Efficiency4	48	4.81	.842
Effectiveness1	48	4.94	.783
Effectiveness2	48	4.75	.729
Effectiveness3	48	4.65	.863
Effectiveness4	48	4.85	.684
InteractSS1	48	4.85	.714
InteractSS2	48	4.73	.765
InteractSS3	48	5.19	.790
InteractSS4	48	4.75	.812
InteractSS5	48	4.73	.792
InteractSS6	48	4.44	.712
InteractSS7	48	5.10	.627

Descriptive Statistics

	N	Mean	Std. Deviation
InteractSI1	48	4.77	.831
InteractSI2	48	4.67	.930
InteractSI3	48	4.60	.962
InteractSI4	48	4.63	.937
InteractSI5	48	4.92	.942
InteractSC1	48	4.67	.975
InteractSC2	48	4.69	.993
InteractSC3	48	4.73	.869
InteractSC4	48	4.65	1.021
SE Participation1	48	4.54	1.091
SE Participation2	48	4.92	.942
SE Participation3	48	5.23	.778
SE Participation4	48	5.31	.689
SE Participation5	48	5.00	.875
SE Participation6	48	5.08	.767
SE Participation7	48	4.92	.710
SE Participation8	48	4.75	.786
Valid N (listwise)	48		

Result 2

Descriptive analysis for constructs used in this study (Satisfaction, Efficiency, Effectiveness, Student Interactions and Student Engagement).

Group Statistics

	Type of Class	N	Mean	Std. Deviation	Std. Error Mean
Satisfaction	Blended Learner	43	5.3628	.48059	.07329
	Web Facilitated	48	4.8292	.69892	.10088
Efficiency	Blended Learner	43	5.2151	.54984	.08385
	Web Facilitated	48	4.8021	.69946	.10096
Effectiveness	Blended Learner	43	5.1337	.52991	.08081
	Web Facilitated	48	4.7969	.66974	.09667
Interactions	Blended Learner	43	5.3198	.36930	.05632
	Web Facilitated	48	4.7565	.58007	.08373
Engagement	Blended Learner	43	5.2442	.38086	.05808
	Web Facilitated	48	4.9688	.59614	.08605

Result 3

Independent t-test for blended learner and web facilitated group to test the impact of blended learning to five main constructs for the study (Satisfaction, Efficiency, Effectiveness, Student Interactions and Student Engagements).

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means	
		F	Sig.	t	df
Satisfaction	Equal variances assumed	5.533	.021	4.195	89
	Equal variances not assumed			4.280	83.634
Efficiency	Equal variances assumed	1.403	.239	3.106	89
	Equal variances not assumed			3.147	87.574
Effectiveness	Equal variances assumed	.807	.372	2.640	89
	Equal variances not assumed			2.673	87.709
Interactions	Equal variances assumed	11.427	.001	5.452	89
	Equal variances not assumed			5.582	80.672
Engagement	Equal variances assumed	5.204	.025	2.592	89
	Equal variances not assumed			2.653	80.812

Independent Samples Test

		t-test for Equality of Means		
		Sig. (2-tailed)	Mean Difference	Std. Error Difference
Satisfaction	Equal variances assumed	.000	.53362	.12720
	Equal variances not assumed	.000	.53362	.12469
Efficiency	Equal variances assumed	.003	.41303	.13297
	Equal variances not assumed	.002	.41303	.13124
Effectiveness	Equal variances assumed	.010	.33685	.12762
	Equal variances not assumed	.009	.33685	.12600
Interactions	Equal variances assumed	.000	.56326	.10330
	Equal variances not assumed	.000	.56326	.10090
Engagement	Equal variances assumed	.011	.27544	.10627
	Equal variances not assumed	.010	.27544	.10381

Independent Samples Test

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
Satisfaction	Equal variances assumed	.28089	.78636
	Equal variances not assumed	.28564	.78160
Efficiency	Equal variances assumed	.14882	.67724
	Equal variances not assumed	.15221	.67386
Effectiveness	Equal variances assumed	.08327	.59042
	Equal variances not assumed	.08644	.58725
Interactions	Equal variances assumed	.35799	.76852
	Equal variances not assumed	.36248	.76404
Engagement	Equal variances assumed	.06429	.48658
	Equal variances not assumed	.06887	.48200



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APPENDIX C
Result for Stage 2 of Data Collection



Introduction

The result for the Stage 2 of the study was conducted using SmartPLS. It consists of three main parts namely (1) Assessment of Measurement Model, (2) Assessment of Structural Model, and (3) Testing of Mediating Effects

1. Assessment of Measurement Model

1a. Assessment of Indicator Reliability

	EFC	EFV	Interaction	SAT	SC	SE	SI	SS
B11				0.771				
B12				0.852				
B13				0.817				
B14				0.723				
B15				0.751				
B21	0.795							
B22	0.868							
B23	0.875							
B24	0.858							
B31		0.807						
B32		0.872						
B33		0.882						
B34		0.888						
C11							0.791	
C12							0.808	
C13							0.784	
C14							0.762	
C15							0.768	
C16							0.702	
C21						0.767		
C22						0.805		
C23						0.836		
C24						0.862		
C25						0.766		
C31				0.871				
C32				0.909				
C33				0.890				
C34				0.831				

Continue

Continued

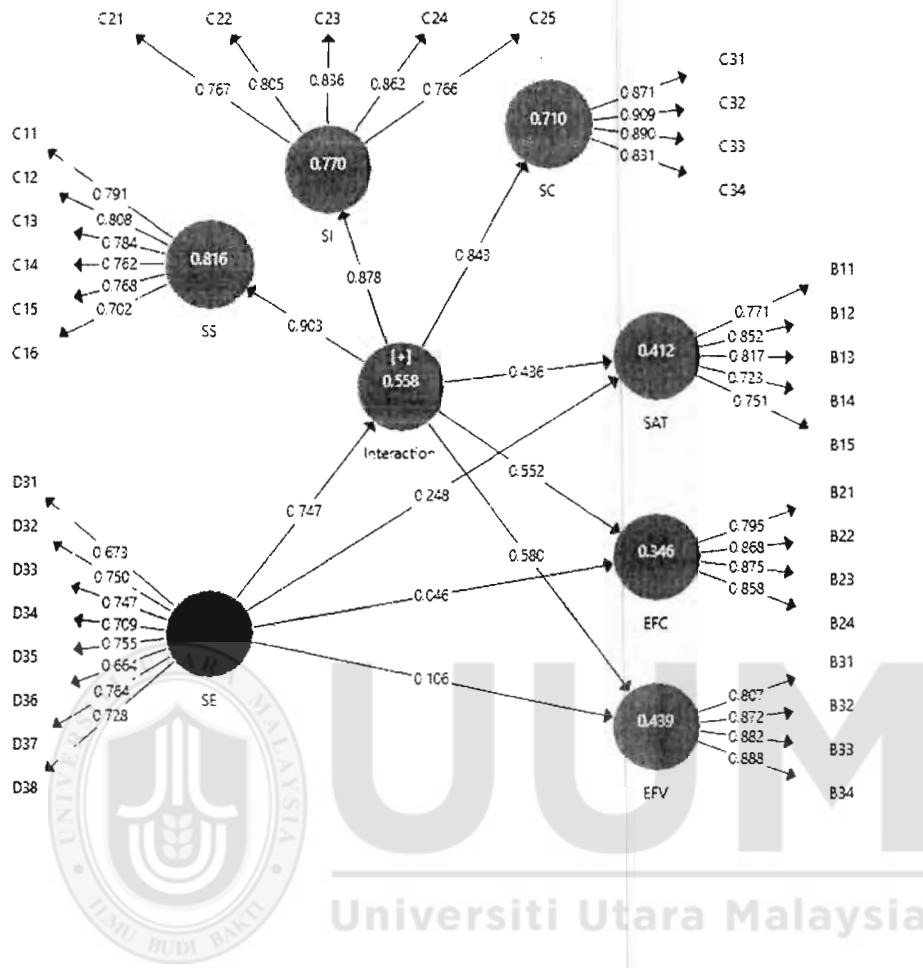
	EFC	EFV	Interaction	SAT	SC	SE	SI	SS
D31						0.673		
D32						0.750		
D33						0.747		
D34						0.709		
D35						0.755		
D36						0.664		
D37						0.764		
D38						0.728		

1b. Assessment of Internal Consistency Reliability

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
EFC	0.871	0.872	0.912	0.722
EFV	0.885	0.891	0.921	0.745
Interaction	0.930	0.931	0.939	0.506
SAT	0.843	0.847	0.888	0.615
SC	0.898	0.899	0.929	0.767
SE	0.870	0.874	0.898	0.525
SI	0.866	0.868	0.904	0.653
SS	0.862	0.863	0.897	0.593

1c. Assessment of Discriminant Validity

	EFC	EFV	Interaction	SAT	SE
EFC	0.850				
EFV	0.753	0.863			
Interaction	0.587	0.659	0.711		
SAT	0.529	0.589	0.621	0.784	
SE	0.459	0.539	0.747	0.573	0.724



2. Assessment of Structural Model

2a. Collinearity

	EFC	EFV	Interaction	SAT	SC	SE	SI	SS
EFC								
EFV								
Interaction	2.261	2.261		2.261	1		1	1
SAT								
SC								
SE	2.261	2.261	1	2.261				
SI								
SS								

2b. Coefficient of Determination (R^2)

	R Square	R Square Adjusted
EFC	0.346	0.341
EFV	0.439	0.435
Interaction	0.558	0.556
SAT	0.412	0.408
SC	0.710	0.709
SI	0.770	0.769
SS	0.816	0.815

2c. Path Coefficient

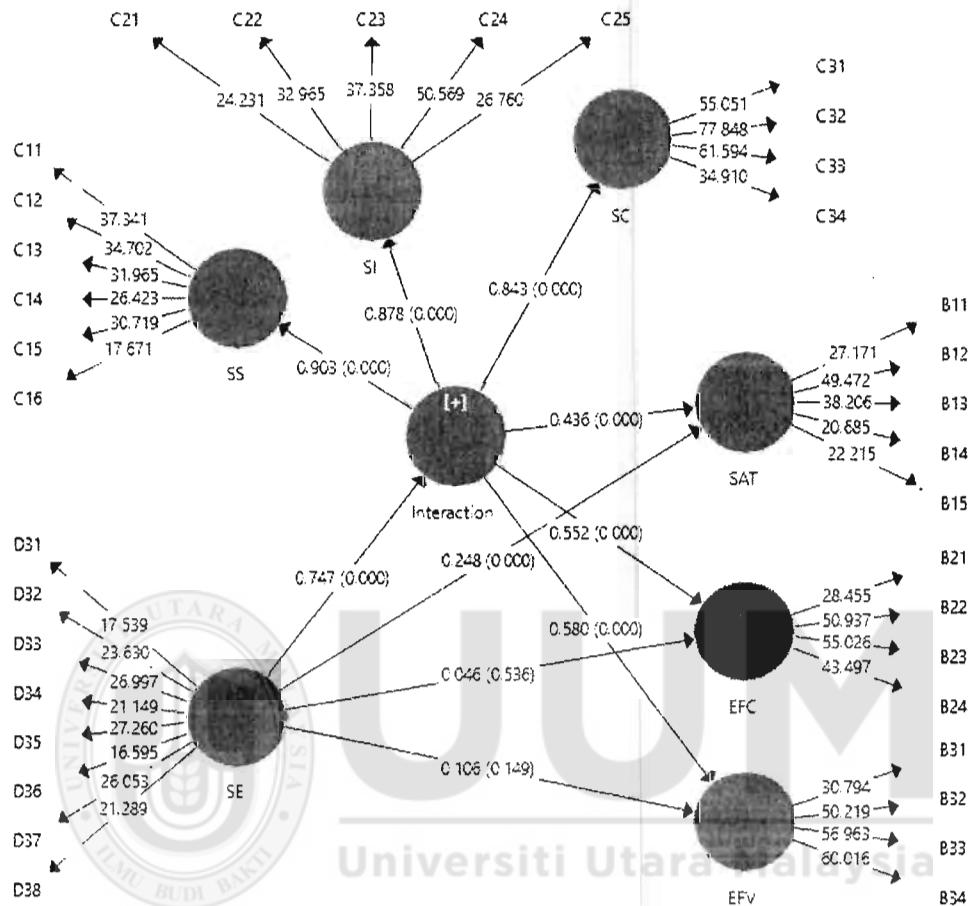
	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Interaction -> EFC	0.552	0.549	0.074	7.428	0.000
Interaction -> EFV	0.580	0.577	0.066	8.727	0.000
Interaction -> SAT	0.436	0.435	0.066	6.555	0.000
Interaction -> SC	0.843	0.844	0.020	43.190	0.000
Interaction -> SI	0.878	0.876	0.018	49.525	0.000
Interaction -> SS	0.903	0.905	0.013	71.290	0.000
SE -> EFC	0.046	0.053	0.075	0.619	0.536
SE -> EFV	0.106	0.109	0.073	1.447	0.149
SE -> Interaction	0.747	0.749	0.028	26.821	0.000
SE -> SAT	0.248	0.254	0.067	3.712	0.000

2d. Calculation of Effect size, f^2

	Exclude	all	R exclude	f squared	Decision
Satisfaction		0.414			
	SE		0.385	0.049	small
	SI		0.333	0.138	medium
Efficiency		0.346			
	SE		0.345	0.002	no effect
	SI		0.211	0.206	medium
Effectiveness		0.44			
	SE		0.434	0.011	small
	SI		0.295	0.259	medium

2e. Calculation of Effect size, q^2

	Exclude	Q all	Q exclude	q squared	Decision
Satisfaction		0.25			
	SE		0.234	0.021	small
	SI		0.198	0.069	small
Efficiency		0.246			
	SE		0.246	0.000	no effect
	SI		0.147	0.131	medium
Effectiveness		0.32			
	SE		0.319	0.001	no effect
	SI		0.21	0.162	medium



3. Mediating Effects

3a. Direct Effect

direct effect

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
SE -> EFC	0.459	0.464	0.050	9.091	0.000
SE -> EFV	0.540	0.543	0.046	11.646	0.000
SE -> SAT	0.574	0.575	0.045	12.768	0.000

3b. Indirect Effect

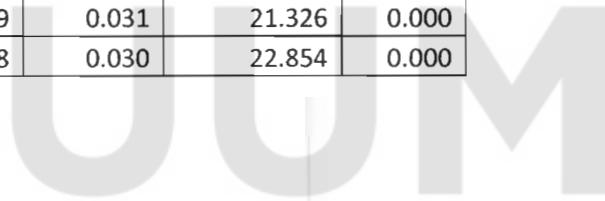
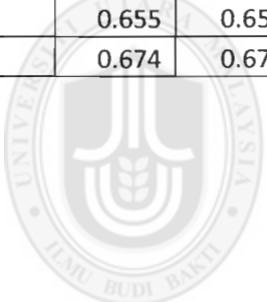
Indirect effect

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Interaction -> EFC					
Interaction -> EFV					
Interaction -> SAT					
Interaction -> SC					
Interaction -> SI					
Interaction -> SS					
SE -> EFC	0.413	0.414	0.049	8.387	0.000
SE -> EFV	0.433	0.435	0.052	8.296	0.000
SE -> Interaction					
SE -> SAT	0.325	0.332	0.052	6.204	0.000
SE -> SC	0.629	0.633	0.031	20.186	0.000
SE -> SI	0.655	0.659	0.031	21.326	0.000
SE -> SS	0.674	0.678	0.030	22.854	0.000

3c. Total Effect

total effect

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Interaction -> EFC	0.552	0.551	0.063	8.772	0.000
Interaction -> EFV	0.580	0.579	0.067	8.710	0.000
Interaction -> SAT	0.436	0.442	0.066	6.641	0.000
Interaction -> SC	0.843	0.843	0.020	42.612	0.000
Interaction -> SI	0.878	0.878	0.018	49.072	0.000
Interaction -> SS	0.903	0.903	0.012	73.271	0.000
SE -> EFC	0.459	0.465	0.048	9.535	0.000
SE -> EFV	0.539	0.544	0.045	11.889	0.000
SE -> Interaction	0.747	0.751	0.028	26.477	0.000
SE -> SAT	0.573	0.579	0.044	13.127	0.000
SE -> SC	0.629	0.633	0.031	20.186	0.000
SE -> SI	0.655	0.659	0.031	21.326	0.000
SE -> SS	0.674	0.678	0.030	22.854	0.000



APPENDIX D
Personal Communication with Nigel Baven
Expert in Usability, ISO 9241, ISO9126





Notifications

Updates **Messages** Requests

Different between 'Quality of Use' and 'Quality in Use' [Report message](#) · [Block user](#)

[Back to list](#)



Noraini Nasirun

9 days ago

Inbox

Sent

Archive

Dear Sir

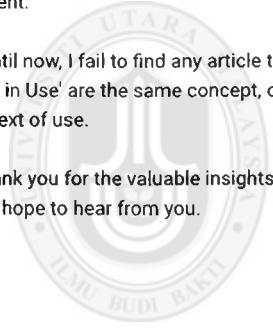
I am a PHD student from Universiti Utara Malaysia (UUM), Malaysia. I started my study in 2013 based on the concept of 'Quality of Use' you discussed in the article Usability is Quality of Use, and Measuring Usability as Quality of Use. However the concept more applicable to products.

For your information, my study related to developing a quality model for blended learning using flipped classroom technology. I used three main variables (satisfaction, efficiency and effectiveness) from 'Quality of Use' concept as the foundation of my model and added two variables related to blended learning environment.

Since I started my study until now, I fail to find any article that stated that 'Quality of Use' and 'Quality in Use' are the same concept, or is it different concept based on the context of use.

Once again, I wanted to thank you for the valuable insights you provided through your articles, and I hope to hear from you.

Warm regards,
Noraini NH



UUM
Universiti Utara Malaysia



Nigel Bevan to you

9 days ago

Although the terms "quality of use" and "quality in use" have slightly different implications, they have been operationalised in the same way. (Quality of use could be seen as a user perspective, while quality in use is a product perspective.)

Note that the most recent concept is "human-centred quality" which explicitly identifies the potential importance of accessibility, user experience and avoidance of harm from use in addition to effectiveness, efficiency and satisfaction in normal use.



Noraini Nasirun

7 days ago

Noted. Thank you very much.

[Unarchive conversation](#)

APPENDIX E

Personal Communication with Darren Yearsley
Senior Media Librarian, CBC Broadcast Centre, Toronto



UUM
Universiti Utara Malaysia



Noraini Nasirun <noraininasirun@gmail.com>

Permission to quote in print transcript for 'Disruptive Innovation' theory often misunderstood, says creator Clayton Christensen

3 messages

noraininasirun@gmail.com <noraininasirun@gmail.com>
To: "darren.yearsley@cbc.ca" <darren.yearsley@cbc.ca>
Bcc: noraininasirun@gmail.com

Thu, Nov 10, 2016 at 12:50 PM

Dear Sir/Madam

My name is Noraini and I am a PHD student from Universiti Utara Malaysia, Malaysia. I'm currently pursuing my PHD study in flipped classroom. The area of my study underpinned by Disruptive Innovation Theory, hence I found that this transcript will give the insight to explain how the theory give an impact to teaching and learning. As for that, I would like to seek your permission to include part of transcript in my thesis.

Hope to hear from you soon. Thank you.

Sent from Mail for Windows 10



Fri, Nov 11, 2016 at 1:34 AM

Darren Yearsley <darren.yearsley@cbc.ca>
To: noraininasirun@gmail.com

Universiti Utara Malaysia

Hello,
Thanks for your request.
Please proceed with use of the transcript.
Please note, this approval is for educational use only, should you need any further licensing please contact me directly.
Thanks,
Darren

Darren Yearsley
Senior Media Librarian
CBC Content Sales, Licensing Division
CBC Broadcast Centre
Room 6B210J,
205 Wellington St. W.
Toronto, Ont.
M5V 3G7
darren.yearsley@cbc.ca
[Quoted text hidden]

noraininasirun <noraininasirun@gmail.com>
To: Darren Yearsley <darren.yearsley@cbc.ca>

Fri, Nov 11, 2016 at 8:36 AM

Noted. Thank you

Sent from my Samsung Galaxy smartphone.
[Quoted text hidden]

APPENDIX F
Notis Pemberitahuan Hak Cipta untuk I-FLIPP



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Universiti Utara Malaysia



Perbadanan Harta Intelek Malaysia

Intellectual Property Corporation of Malaysia

(Diperbadankan)

Unit 1-7 & Mezzanine, Unit 12, 12A, 13, 15, 16, 17, 18, dan 19
Tower B Menara UOA Bangsar, No. 5, Jalan Bangsar Utama 1
59100 Kuala Lumpur
Tel : +603-22998400 Faks: +603-2299 8989
Laman Sesawang : www.myipo.gov.my



LCR01



NORAINI NASIRUN @ HIRUN
FAKULTI PENGURUSAN PERNIAGAAN
BAHAGIAN HAL EHWAL AKADEMIK, BANGUNAN AL-FARABI 1
UNIVERSITI TEKNOLOGI MARA (PERLIS)
02600 ARAU
PERLIS

NOTIS PEMBERITAHUAN HAK CIPTA

(Seksyen 26B, Akta Hak Cipta 1987)

Tuan/Puan

Sukacita dimaklumkan, maklumat butiran Pemberitahuan Sukarela Hak Cipta tuan/puan telah direkodkan ke dalam Daftar Hak Cipta sebagaimana diperuntukkan di bawah Seksyen 26B, Akta Hak Cipta 1987. Butiran Pemberitahuan Hak Cipta tersebut dirujukkan seperti berikut:

TARIKH PERMOHONAN	: 11/12/2015
NO. PERMOHONAN	: LY2015002596
NO. PEMBERITAHUAN	: CRLY00004451
TAJUK KARYA	: INTERGRATES MEASUREMENT FOR FLIPPED CLASSROOM (I-FLIPP)
KATEGORI KARYA	: SASTERA
TARIKH PENERBITAN PERTAMA	: 01/12/2015
PENCIPTA	: NORAINI NASIRUN @ HIRUN SARINA BINTI MUHAMAD NOOR RUSHAMI ZIEN YUSOFF ABD AZIZ OTHMAN
PEMUNYA	: UNIVERSITI UTARA MALAYSIA
PEMEGANG LESEN	: TIDAK BERKAITAN

Tuan/Puan boleh memohon Sijil Pemberitahuan Hak Cipta dengan mengemukakan Borang CR-5 seperti dikepilkkan bersama. Pihak tuan/puan juga boleh memohon petikan yang diperakui sah daripada Daftar Hak Cipta yang boleh dijadikan satu keterangan *prima facie* mengenai butiran yang direkodkan.

Sukacita dimaklumkan juga, sekiranya terdapat sebarang perubahan maklumat sedia ada, pihak tuan/puan dinasihatkan kemukakan maklumat perubahan tersebut untuk direkodkan dalam Daftar Hak Cipta.

Sekian, terima kasih.

"BERKHIDMAT UNTUK NEGARA"

Saya yang menurut perintah,



(MOHAMED FAIRUZ BIN MOHD PILUS)

b.p. Pengawal Hak Cipta

Perbadanan Harta Intelek Malaysia

Tarikh: 07/11/2016

