FACTORS AFFECTING THE USE OF WEB-BASED LEARNING FOR UNIVERSITIES IN THAILAND

RUNGSAN SUWANNAHONG

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY PROGRAM IN BUSINESS ADMINISTRATION FACULTY OF BUSINESS ADMINISTRATION RAJAMANGALA UNIVERSITY OF TECHNOLOGY THANYABURI ACADEMIC YEAR 2014

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Dissertation Title	Factor Affecting the Use of Web-based Learning for Universities in Thailand
Name-Surname	Mr. Rungsan Suwannahong
Program	Business Administration
Dissertation Advisor	Mr. Terawat Piboongungon, Ph.D.
Dissertation Co-advisor	Mr. Werayuth Charoenruengkit, Ph.D.
Academic Year	2014

DISSERTATION COMMITTEE

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(Associate Professor Arunee Intrapairot, Ph. D.)

.....Committee

(Assistant Professor Sureerut Inmor, D. Tech. Sc.)

.....Committee

(Mr. Werayuth Charoenruengkit, Ph. D.)

.....Committee

(Mr. Terawat Piboongungon, Ph. D.)

Approved by the Faculty of Business Administration Rajamangala University of Technology Thanyaburi in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

.....Dean of Faculty of Business Administration

(Associate Professor Chanongkorn Kuntonbutr, D.B.A.)

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ABSTRACT

The purposes of this study were to determine the effects of the four influential factors, namely, performance expectancy, effort expectancy, social influence, and facilitating conditions and a moderator (university policies) on usage behavior and behavioral intention to use web-based learning system, and to explore how universities adjust their policies to increase the usage of web-based learning systems. Population in this study were students who studied in Faculty of Business Administration and Faculty of Science and Technology in list of universities by the Office of the Higher Education Commission of Thailand. And those 2 faculties had launched their web-based learning systems more than one year. Both qualitative and quantitative methods were employed; Unified Theory of Acceptance and Use of Technology (UTAUT) theory were introduced as the technology acceptance model.

According to the quantitative method, data were collected from students by using questionnaire and analyzed with Structural Equation Model (SEM) while the convergent validity was measured by Confirmatory Factor Analysis. The value of factor loading used in the study was greater than 0.6. Concerning the qualitative method, data were collected from selected Dean or Associate Dean for Academic Affairs by in-depth interview and the data were analyzed to facilitate the results of quantitative research.

Research findings were as follows. The relationship among performance expectancy, effort expectancy, social influence, facilitating conditions and usage behavior with the behavioral intention to use web-based learning had a model fit and regression weight significantly support the hypotheses ($p<.05$) for the science students. While results from both the social science and science students indicated that the performance expectancy had no relation to behavioral intention to use the web-based learning system. In addition, the influence of effort expectancy and social influence on behavioral intention to use web-based learning were varied by university policies, such that the effects were stronger in universities with high control policy. The influence of facilitating conditions on usage behavior was varied by university policies, such that the effects were stronger in universities with high control policy. Finally, instructors should inform their students that they could use web-based learning through website and they should have some channels on the systems in order to communicate with their students.

Keywords: Web-based learning, UTAUT, behavioral intention to use web-based learning, universities in Thailand

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Mr. Rungsan Suwannahong

Table of Contents

Table of Contents (Continued)

Table of Contents (Continued)

List of Tables

List of Tables (Continued)

Page

List of Tables (Continued)

Page

List of Figures

CHAPTER 1

INTRODUCTION

1.1 Background and Statement of the Problems

Distance learning is a general concept for adopting non-traditional learning and independent study. Distance learning has begun through the use of technology and use of electronic communication as in instructional compact disk, instructional video tape, educational radio, instructional television, video teleconferencing and web-based learning (E.Owen, 2003).

Web-based learning has exploded across many countries in the world through the Internet. This explosion has been fueled by the information technology revolution (E.Owen, 2003). These types of web-based learning programs offer both theoretical and practical learning. Web-based learning programs are mostly presented in the English language, only a small percentage is presented in other languages. The usage of web-based learning can solve the problem in lacking of experienced teachers because information had posted by experts on their specialized subjects without any geographical restriction. Furthermore, students can utilize the programs anywhere anytime. However, its potential to create value can occur only when individuals are willing to accept and adopt it as a method of learning.

The major reason for students to choose to study online is time flexibility. Other reasons include the elasticity of accessing learning materials anywhere anytime, 24 hours a day, 7 days a week, students with an Internet connection can receive instruction, compose and submit assignments (Sher, 2009) and the convenience of not

having to schedule the time to attend traditional classes. Although web-based learning has certain advantages, it also has several weaknesses including the delay in reply (Petrides, 2002), and feelings of solitude (Hamburg, Lindecke, & Thij, 2003).

Massachusetts Institute of Technology (MIT) at Cambridge, Massachusetts in United States of America, has the most popular web-based learning programs. Students living anywhere in the world can register at MIT by using this system and, instantly, have access to high quality education. Michigan's schools in USA apply web-based virtual learning in K-12 education (Beek, 2011). Saudi Arabian Governmental Universities also use web-based learning for higher education (Alenezi, 2010).

In web-based learning environments, teachers could create interactions within their course materials that focus students' efforts on the courses' objectives and development of important skills. If students cannot achieve the aim of learning tasks, feedback should be immediately provided and addition practical models should be available for the students to improve their learning. While web-based learning environments can be powerful, their potential is often limited by problems of design and implementation (Wijekumar, 2005).

In Thailand, web-based learning has been widely used in various areas such as training new employees in the company, learning courses in both public and private universities, and sharing knowledge in the rural community. Several universities have been developing web-based learning programs either by using their in-house resources or using third-party programs such as proprietary software or open sources.

In 1997, Office of Higher Education Commission provided Thailand Cyber University for formal education, non-formal education and in-formal education.

Although web-based learning is widely used, information provided by National Electronics and Computer Technology Center (NECTEC) stated that the percentage of total visit to educational website in year 2003 accounted to only 2.1% of all visited website in Thailand (NECTEC, 2005) and National Statistic Organization stated that the population with computer usage in the year 2006 accounted to 25.9% and the Internet usage accounted to 14.2% of all population in Thailand (NSO, 2006). Based on these figures, the usage of web-based learning is very low; therefore, students should spend more time on the computer.

1.2 Purpose of the Study

Many researchers have been studying the subject of web-based learning or distance learning. These researches can be divided into three groups. First group of research investigated whether the type of media in distance education affected distance learning achievement. The results from the researches shown that no medium of distance education, from the simplest media (twisted pair) to the more bandwidth media (fiber optic), is superior to another (Biner, 1994; Pruett, 2000; Sorensen, 1996). Second group investigated whether the form of instruction content affected the learning achievement. The results shown that no instruction content of distance education, from the simplest form (text only or printed form) to the most technologically advanced form (two-way video-conferencing), is superior to another; nor is inferior to traditional, face-to-face instruction (Beare, 1989; Merisotis & Phipps, 1999; Schlosser, 1996). The last group created and evaluated distance learning systems (Chen, Lin, & Kinshuk, 2004; Konradt, Christophersen, & Schaeffer-Kuelz, 2006). The researchers recommended

that web-based learning system has potential to create value only when the users are willing to accept and adopt it in their life.

Unified Theory of Acceptance and Use of Technology (UTAUT) is widely used to explain users' behavior in technology acceptance and used to explain user behavior in many fields of research in United States of America (Chiu & Wang, 2008; Marchewka, Liu, & Kostiwa, 2007) but only a small number of researches have been generated in other countries (Im, Hong, & Kang, 2007; Kijsanayotina, Pannarunothai, & Speedie, 2009). The results of the prior study shown that the magnitudes of impacts in the well-accepted UTAUT model vary across different countries and different cultures (Im, et al., 2007; Venkatesh & Zhang, 2010).

Although UTAUT have been used to explain the usage of web-based learning (Marchewka, et al., 2007; Šumak, Polančič, & Heričko, 2010), the critical success factors in web-based learning for universities in Thailand has never been studied before.

The low usage of web-based learning in Thailand could be caused by several reasons. First of all, the users' attitude toward web-based learning, users would prefer to participate with one another in traditional classroom environment rather than learning in web-based learning which left them feeling isolated. Secondly, the aspect of social influence on the students, where the users have no one to influence them or giving them advise on the advantage of using web-based learning. Thirdly, performance expectancy of individual that believes the system will help him or her achieving better learning performance. Next, the level of effort required to use the system. National Electronics and Computer Technology Center (NECTEC) stated that in year 2004 the student to computer ratio in higher education is 8 students per 1 computer, in secondary school is

24 students per 1 computer, and in vocational school is 27 students per 1 computer (NECTEC, 2005), Therefore, student's knowledge in computer usage is extremely low and they should spend more time and effort to learn how use the system effectively. Next, the quality and availability of networking facility, which provided by the universities to support their students to use the web-based learning systems, may not be sufficient for students to make uncomplicated connection to the system. Finally, the application of the university policies that encourage their teachers to create web-based learning materials and provide support for their students to use the system. If university policies do not emphasize the necessity to the use of web-based learning, the web-based learning system would not have a chance to be successful.

Policy is an importance part in the implementation of the goal. Bourgeois et al. defined policy as the set of specific objectives and strategies defined by an institution or organization to achieve its goals or solve problems in a particular area (Suanpang & Petocz, 2006). University policies are critical in the sense that the nature of support provided by higher management level and the terms in the policies may initiate and direct the development of web-based learning within the university (Saekow & Samson, 2011a, 2011b; Suanpang & Petocz, 2006) because distance learning continues to grow in size and importance (Siritongthaworn, Krairit, Dimmitt, & Paul, 2006).

This study chooses model UTAUT to investigate the factors affecting the use of web-based learning for universities in Thailand. The UTAUT model has been selected for many reasons. First, UTAUT is suitable model to study what degree the moderating variable of age, gender and experience present in the technology acceptance and UTAUT can overcome significant limitations by studying complex organizational

technologies, studying employees in technological changes in organizations, and studying usage of technology by contributors. Next, UTAUT is an empirical study that union eight models of technology. Finally, the testing result of the UTAUT had shown very high value for explanation of users' intention to use and usage behavior at approximately 60-70% of the predictable.

This study will study web-based learning adoption in universities in Thailand by UTAUT model and study the effect of university policy on the adoption of web-based learning for universities in Thailand.

This study will make two important contributions. The research will seek to understand general boundary condition related to technology adoption research in web-based learning systems. Also, the study will make recommendation on how universities can manage their web-based learning system to increase the usage of web-based learning systems.

Furthermore, the study will generate information that higher management levels in universities can utilize to manage their resources such as planning for equipment upgrade, training for employees, providing places and networks or facilities to increase the usage of the web-based learning systems in their universities.

1.3 Research Questions and Hypotheses

1.3.1 Research Question

According to previous researches, for the goals of web-based learning to be achieved, it must include four constructs such as facilitating conditions, social

influence, effort expectancy and performance expectancy. It also depends on the policies of the organization.

Facilitating conditions, social influence, effort expectancy and performance expectancy are varying by gender, age, experience and policies. All constructs with behavioral intention may have existed in sequence before use behavior. Therefore, this research wants to study how to get a web-based learning at the university to be more effective and fully utilize the resources. The research question is:

What are factors affecting the use of web-based learning for universities in Thailand?

1.3.2 Hypotheses

When universities invest in web-based learning, they have to effectively manage web-based learning systems to its full potential. Universities have to manage web-based learning system in correspond to the facilitating conditions, social influence, effort expectancy, performance expectancy, and university policies.

For testing whether the context of behavioral intention to use web-based learning have positive effect on usage behavior, the hypotheses are following.

H1: The influence of performance expectancy on behavioral intention will be varied by gender and age, such that the effect will be stronger for men and particularly for younger men.

H2: The influence of effort expectancy on behavioral intention will be varied by gender, age, experience, and university policies, such that the effect will be stronger for women, particularly younger women, and particularly at early stages of experience.

H3: The influence of social influence on behavioral intention will be varied by gender, age, experience, and university policies, such that the effect will be stronger for women, particularly for older women, and particularly in mandatory at early stages of experience.

H4a: Facilitating conditions will not have a significant influence on behavioral intention.

H4b: The influence of facilitating conditions on usage will be varied by age, experience, and university policies, such that the effect will be stronger for older student, particularly with increasing experience.

H5: Behavioral intention will have significant positive influence on usage.

1.3.3 Research Framework

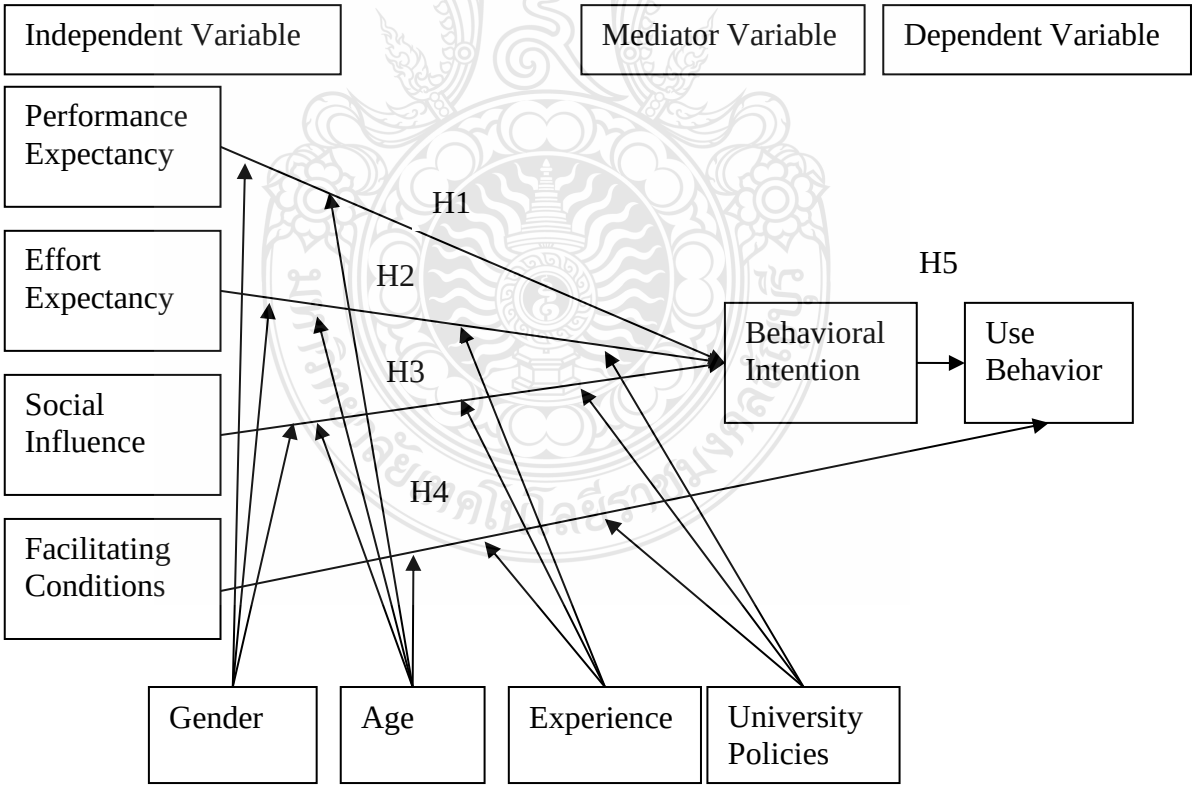

Figure 1.1 Research Framework

1.4 Definition of Terms

Web-based learning has many meanings. Hill propose that it is a revolutionary resource tool and a viable option for all types of learners (Hill, 1997). Wagner propose that it presents a more customized format in which teacher need to interact with each student (Wagner, 2001).

In this study the word web-based learning is defined as learning that teacher need to interact with students through the web-based system, either by using open source or proprietary system platform, such as Blackboard, Moodle, Atutor. Nevertheless, web-based learning in this study excluded learning or teaching by video-conferencing, broadcast radio, satellite TV, and CD.

The word university policy is defined as that set of specific objectives and strategies defined by an institution or organization to achieve or solve problems in usage of web-based learning system in their universities.

1.5 Limitation of the Study

The purpose of this research is to study which factors can be predictable in user behavior to use web-based learning system in universities in Thailand by utilizing UTAUT model as the model of technology acceptance.

Although there are many studies about UTAUT, none of the studies have completely replicated the model. For instance, limitations of prior replications consist of only certain partial of the models, not included all of the moderators, that are different from the original UTAUT (Rosen, 2005). In this study, the whole UTAUT will be replicated such that all constructs, includes all moderators remained as they were

in the study by conducted Venkatesh and Zhang in year 2010.

Another purpose of this research is to determine the major factors affecting the adoption of web-based learning in 20 universities in Thailand which their web-based learning system have already been launched for more than 1 year. The investigation of the faculty of business administration presented as social science representation and faculty of science and technology presented as science representation. The behavioral factors are adoption of web-based learning in the university. This research will be able to drawing of some conclusions concerning the strategies and actions a university should pursue to enhance web-based learning activities.

This study focuses on web-based learning as a distance learning instructional delivery made in bachelor degree programs. For this reason, only data from undergraduate students that used web-based learning are used. The distance education programs that teach online for the graduate and doctoral levels are not included in this study due to the disparate nature of their characterization.

1.6 Scope of the Study

This study will collect data by take questionnaire and in-depth interview between November, 2012 and December, 2012 in universities in Thailand. The scope of this study is limited to analyze and evaluate factors that had effects on web-based learning system. Web-based learning programs delivered at the graduate and doctoral programs are excluded due to the dissimilarity in characterization of students. Assumed no difference of students' types is made between web-based learning and traditional programs. All students are assumed to be a uniform population. The student academic

achievement is not measured and not analyzed in this research.

1.7 Organization of the Study

This research consists of five chapters. Chapter one covers the statement of the problem, purpose of the study, research question, hypothesis, research framework, limitation of study and significant of the study. Chapter two reviews the previous study that related with web-based learning, technology acceptance and policies. It also shows the selection of variable into research framework including facilitating conditions, social influence, effort expectancy, performance expectancy, behavioral intention and usage behavior. Chapter three covers the research methodology that consists of quantitative research for analyzing data and hypothesis testing and qualitative research for confirming and validation the results respectively. Chapter four presents and discusses the research finding. Chapter five presents the conclusion, discussion, research implication, research limitation and future research.

CHAPTER 2

REVIEW OF THE LITERATURE

2.1 Introduction

A literature review has been conducted with the emphasis on the areas relevant to those addressed in this research. It covers UTAUT, an overview of web-based learning, and related literatures.

There are many theories or models of individual acceptance and technology adoption. The 8 popular theories or models are the Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Technology Acceptance Model (TAM), Innovation Diffusion Theory (IDT), Model of PC Utilization (MPCU), Social Cognitive Theory (SCT), Motivational Model (MM), and Combined TAM and TPB (C-TAM-TPB).

TRA is one of the fundamental behavior of human (Ajzen & Fishbein, 1980). TRA has subjective norm and attitude toward behavior as two main constructs for investigating the behavioral intention and behavior.

TPB was adapted from TRA by adding the new construct of perceived behavioral control (Ajzen, 1985).

In 1989 Davis presented the Technology Acceptance Model (TAM) that specified object to acceptance of information systems. The purpose of TAM was to provide a foundation on the impact of external variables on individual's internal beliefs, attitudes, and intentions. TAM has 2 constructs: perceived usefulness (PU) and perceived ease of use (PEOU). PU is defined as the degree to which a person believes that using a particular system would enhance his or her job performance and PEOU is

defined as the degree to which a person believes that using a particular system would be free of effort (F.D. Davis, 1989). In 2000 TAM has been renamed to TAM2 because subjective norm that adapted from TRA and TPB has been added (Venkatesh & Davis, 2000). TAM is the most robust across a range of technologies and is easily applied to different situations because of its predictive power and lower number of constructs.

IDT is proposed by Roger in 1962 and is the ground theory in sociology research. IDT has long served as a useful explanatory in the user behavior. The framework has five constructs of innovations such as relative advantage, compatibility, complexity, trial ability, and observability. Relative advantage is defined as the degree to which innovation is perceived as being better than the idea it replaced. Compatibility is defined as the degree to which innovation is perceived as compatible with existing values and past experiences. Complexity is defined as the degree to which innovation is perceived as relatively difficult to understand and use. Trial ability is defined as the degree to which innovation may be experimented with on a limited base. Finally, observability is defined as the degree to which appearance of innovation are visible to others (Rogers, 1995). In 1991, IDT has been applied to understand the information systems acceptance (Moore & Benbasat, 1991).

MPCU is the model that is adapted from theory of human behavior proposed by Triandis in 1977. MPCU is used to predict usage behavior rather than intention to use (Thompson, Higgins, & Howell, 1991).

SCT is one of the most powerful theories of human behavior. In 1991, Compeau and Higgins applied SCT in computer utilization (Compeau & Higgins, 1991).

MM is normally used in psychology research to support general motivation theory. In 1992, MM has been applied to understand the information systems adoption and use

(F. D. Davis, Bagozzi, & Warshaw, 1992).

C-TAM-TPB is the model that combined all of three constructs of TPB and perceived usefulness of TAM (Taylor & Todd, 1995).

Although each of these models have their strength, their abilities are limited and can only achieve in describe approximately 30-40% of the predictable in user behavior.

After that several similar theories and models were set up to explain why an individual should adapt and use a new technology, and what actions an organization should take to facilitate the use of new technology. TAM has been widely accepted and approved as a reasonably accurate predictor of both behavioral intentions to use a technology and actual usage. Many researchers have tried to add new constructs to the TAM model in an attempt to broaden its explanatory power (Chang, 2008).

In 2003 Venkatesh et al. presented the Unified Theory of Acceptance and Use of Technology (UTAUT) which consists of eight perspectives in the field of technology acceptance research such as TRA, TAM, TPB, C-TAM-TPB, MM, IDT, MPCU, and SCT to obtain an aggregate view of user's acceptance. Venkatesh shown that 3 direct factors of behavioral intention to use a technology are performance expectancy, effort expectancy and social influence and 2 direct factors of technology use are behavioral intention and facilitating conditions and 4 moderators are gender, age, experience and voluntariness may have effect to the factors on behavioral intention and / or use

behavior (Venkatesh, Morris, Davis, & Davis, 2003). It has achieved in describing about 60-70% of the predictable in user behavior.

2.2 Unified Theory of Acceptance and Use of Technology (UTAUT)

Venkatesh, et al. proposed a UTAUT model that combined elements from eight well-known technology acceptance models found in the MIS literature (Venkatesh, et al., 2003). All eight models pointed to behavioral intention or usage behavior at the individual user level. UTAUT model is a unified model that has been synthesized and added to previous models and have been tested by a massive real world dataset. All model's constructs are shown in table 2.1.

Table 2.1 Models and theories of user acceptance

User Acceptance Model	Constructs
Theory of Reasoned Action	subjective norm
	attitude toward behavior
Theory of Planned Behavior	subjective norm
	attitude toward behavior
	perceived behavioral control
Combined TAM and TPB	subjective norm
	attitude toward behavior
	perceived behavioral control
	perceived usefulness

Table 2.1 Models and theories of user acceptance (Cont.)

User Acceptance Model	Constructs
Innovation Diffusion Theory	relative advantage
	ease of use
	result demonstrability
	visibility
	image
	compatibility
	voluntariness of use
Technology Acceptance Model	perceived usefulness
	perceived ease of use
	subjective norm (only in TAM2)
Social Cognitive Theory	outcome expectations performance
	outcome expectations personal
	self-efficacy
	affect
	anxiety
Model of PC Utilization	usage behavior
	long term consequences
	job-fit
	complexity
	affect towards use
	social factors
	facilitating conditions
Motivational Model	extrinsic motivation
	intrinsic motivation

The first step of the UTAUT model creation was to identify overlapping areas and the most important variables. Five new constructs were created that incorporate the

similarities of previous constructs; performance expectancy, effort expectancy, social influence, facilitating conditions, and attitude. The last two of the seven constructs, anxiety and self-efficacy, are taken directly from the Social Cognitive Theory model as shown in table 2.2. (Venkatesh, et al., 2003).

Table 2.2 UTAUT Model Constructs

Construct Name	**Description**	**Original Model**	**Previous Construct Name**
Performance Expectancy	Degree to which individual believes using the system will help him/her attain gains in job performance	TAM, C TAM-TPB, MM MPCU IDT SCT	Perceived Usefulness Job Fit Relative Advantage Outcome Expectations
Effort Expectancy	Degree of ease associated with use of system	TAM, C-TAM-TPB, MM MPCU IDT	Perceived Ease of Use Complexity Ease of Use
Social Influence	Degree to which individual perceives that important others believe he/she should use the technology	TRA, TPB, C-TAM-TPB MPCU IDT	Subjective Norm Social Factors Image
Facilitating Conditions	Degree to which an individual believes that organizational and technical infrastructure exists to support use of the system	TPB, C-TAM-TPB MPCU IDT	Perceived Behavioral Control Facilitating Conditions Compatibility

Table 2.2 UTAUT Model Constructs (Cont.)

Construct Name	Description	Original Model	Previous Construct Name
Attitude	Attitude toward using technology	TRA, TPB, C-TAM-TPB	Attitude Toward Behavior
		MM	Intrinsic Motivation
		MPCU	Affect Toward Use
		SCT	Affect
Anxiety	Feeling of nervousness or worry	SCT	Anxiety
Self-Efficacy	Feeling of effectiveness	SCT	Self-Efficacy

Performance expectancy is defined as the degree to which individual believes using the system will help him or her attain significant gains in job performance. Performance expectancy is a significant factor on behavioral intention varying by gender and age such that the effect is strongest for younger men. The concept of performance expectancy has been considered as the most powerful tool for explaining the intention to use the system regardless of the types of environments, whether mandatory or voluntarily. Effort expectancy is defined as the level people feel comfortable and find it easy to adopt and employ the system for their jobs. Effort expectancy is a significant factor on behavioral intention varying by gender, age and experience such that the effect is strongest for older women in early stages of experience. Social influence is defined as the degree to which individual perceives that important others believe he or she should use the new technology. Social influence is a significant factor on behavioral intention varying by gender, age, experience and

voluntariness such that it is the strongest for older women in early stages of experience in mandatory condition and, as a consequence, intention to use is affect on actual behavior toward technology adoption with facilitating conditions. Facilitating conditions is defined as the degree to which an individual believes that an organizational and technical infrastructure exists to assist use of the system. Facilitating conditions is varying by age and experience such that the effect was strongest for older students in later stages of experience.

As the use of web-based learning in universities continue to increase, it is important that the research studies the user acceptance and the moderating variables such as age, gender, and experience so that universities can maximize web-based learning acceptance and usage.

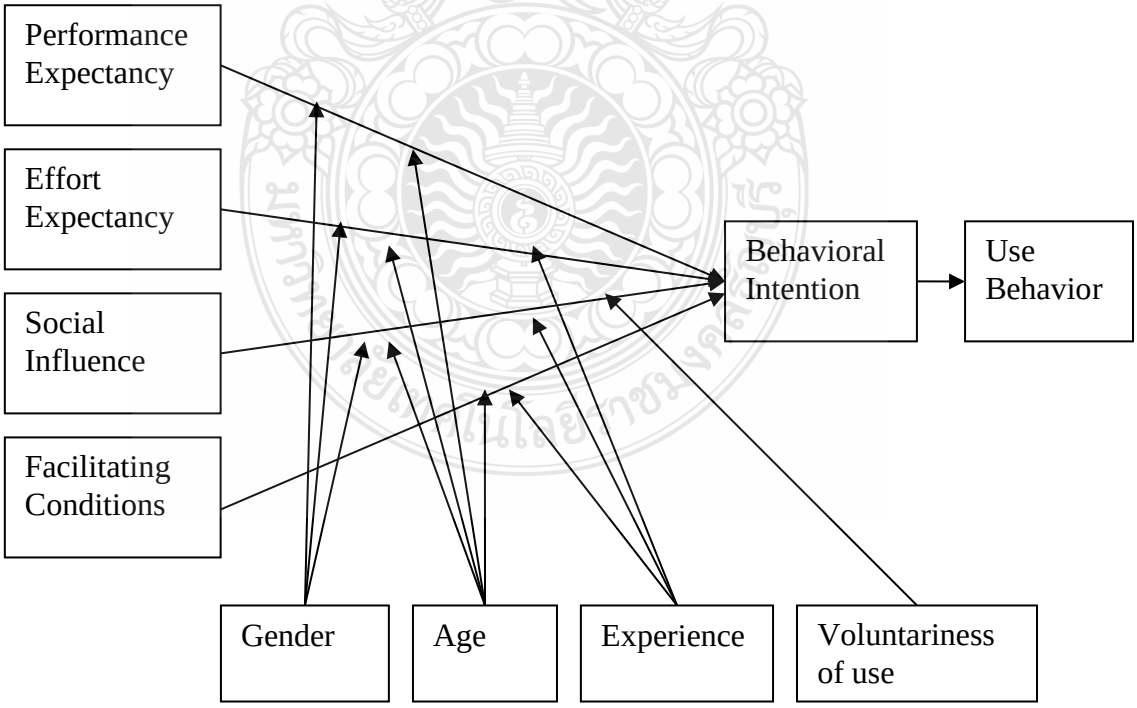

Figure 2.1 Original UTAUT (Venkatesh, et al., 2003)

The original UTAUT model shows that performance expectancy, effort expectancy, social influence, and facilitating conditions as the four main constructs of behavioral intention and usage behavior and portray gender, age, experience and voluntariness of use as moderators (Venkatesh, et al., 2003).

The UTAUT model has been validated in empirical settings as having superior explanation power over other past models. It interprets for 70 percent of the variance in usage intention that is better than any of technology acceptance studies alone.

The results of the prior study shown that the magnitudes of impacts in the well-accepted UTAUT model vary across different countries and different cultures (Im, et al., 2007; Venkatesh & Zhang, 2010).

Based on these evidences, it seemed reasonable to assume that UTAUT could be used to study factor affecting the use of web-based learning for universities in Thailand.

2.3 Overview of web-based learning

Distance learning is a planned learning that normally appears in different places from teaching (Lloyd, 2000). Distance learning instructions are presented in many types of platforms such as CD-ROM, radio, magnetic tape, television through satellite, web pages and video, etc. (Chute, Thompson, & Hancock, 1999).

There are many approaches to web-based learning because they have been fueled by the information technology revolution (Colderway, 1987). Web-based learning is distance learning taught through the Internet or world wide web **(**www**)** often referred to as the "web" as the primary technology medium to deliver the courses

online. The term "online" refers to the active and continuous operation of the Internet using multiple computer networks. This type of distance learning is called "asynchronous" because the course can be delivered anywhere anytime to students whom have a computer and an internet access. One of the approaches is that students can access resources on the web to learn and to solve the required tasks by themselves.

Currently, the learners demand new teaching methods that cater to their technology expectations and individual's learning styles. Web-based learning provides tools to focus on the learning preferences of the students and support teachers in addressing these preferences. Nevertheless, each web-based learning system has unique features and competency levels that effect learning effectiveness of the system (Pergola & Walters, 2011).

The success of web-based learning depends on learner satisfaction and other end-user factors such as self- effectiveness and usefulness. As indicated earlier, e-learner satisfaction is defined as a summary affective response that follows asynchronous web-based learning activities (Crawford, 2000; Wang, 2003). Affect is defined as feelings of like or dislike. Moreover, high level of user satisfaction suggests increased motivation and commitment to web-based learning programs, better learning achievement, and lower dropout rate (Biner, 1994; Chute, et al., 1999). An end-user who perceives web-based learning as a valuable or useful learning tool is more likely to be satisfied with it (Adamson & Shine, 2003). Empirical research findings showed a positive relationship between e-learner satisfaction and perceived usefulness (Konradt, et al., 2006; Peng, Tsai, & Wu, 2006).

A learning management system (LMS) has been adopted, which is the system for managing the learning contents, learning activities and communication between teachers (instructors) and students. LMS included test creation and valuation on the network. LMS has five main functions; registration, delivery, tracking, communication, and testing. Now LMS can be divided into 2 types as follows.

1. Free software (Open Source LMS) with General Public License (GNU).
2. Proprietary LMS. (Coleman & O'Connor, 2007)

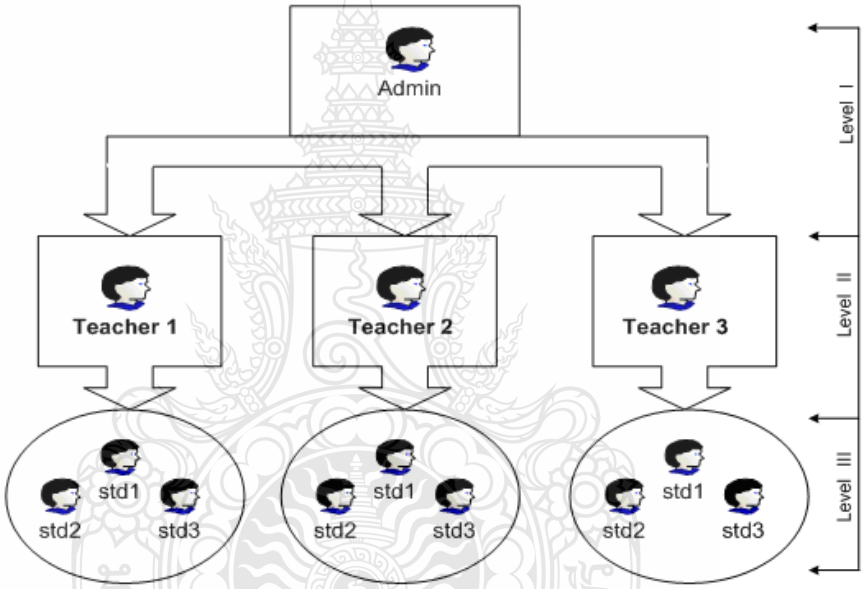

Figure 2.2 LMS User Levels (Coleman & O'Connor, 2007)

Users for LMS can be divided into 3 groups as follows.

- Administrator or admin who installs LMS, setup system, backup all data, and grant privilege for teachers.
- Teacher who creates learning materials.
- Student or guest who enrolls or agrees to learn the subjects.

The reasons of students to select to study web-based learning are availability of not having to attend traditional classes, and the elasticity of accessing course materials anytime and anywhere. On the other hand, weaknesses of web-based learning are the delay of reply (Petrides, 2002), and feeling of solitude (Hamburg, et al., 2003).

2.4 Policy

Bourgeois et al. defined policy as the set of specific objectives and strategies defined by an institution or organization to achieve its goals or solve problems in a particular area (Suanpang & Petocz, 2006). University policies are critical that the nature of support provided at higher management level and the terms in the policies may initiate and direct the development of web-based learning within the university (Saekow & Samson, 2011a, 2011b; Suanpang & Petocz, 2006) because distance learning continues to grow in size and importance (Siritongthaworn, et al., 2006). A successful learning strategy brings about a new awareness for university and student relationships to the achievement of this dynamic state, which is the awakening of individuals to the characteristics of their learning styles and how they can more effectively manage their processes of learning through learning management system and other forms of university sponsored learning procurement (Intanam, Wongwanich, & Lawthong, 2012). Based on this research, university policies should be investigated.

2.5 Related Literature/Previous Studies

There are many researchers who studies web-based learning. For example, Kim studied the web-based subscription databases and the result shown that perceived

usefulness had a stronger effect on user acceptance than ease of use and user training did not have a significant effect on either usefulness or ease of use (Kim, 2005), Coates studied the online learning (Coates, 2006). Ramayah studied the usage of a course website among distance learning business management students in a public institution of higher learning in Malaysia (Ramayah, 2010). Sivo and Pan studied the use of a course management system that developed by the University of British Columbia (Sivo, 2005). All these researches found that perceived usefulness (PU) and perceived ease of use (PEOU) are the key constructs that certainly lead to the actual usage of a particular technology or system.

Alenezi et al studied students' intention to use web-based learning in Saudi Arabian governmental universities. From the result, it confirms that the attitude toward using in mediating have significant association between perceived usefulness, perceived ease of use and behavioral intention (Alenezi, 2010).

In the United States of America, UTAUT has been utilized in many studies. For example, Rosen's investigation of Personal Innovativeness in the domain of information technology studied only partial of the UTAUT models and without moderator (Rosen, 2005). Cameron has been studied the moderating variables of UTAUT (Cameron, 2006). Marchewka and Liu have been studied to gain understanding of student perceptions using Blackboard program as a course management software at a large Midwestern university. Students agreed that Blackboard is a good concept, but have not fully utilized its features. Effort expectancy and social influence were significant constructs of students' behavioral intention (Marchewka, et al., 2007), and Chiu and Wang have been studied learners' continued usage intentions in web-based

learning by uses only partial of the UTAUT models. The results of these studies mentioned above show that performance expectancy, effort expectancy, and computer self efficacy are significant constructs of individuals' intentions to continue using web-based learning (Chiu & Wang, 2008).

Outside United States of America, UTAUT is also widely tested. For example, in the People's Republic of China, Park et.al studied consumers' adoption of mobile technologies by uses only partial of the UTAUT models (Park, 2007). In Hashemite Kingdom of Jordan, AbuShanab, et.al. studied customers' acceptance in Internet banking (AbuShanab, Pearson, & Setterstrom, 2010). In the Kingdom of Thailand, Kijsanayotin, et. al. studied users' adoption in community health centers (Kijsanayotina, et al., 2009). Also in Republic of Slovenia, Šumak used UTAUT to study students' perceptions regarding the use of Moodle. The results show that performance expectancy and social influence have a significant impact on students' attitudes towards using Moodle. Social influence and attitudes toward using are significant constructs of students' behavioral intention. Students' behavioral intention has been shown to be strong and significant construct of actual use of Moodle (Šumak, et al., 2010). Also in 2006, two students in Business Statistics at Suan Dusit Rajabhat University (SDU), Suanpang and Petocz, studied the efficiency and effectiveness of the online learning system. The research conducted over 16 weeks compared online learning with traditional teaching. Results of the analysis show that students' outcomes were more favorable in the online groups than in the traditional groups (Suanpang & Petocz, 2006). Trangratapit studied how culture influenced faculty members' perception toward the implementation of e-learning, the results show that faculty members with more prior

technological familiarity were more motivated to participate in the implementation of e-learning than those with less prior technological experience and faculty members with less prior technological familiarity reported the need for more training than those with greater technological familiarity (Trangratapit, 2010). In 2010. Sanserm studied perceptions of using ATutor as the learning content management system for distance learning. The results show that gender, comfort of using the system, time spent online each week and frequency of access to system had positive significant to students' perception of using ATutor (Sanserm, 2010).

Cross culture studies, Im et.al. uses UTAUT to identified user's intention to use MP3 player and Internet banking by comparison cross culture of Republic of Korea and United States of America (Im, et al., 2007). In 2010 Venkatesh and Zhang use UTAUT to compare cross culture of United States of America and the People's Republic of China (Venkatesh & Zhang, 2010). In 2011, Saekow and Samson studied e-learning readiness of Thailand's universities comparing to the USA's cases. The results show that e-learning adoption in Thailand requires support from both the public and private sectors in order to succeed, the content of e-learning in Thailand is not well designed and lacks cultural accessibility, Thai universities must provide adequate, effective staff for developing e-learning systems and for supporting lecturers and students and Institutions must offer instructional technology support to help faculty so that they can focus on the instruction rather than the technology (Saekow & Samson, 2011b).

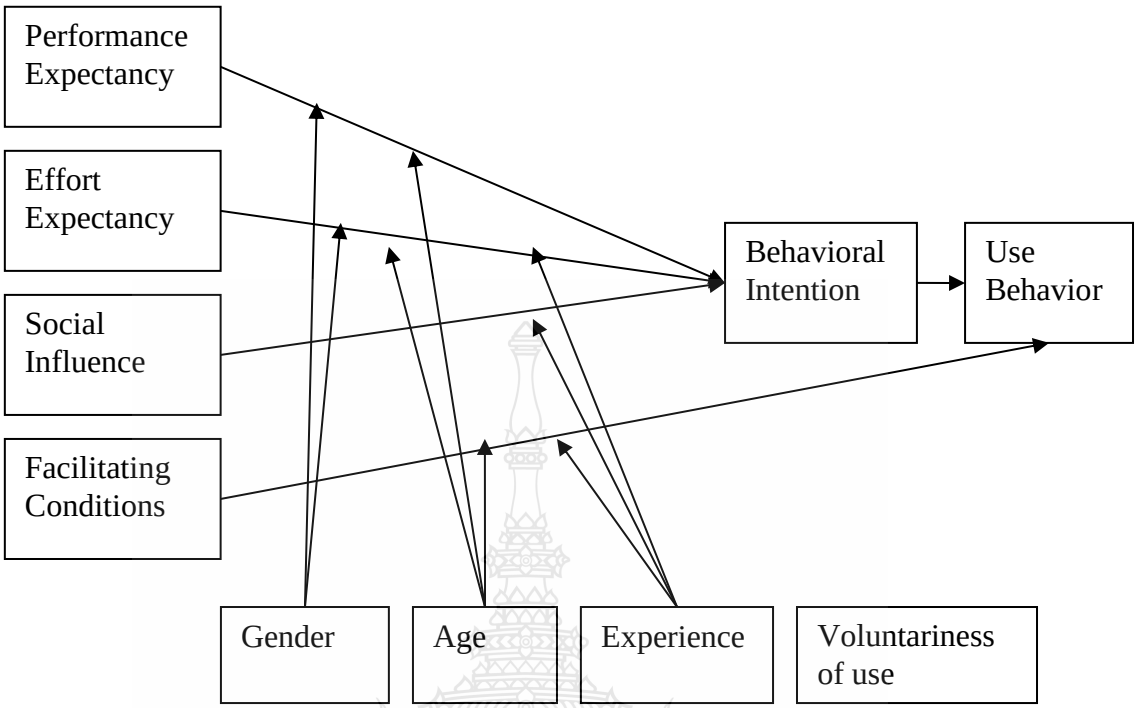

Figure 2.3 Revised UTAUT (Venkatesh & Zhang, 2010)

Although there are many studies about UTAUT, none of the studies in web-based learning in Thailand has completely replicated the model. For instance, limitations of prior replications consist of only partial of the models, not included all moderators that are different from the original UTAUT.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents research methodology utilized to study the relationship between performance expectancy, effort expectancy, social influence, facilitating conditions and use behavior with behavioral intention. The chapter comprises of four parts: Research design, Quantitative Methodology, Qualitative Methodology, and Sequence of Analysis.

3.2 Research Design

The research design is a non-experimental research design that observes from population or research sample at one specific point in time and it is designed in the form of mixed method. This research uses a questionnaire based survey for quantitative research and in-depth interview with Dean or Associate Dean for Academic Affairs for qualitative research. The data from the interview is uses to confirm the result of quantitative research.

UTAUT variables were operationalized according to the items used for estimating UTAUT by Venkatesh and Zhang (2010). Babbie says that the survey is best method of observation to the social scientist interested in collecting original data for describing a population too large to observe directly (Babbie, 2007) and Denscombe says that the survey approach is suitable for quantitative data (Denscombe, 2007). The items have been set into the context of web-based learning. The unit of analysis is the

students in universities in Thailand that their web-based learning system in the university has already been launched for more than 1 year. Data collection has been done in November, 2012 and December, 2012.

3.3 Quantitative Methodology

3.3.1 Population and Sampling

Data collected from surveys provide the universities in Thailand valuable insights and lessons learned from the implication of how the technological pedagogical and monetary outcome connected with developing, delivering, managing and evaluating web-based learning systems. The results generated by this paper can help them develop or improve their distance learning education models.

In this research, data for analysis is collected from both public universities and private universities in Thailand that their web-based learning systems have been launched for more than 1 year and those universities have both faculty of business administration and faculty of science and technology, which represented for social science and science students. The 20 universities listed on Office of the Higher Education Commission (Trangratapit, 2010) of Thailand are the research population. Sample size was computed by Yamane formula with 95% of confidence levels

$$n = \frac{N}{1 + Ne^2}$$

Where n is sample size

N is the population, 39,773 people

and e is error value

$$n = \frac{39773}{1 + 39773(.05)^2}$$
$$n = 396$$

At individual university and each of the two faculties, the study collected data from 10 students who were enrolled for web-based learning to complete the survey by using convenience method survey for quantitative method. Qualitative method will be in-depth interview Dean or Associate Dean for Administrative for each faculty.

3.3.2 Data Gathering

Data were collected from three sources. First, the secondary data from university listed on Office of the Higher Education Commission of Thailand database. Data were filtered and chosen only universities with both faculty of business administration and faculty of science and technology. The selected field uses in this research are university name.

The second part of data is observation made on the web page of each university. Data were filtered and chosen only universities that their web-based learning systems have been launch for more than 1 year.

The third part of data is primary data that have been gathered by collecting questionnaires from students on site. The respondents represented student attitude of giving important to performance expectancy, effort expectancy, social influence,

facilitating conditions with the context of behavioral intention and benefit from using web-based learning.

3.3.3 Research Instrumentation

3.3.3.1 Questionnaire

The questionnaire is a tool for gathering data from research samples. The survey contained a number of questions that were adapted from Venkatesh et al and designed to capture information on the individual constructs in the research model. The questions measured performance expectancy, effort expectancy, social influence, facilitating conditions, behavioral intention to use the system, usage behavior and university policies (Venkatesh, et al., 2003). The questionnaire composes of nine parts.

The first part of questionnaire, question number 1 to 4, are questions about performance expectancy to evaluate the student or lecturer attitude of the degree to which individual believes using the system will help him/her attain gains in their performance.

The second part of questionnaire, question number 5 to 8, are questions about effort expectancy to evaluate the students or lecturers' attitude of the degree of ease associated with the use of web-based learning system.

The third part of questionnaire, question number 9 to 12, are questions about social influence to evaluate the students or lecturers' attitude of degree to which individual perceives that important others believe he/she should use the technology.

The fourth part of questionnaire, question number 13 to 16, are questions about facilitating conditions to evaluate the students or lecturers' attitude of

the degree to which an individual believes that organizational and technical infrastructure exists to support use of the web-based learning system.

The fifth part of questionnaire, question number 16 to 20, are questions about self efficacy.

The sixth part of questionnaire, question number 21 to 25, are questions about behavioral intention.

The seventh part of questionnaire, question number 26 to 28, are questions about use behavior.

The eighth part of questionnaire, question number 29 to 31, are questions about university policies.

The last part of questionnaire is questions with the context of general information about demographics and experience in using web-based learning. Question number 32 is gender. Question number 33 is Age. Question number 34 is faculty name. Question number 35 is educational level. Question number 36 is experience in using web-based learning and question number 37 is university type.

3.3.3.2 Test for Response Bias

Because questionnaire was used for collecting attitude from research sample, the bias may incurred from respondents. This research has designed methodology to prevent and detect respondents' bias in both social and non-response bias.

Social bias is errors that come from respondent try to fill differing potential answer into questionnaire, because they try to show their good behavior in the

answer. To prevent social bias, questionnaire should be designed by avoiding content that affect respondents' feeling of impairment.

The return questionnaire will be omitted if all answers are the same and there was no intention to answer the questionnaire. Thus, these questionnaires will not be used for research data. Additionally, it is assumed that the late return of the questionnaires would be under the response bias. The response bias will be tested by comparing the first and the second half of the data between the late return questionnaires and the existing questionnaires using the model. If they are not different, then there is no response bias.

3.3.4 Measurement

Scale: This study uses Likert 5 scale to receive the attitude from survey questionnaire. The Likert 5 scale use as a proxy of interval scale for presenting the level of constructs. Level of give agrees.

1 = Strongly Disagree

2 = Slightly Disagree

3 = Moderately Agree

4 = Agree

5 = Strongly Agree

3.3.5 Validity and Reliability

3.3.5.1 Content Validity Testing: The content validity uses for assessing the questionnaire cover the theory. The questionnaire has been assessed by 5

scholars. The result from the assessment uses to adjust and improve the questions to be more accurate.

3.3.5.2 Convergent Validity Testing: The convergent validity uses in Structural Equation Model analysis for assessing variables whether it represents its theoretical context. The method for testing is CFA (Confirmatory Factor Analysis). After CFA analysis, they are good represent of latent variables, if they were being able to arrange in the same group.

3.3.5.3 Discriminant Validity Testing: One of testing that assess SEM analysis is Convergent Validity Testing. The SEM method use it for assessing correlation among latent variables to confirm that they are good represent of latent variable and do not correlate with other latent variable.

3.3.5.4 Reliability Testing: The questionnaire was sent to twenty students volunteered for the pre-test, whom were available at the time. The main goal of the pre-test was to improve the content of the measuring items for meaningfulness, relevance and clarity. The reliability testing analyzes and selects only the Cronbach's alpha score above 0.7. If the score is lower than 0.7, it will be dropped out. The reliability testing will be tested again after the questionnaires are filled and returned. This pre-testing is one of requirements of SEM analysis.

3.3.6 Result Methodology

The analysis of demographic data of respondents will use mean, frequency, percentage, and standard deviation. The analysis of descriptive statistic that studied the factor affecting the use of web-based learning for universities in Thailand compares with the following scale.

The scale levels of all constructs gives agree that calculated from (5-1)/5 = 0.80.

1.00 - 1.79 = Strongly Disagree

1.80 – 2.59 = Disagree

2.60 – 3.39 = Moderately Agree

3.40 – 4.19 = Agree

4.20 – 5.00 = Strongly agree

The Structural Equation Model analyze as follows:

- Investigate variable with Reliability, Convergent Validity, Discriminant Validity.
- Create Model from research framework
- Define observe and latent to research model.
- Analyze model for calculating regression weight
- Assessment the Model Fit
    a. Chi-Square should not have significant, p-value > .05
    b. Chi-Square/ Degree of Freedom should be less than 2.00
    c. RMR (Root Mean Square Residual) should be less than 0.05
    d. Good of fit index close to 1
    e. Root Mean Square Error of Approximation should be less than 0.05
    f. NFI (Normed Fit Index) and CFI (Comparative Fit Index) close to 1

g. Examine the Hoelter value should be more than 200 for confirming that research samples are appropriate with the model.

According to research framework and hypothesis in chapter one, this study use Structural Equation Model Analysis. Thus, for hypothesis testing the statistical research model was created as follows:

The first model used to test that performance expectancy, effort expectancy, social influence, and facilitating conditions have effect on behavioral intention and behavioral intention has effect on usage behavior with portray gender, age, experience voluntariness of use and university policies as moderators.

3.4 Qualitative Methodology

The qualitative research uses the in-depth interview from Dean or Associate Dean for Academic Affairs to confirm the result of quantitative research.

3.4.1 Population and Sample

The qualitative research populations are the same as quantitative research. This step did not defined the amount of research sample, but it will postpone the interview until working hypothesis has been accepted.

3.4.2 Research Instrument

Interview is the face-to-face interview conduct with Dean or Associate Dean for Academic Affairs. The questions are open-ended questions that require the explanatory answers without any pre-determine or controlling direction. The answer will phrase by statement responds.

The questions of in-depth interview consist of 6 parts as follows:

1. Consent to participate

2. University Policies questions

3. Web-based learning design questions

4. Conducting the used of web-based learning questions

5. Open question

6. Grateful close

3.4.3 Result Methodology

The interview for qualitative research was analyzed in inductive description. Firstly, the in-depth interview with the first interviewee then the working hypothesis is proposed. Secondly, another interview is performed. The answer from latest interviewee had been tested with the working hypothesis. The working hypothesis had been adapted into a new working hypothesis should the result from the next interview disagrees with previous working hypothesis. The process is then repeated until the latest interview had generalized with working hypothesis until all hypotheses had been accepted.

3.5 Sequence of Analysis

This research uses both methodologies: quantitative and qualitative research. The sequence of analysis present as follows:

- The Quantitative Research
    - Pre-testing
        1) Content Validity

2) Reliability test, only 20 tryout sampling data

- Cronbach's alpha testing

3) Redesign questionnaire if Cronbach’s alpha less than 0.7

- Statistic Analysis

1) Descriptive Statistic Analysis

- Mean, Frequency

2) Reliability testing

- Cronbach's alpha testing

3) Validity Testing

- Confirmatory Factor Analysis (Convergent validity)
- Statistic Method (Discriminant Validity)

4) Structure Equation Model Testing

- Create Model
- Analysis Model
- Measure of fit:

- Consider X , X /df, degree of freedom, P-value, RMSEA, GFI
- If model not fit, it has adjust modification indices and go to analyze model again
- If model fit
  - Analyze the regression weight, p-value
  - Analyze direct and indirect relationship

5) Quantitative Research reporting

- The Qualitative Research
    - Interview
        - Description content analysis
        - Propose working hypothesis
    - Iteration Interview
        - Description content analysis
        - Repeat until working hypothesis accepted
    - Qualitative research report
- Analysis both quantitative research and qualitative research
- Conclusion

CHAPTER 4

RESERCH RESULT

4.1 Introduction

This chapter presents research results which of three parts. Part one is the result of quantitative research including the pre-testing, its demographic data, and Structural Equation Model analysis. Part two is the result of quantitative research conducted with the focus group including its demographic data, and Structural Equation Model analysis. Part three is the qualitative research result of the in-depth interview with Dean or Associate Dean for Academic Affairs.

4.2 Quantitative Result

4.2.1 Pre-Testing

The questionnaire has been tested in term of content validity and reliability before commencing the data research sample collection.

4.2.1.1 Content Validity

The content validity has been assessed by experts including five scholars: Assoc. Prof. Dr. Jaruthat Santisirisomboon, Dr. Piyarat Premanoch, Dr. Duangkamol Panrostip Thunmatiwat, Assoc. Prof. Dr. Thanadol Kongsomboon and Dr. Napachat Tareelap. The assessment used IOC (Index of Item-objective Congruence) method to score individual question according to theory, research objective, and accurate meaning. After the test on the questions has been completed, the result of the

IOC score was 0.75, which acceptable in term of the content validity. However, some questions had been modified based on the experts' suggestions and recommendations.

4.2.1.2 Reliability Testing

The reliability testing is a measurement for internal consistency of the questionnaire. The questionnaires were applied to 20 students. After receiving the questionnaires back from the research samples, data was analyzed using Cronbach's alpha to test the reliability of the questions. The test results of each questions' group is presented in Table 4.1.

Table 4.1 Reliability statistic

Variable	Cronbach's alpha
Performance expectancy	0.826
Effort expectancy	0.839
Social influence	0.801
Facilitating conditions	0.857
Behavioral intention	0.866
Use behavior	0.892
University policies	0.849

The analysis result of reliability testing have the following details: performance expectancy has Cronbach' alpha of .826, effort expectancy has Cronbach's alpha of .839, social influence has Cronbach's alpha of .801, facilitating conditions has Cronbach's alpha of .857, behavioral intention has Cronbach's alpha of 0.866, use behavior has Cronbach's alpha of .892, and university policies has Cronbach's alpha of

.849. From the test results, Cronbach's alpha scored more than 0.7 on all variables, thus it indicated that they are reliable.

4.2.2 Response Rate

To prevent the low rate of response, the questionnaires were collected from 410 people which more than the number of sample size calculated in chapter three. The 410 people had responded to the questionnaires. It is a 100.0% of 410. The respondents show as follows. 406 bachelor's degree students and 4 graduate degree students replied, 205 public university students and 205 private university students replied.

Table 4.2 Response rate

Type of University	Faculty	Sent	Return
Public universities	Faculty of Business Administration	103	103
	Faculty of Science	102	101
Private universities	Faculty of Business Administration	102	102
	Faculty of Science	103	100

4.3 Demographic Data

Questionnaires had been distributed to research sample, which defined the respondents as bachelor's degree students who use web-based learning. The questions on their demographical details consist of six parts: gender, age, faculty, using experience, university type and frequency in using web-based learning. After questionnaires are filled and returned, the data from the questionnaires are collected. The demographic data and detail can be summarized as shown in Table 4.3.

Table 4.3 Demography summary

	Frequency	Percentage
Gender		
Female	222	54.7
Male	184	45.3
Age		
Younger than or equal to 19 years old	161	39.7
20 years old	31	7.6
21 years old	65	16.0
22 years old	19	4.7
Older than or equal to 23 years old	130	32.0
Faculty		
Faculty of Business Administration	205	50.5
Faculty of Science	201	49.5
Using experience		
Less than 1 year	162	39.9
Between 1 – 2 years	31	7.6
Between 2 – 3 years	65	16.0
Between 3 – 4 years	19	4.7
More than 5 years	129	31.8
University type		
Public universities	204	50.2
Private universities	202	49.8

Table 4.3 Demography summary (Cont.)

	Frequency	Percentage
Frequency in using web-based learning		
Less than 1 time per week	18	4.4
1 or 2 times per week	67	16.5
3 to 5 times per week	138	34.0
1 per day	59	14.5
More than 1 per day	124	30.5

In Table 4.3, the result of demographic data of respondent consists of seven parts show as following.

4.3.1 Gender

According to demographic data, 222 (54.7%) of the respondents were female and 184 (45.3%) were male. It showed that the majority of respondents were female.

4.3.2 Age

According to demographic data, 161 (39.7.0%) of the respondents were younger than or equal to 19 years old, 31 (7.6%) of them were 20 years old, 65 (16.0%) of them were 21 years old, 19 (4.7%) of them were 22 years old, and 130(32.0%) of them were older than or equal to 23 years old. It showed that the majority of web-based learning respondents was at the ages younger than or equal to 19 years old.

4.3.3 Faculty

According to demographic data, 205 (50.5%) of the respondents were students in Faculty of Business Administration, and 201 (49.5%) of them were students in Faculty of Science. It showed that the numbers of responds from Faculty of Business Administration and Faculty of Science constituted the similar portion.

4.3.4 Using experience

According to demographic data, 162 (39.9%) of the respondents had less than 1 year using experience, 31 (7.6%) of the respondents had between 1 or 2 years, 65 (16.0%) of the respondents had between 2 to 3 years, 19 (4.7%) of the respondents had between 3 to 4 years, and 129 (31.8%) of the respondents had more than 5 years. It showed that the majority has less than 1 year experience in using web-based learning.

4.3.5 University type

According to demographic data, 204 (50.2%) of the respondents were students in public universities, and 202(49.8%) of them were students in private universities, it showed that the responds from public universities and private universities constituted the similar portion.

4.3.6 Frequency in using web-based learning

According to demographic data, 18 (4.4%) of the respondents used web-based learning less than 1 time per week, 67 (16.5%) of them between 1 or 2 times per week, 138 (34.0%) of them between 3 to 5 times per week, 59 (14.5%) of them once per day, and 124 (30.5%) of them more than once per day. It showed that the majority had the frequency of using web-based learning between 3 to 5 times per week.

4.4 Descriptive Statistic

4.4.1 Performance Expectancy

The giving agree to performance expectancy is independent variable of the study. The questions asked the degree to which individual believes using the web-based learning will help him/her attain gains in job performance. The results presented in Table 4.4.

Table 4.4 The performance expectancy descriptive statistic

Variable	Min	Max	Mean	S.D.	Result
PE1 (Find the web-based learning useful)	2	5	4.50	0.686	Strongly Agree
PE2 (Accomplish tasks more quickly)	2	5	4.56	0.708	Strongly Agree
PE3 (Increases productivity)	2	5	4.38	0.769	Strongly Agree
PE4 (Increase chances of getting a good score)	2	5	4.50	0.707	Strongly Agree

According to Table 4.4, the results of statistical analysis of giving agree are:

Respondents find the web-based learning useful was strongly agree level ($\bar{x}$ = 4.50) with S.D. of 0.686, respondents accomplish tasks more quickly when using web-based learning was strongly agree level ($\bar{x}$ =4.56) with S.D. of 0.708, respondents using web-based learning for increases productivity was strongly agree level ($\bar{x}$ =4.38) with S.D. of 0.769, and respondents using web-based learning to increase chances of getting a good score was strongly agree level ($\bar{x}$ =4.50) with S.D. of 0.707.

4.4.2 Effort Expectancy

The giving agree to effort expectancy is independent variable of the study. The questions asked the degree of ease associated with use of web-based learning. The results presented in Table 4.5.

Table 4.5 The effort expectancy descriptive statistic

Variable	Min	Max	Mean	S.D.	Result
EE1 (Web-based learning would be clear and understandable)	2	5	4.43	0.798	Strongly Agree
EE2 (Easy to become skillful)	1	5	4.20	0.880	Strongly Agree
EE3 (Web-based learning is easy to use)	1	5	4.19	0.727	Agree
EE4 (Operate the web-based learning is easy)	1	5	4.02	0.665	Agree

According to Table 4.5, the results of statistical analysis of giving agree are: Web-based learning would be clear and understandable was strongly agree level ($\bar{x}$ = 4.43) with S.D. of 0.798, easy to become skillful was strongly agree level ($\bar{x}$ = 4.20) with S.D. of 0.880, web-based learning is easy to use was agree level ($\bar{x}$ = 4.19) with S.D. of 0.727, and operate the web-based learning is easy also was agree level ($\bar{x}$ = 4.02) with S.D. of 0.665.

4.4.3 Social Influence

The giving agree to Social Influence is independent variable of the study. The questions asked the degree to which individual perceives that important others believe he/she should use the web-based learning system. The results presented in Table 4.6.

Table 4.6 The social influence descriptive statistic

Variable	Min	Max	Mean	S.D.	Result
SI1 (People who influence my behavior think that I should use it)	3	5	4.62	0.700	Strongly Agree
SI2 (People who are important to me think that I should use it)	3	5	4.63	0.597	Strongly Agree
SI3 (The senior management of this university has been helpful)	3	5	4.36	0.616	Strongly Agree
SI4 (The university has provided supports)	3	5	4.40	0.585	Strongly Agree

According to Table 4.6, the results of statistical analysis of giving agree are:

People who influence them behavior think that they should use it was strongly agree level ($\bar{x}$ = 4.62) with S.D. of 0.700, people who are important to them think that they should use it was strongly agree level ($\bar{x}$ = 4.63) with S.D. of 0.597, the senior management of this university has been helpful was strongly agree level ($\bar{x}$ = 4.36) with S.D. of 0.616, and the university has provided supports also was strongly agree level el ($\bar{x}$ = 4.40) with S.D. of 0.585.

4.4.4 Facilitating Conditions

The giving agree to facilitating conditions is independent variable of the study. The questions asked the degree to which an individual believes that organizational and technical infrastructure exists to support use of the web-based learning system. The results presented in Table 4.7.

Table 4.7 The facilitating conditions descriptive statistic

Variable	Min	Max	Mean	S.D.	Result
FC1 (I have the necessary resources to use it)	2	5	4.19	0.809	Agree
FC2 (I have the necessary knowledge to use it)	1	5	3.94	0.930	Agree
FC3 (The web-based learning is not compatible with other systems)	1	5	4.08	0.738	Agree
FC4 (A specific person or group is available for assistance with web-based learning difficulties)	1	5	4.06	0.769	Agree

According to Table 4.7, the results of statistical analysis of giving agree are:

Respondents have the necessary resources to use it was agree level ($\bar{x}$ = 4.19) with S.D. of 0.809, respondents have the necessary knowledge to use it was agree level ($\bar{x}$ = 3.94) with S.D. of 0.930, the web-based learning is not compatible with other systems was agree level ($\bar{x}$ = 4.08) with S.D. of 0.738, and a specific person or group is

available for assistance with web-based learning difficulties also was agree level ($\bar{x}$ = 4.06) with S.D. of 0.769.

4.4.5 Behavioral Intention

The giving agree to behavioral intention is independent variable of the study. The questions asked the behavioral intentions to use a web-based learning system. The results presented in Table 4.8.

Table 4.8 The behavioral intention descriptive statistic

Variable	Min	Max	Mean	S.D.	Result
BI1 (I intend to use the web-based learning in the next 6 months)	3	5	4.53	0.618	Strongly Agree
BI2 (I predict I would use the web-based learning in the next 6 months)	3	5	4.29	0.755	Strongly Agree
BI3 (I plan to use the web-based learning in the next 6 months)	2	5	4.41	0.612	Strongly Agree
BI4 (Assuming I had access to the web-based learning, I intend to use it)	2	5	4.21	0.575	Strongly Agree
BI5 (Given that I had access to the web-based learning, I predict that I would use it)	3	5	4.15	0.499	Agree

According to Table 4.8, the results of statistical analysis of giving agree are:

Respondents intend to use the web-based learning in the next 6 months was strongly agree level ($\bar{x}$ = 4.53) with S.D. of 0.618, respondents predict they would use the web-based learning in the next 6 months was strongly agree level ($\bar{x}$ = 4.29) with S.D. of 0.755, respondents plan to use the web-based learning in the next 6 months was strongly agree level ($\bar{x}$ = 4.41) with S.D. of 0.612, assuming respondents had access to the web-based learning, they intend to use it was strongly agree level ($\bar{x}$ = 4.21) with S.D. of 0.575, and given that respondents had access to the web-based learning, they predict that they would use it also was agree level ($\bar{x}$ = 4.15) with S.D. of 0.499.

4.4.6 Use Behavior

The giving agree to use behavior is dependent variable of the study. The questions asked about the actual use of web-based learning system. The results presented in Table 4.9.

Table 4.9 The use behavior descriptive statistic

Variable	Min	Max	Mean	S.D.	Result
UB1 (I do not evaluate costs and benefits of using the web-based learning before every use)	3	5	4.35	0.711	Strongly Agree
UB2 (I carefully think about using the web-based learning before every use)	3	5	3.89	0.765	Agree
UB3 (My use of the web-based learning is automatic)	3	5	4.21	0.715	Strongly Agree

According to Table 4.9, the results of statistical analysis of giving agree are:

Respondents do not evaluate costs and benefits of using the web-based learning before every use was strongly agree level ($\bar{x}$ = 4.35) with S.D. of 0.711, respondents carefully think about using the web-based learning before every use was agree level ($\bar{x}$ =3.89) with S.D. of 0.765, and respondents use of the web-based learning is automatic was strongly agree level ($\bar{x}$ =4.21) with S.D. of 0.715.

4.4.7 University Policies

The giving agree to university policies is moderator variable of the study. The questions asked about the policy of using web-based learning system. The results presented in Table 4.10.

Table 4.10 The university policies descriptive statistic

	Frequency	**Percentage**
UP1 (Portion of lecturers told respondents that they can using the web-based learning)		
Less than or equal to 20 %	35	16.01
Between 21 - 40 %	67	16.50
Between 41- 60%	145	35.71
Between 61 - 80%	59	14.53
More than or equal to 80%	70	17.24
UP2 (Portion of subjects in semester that using the web-based learning)		

Table 4.10 The university policies descriptive statistic (Cont.)

	Frequency	**Percentage**
Less than or equal to 20 %	40	9.85
Between 21 - 40 %	62	15.27
Between 41- 60%	153	37.68
Between 61 - 80%	59	14.53
More than or equal to 80%	92	22.66
UP3 (Portion of fail connections to system during semester)		
Less than or equal to 20 %	143	35.22
Between 21 - 40 %	51	12.56
Between 41- 60%	150	36.95
Between 61 - 80%	50	12.32
More than or equal to 80%	12	2.96

According to Table 4.10, the results of statistical analysis are:

Only 145 (35.71%) of the respondents answered the portion of lecturers told them that they can use the web-based learning between 41- 60%, 153 (37.68%) of the respondents found the portion of subjects in semester that using the web-based learning between 41- 60%, and 150 (36.95%) of the respondents found that they had fail connections to web-based learning system between 41- 60% during semester.

4.5 Structural Equation Model

4.5.1 Normal Distribution Testing

The Structural Equation Model Analysis requires that all variables should be normal distribution. The normality testing measured from skewness and kurtosis must be between -2 and +2 (Division of Statistic Scientific Computation College of Natural Sciences The University of Texas at Austin, 2011; Stahl, 2011). After testing, the researcher found that all variables are normal distribution. The result of testing is shown in Appendix A

4.5.2 Reliability Testing

One of Structural Equation Model Analysis requirement is the observe variables should have reliability. The Cronbach's alpha above 0.7 is a criterion to accept the reliability. After testing, the reliability testing result is shown in table below, and the result of individual questions is presented in Appendix B.

Table 4.11 Reliability Statistic

Question	Cronbach's alpha
Part 1: Performance expectancy	0.847
Part 2: Effort expectancy	0.839
Part 3: Social influence	0.802
Part 4: Facilitating conditions	0.857
Part 5: Self efficacy	0.810
Part 6: Behavioral intention	0.866
Part 7: Use behavior	0.892
Part 8: University policies	0.876

In Table 4.11, the Cronbach's alpha testing of social influence, performance expectancy, effort expectancy, facilitating conditions, self efficacy, behavioral intention and use behavior, they all have the testing score above 0.8. This indicates that the questionnaire is reliable.

4.5.3 Multicollinearlity Testing

Since the Structural Equation Model is based on regression analysis, thus this research must go through Multicollinearity testing. The assumption of regression analysis has a limitation that each variable should not be highly correlate with others. The Tolerance and Variance Inflation Factor (VIF) measurement used for testing. The Tolerance should be more than 0.1 or VIF should be less than 10 (VIF = 1 / Tolerance) to accept that they have no Multicollinearity problems. The result of Multicollinearity of PE1 testing with PE2, PE3, and PE4 has shown in Table below. The rest of Multicollinearity testing of other variables has shown in Appendix C.

Table 4.12 Multicollinearity statistics testing with PE1

	Collinearity Statistic	
Variable	**Tolerance**	**VIF**
PE2 (Accomplish tasks more quickly)	.590	1.696
PE3 (Increases productivity)	.289	3.460
PE4 (Increase chances of getting a good score)	.293	3.418

4.5.4 Construct Validity

Before model for Structural Equation Model Analysis can be create, the next testing to be performed are Convergent Validity Testing and Discriminant Validity

Testing. The Convergent Validity Testing will verify that the indicators can represent into latent variable, whereas Discriminant Validity testing is performed to show that the observe variable is represent on the same latent variable and not associated with observe variable of the other latent variables.

The researchers measured convergent validity with Confirmatory Factor Analysis. If observe variable is the best represent of latent variable, Factor Loading should be above 0.6. The result of independent variable testing is presented in Figure 4.1 and Table 4.13.

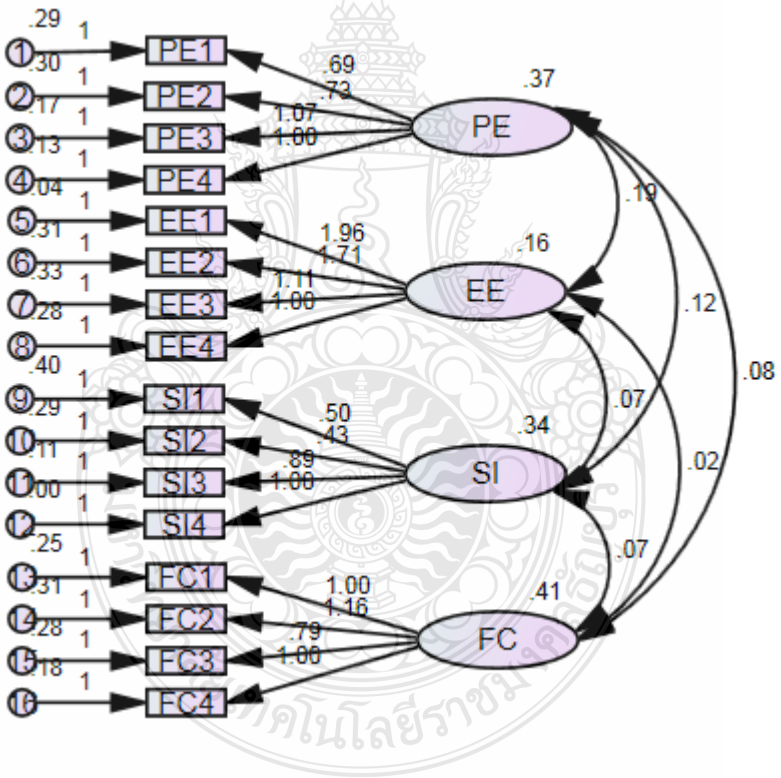

Figure 4.1 Factor loading of all variables

Table 4.13 Factor Loading of Independent variables

Variable	Factor Loading
PE (Performance Expectancy)	
PE1	0.692
PE2	0.733
PE3	1.070
PE4	1.000
EE (Effort Expectancy)	
EE1	1.959
EE2	1.713
EE3	1.111
EE4	1.000
SI (Social Influence)	
SI1	0.503
SI2	0.426
SI3	0.888
SI4	1.000
FC (Facilitating Conditions)	
FC1	0.999
FC2	1.162
FC3	0.795
FC4	1.000

After Convergent Validity Testing, SI1 and SI2 were not convergent. It was dropped and not brought to Structural Equation Model Analysis.

Discriminant Validity Testing uses Statistic Method for the test by constructing pair of models from latent variable. A criterion of assessment is that the correlation should not be higher than 0.85. This model is accepted. The model fit testing confirmed the model consistency with data. The criteria for model fit testing are chi-square, p-value, GFI, AGFI, RMR, CFI, and NFI that mentioned in chapter three. If model fit testing is not accepted, one of observed variable should be dropped out until the test is accepted.

Discriminant Validity testing result shown that correlation was not higher than 0.85, it indicates that both latent do not have Discriminant Validity. Correlation testing results are shown in Appendix D.

4.5.5 Research Sample Assumption

To analyze Structure Equation Model, the data have to be sufficient and suitable with indicator in the model. The minimum of data can be computed from formula p(p+1)/2; where p is an indicator in the model. The filled-up and submitted of 410 questionnaires can reverse equation, thus (p+1) equal 28, specified that the indicator of the model should not be more than 28.

4.6 Construct Research Model

The research constructed three models for hypothesis testing and for answer research questions as following: 1) Model of the relationship between PE, EE, SI, FC and UB with the context of BI 2) Model adjusted fit of the relationship between PE, EE,

SI, FC and UB with the context of BI 3) Model of the relationship between PE, EE, SI, FC and UB with the context of BI that drop some parameters.

4.6.1 Model One: the relationship between PE, EE, SI, FC and UB with the context of BI

The objective of creating model one is to develop the relationship between PE, EE, SI, FC and UB with the context of BI.

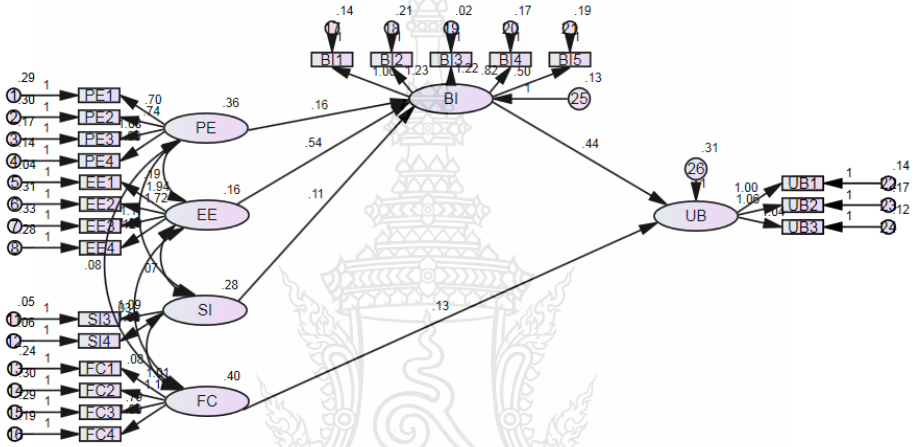

Figure 4.2 Model One

According to Figure 4.2, Factor Loading presented observed variables are the member of latent variable. The Factor Loading of PE is presented as below, whereas the rest of other latent variables are shown in Appendix F.

Performance Expectancy Latent Variable: Performance Expectancy variables compose of observed variables; find the web-based learning useful has factor loading of 0.694, find the web-based learning accomplish tasks more quickly has factor loading of 0.735, find the web-based learning increases productivity has factor loading of 1.078, and find the web-based learning increase chances of getting a good score has factor loading of 1.000, as shown in Table 4.14.

Table 4.14 Factor Loading of indicator of the PE Latent variable

Latent variable	Observe variable	Factor Loading
PE	Find the web-based learning useful (PE1)	0.694
	Accomplish tasks more quickly (PE2)	0.735
	Increases productivity (PE3)	1.078
	Increase chances of getting a good score (PE4)	1.000

4.6.2 Model Two: the relationship between PE, EE, SI, FC and UB with the context of BI

The objective of creating model one is to develop the relationship between PE, EE, SI, FC and UB with the context of BI.

After creating the model, the model fit testing was tested under the methodology that stated as the analysis of Structure Equation Model in chapter three. The result of model fit testing showed as follow: Chi-Square=326.821, df=164, p-value= .000, GFI=0.936, AGFI=0.913, RMSR=0.031, RMSEA= 0.049 (PCLOSE=1.00), NFI=0.994, CFI=0.974 and Hoelter=246(0.01), as presented in Table 4.15.

Table 4.15 Measuring of Model Fit of Model Two

Model Fit Criteria	Value	Acceptable Level Value
Chi-Square	326.821	
Degree of freedom	164	
Chi-Square/Degree of freedom	1.993	Less than 2
p-value	0.000	P > 0.05
GFI	0.936	>=0.90
AGFI	0.913	>=0.80
RMSR	0.031	Next to zero
RMSEA	0.049	<0.10
NFI	0.949	>0.90
CFI	0.974	>0.90
Hoelter	246	>200

According to Table 4.15, the result of model fit testing is shown that they were consistent with data. The diagram of model two was depicted as Figure 4.3.

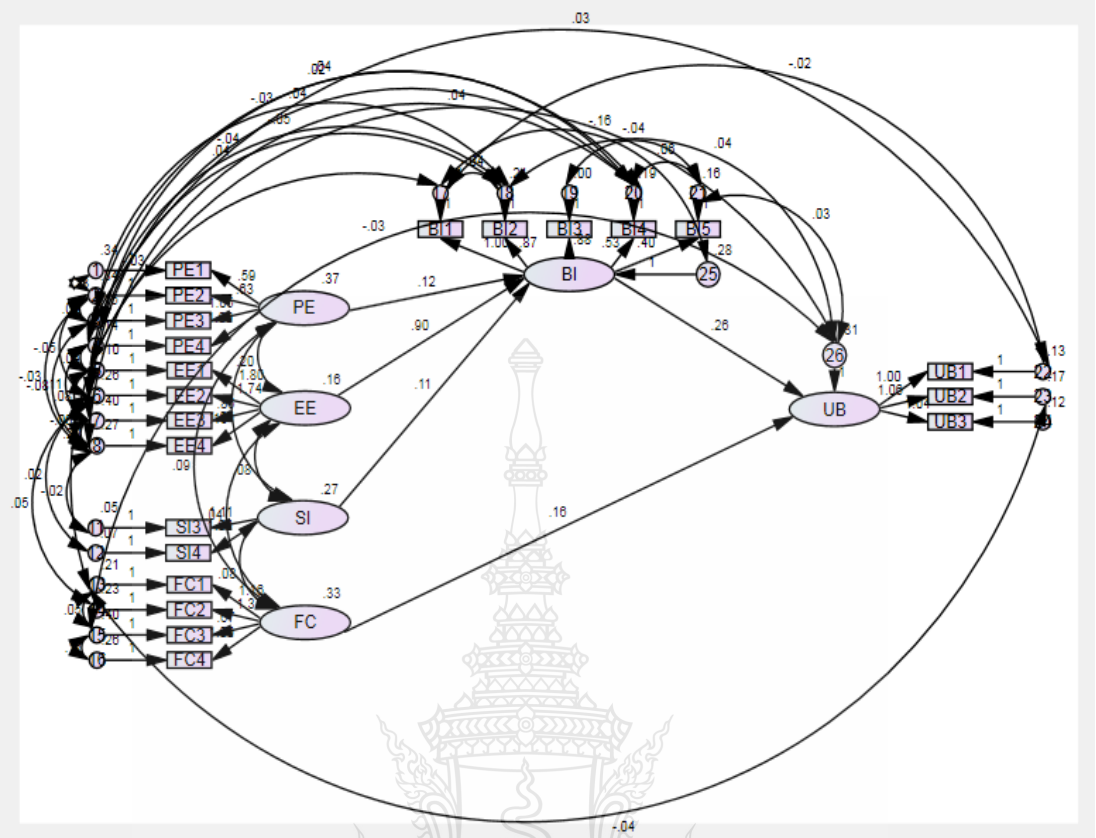

Figure 4.3 Model Two

According to Figure 4.3, Factor Loading presented observed variables are the member of latent variable. The Factor Loading of PE is presented as below, whereas the rest of other latent variables are shown in Appendix F.

Performance expectancy variables comprise of observed variables; find the web-based learning useful has factor loading of 0.593, accomplish tasks more quickly has factor loading of 0.628, increases productivity has factor loading of 1.050 and increase chances of getting a good score has factor loading of 1.000.

Table 4.16 Factor loading of indicator of the PE Latent variable

Latent Variable	Observe Variable	Factor Loading
PE	Find the web-based learning useful (PE1)	0.593
	Accomplish tasks more quickly (PE2)	0.628
	Increases productivity (PE3)	1.050
	Increase chances of getting a good score (PE4)	1.000

After analyzing the model two, it is found that PE has positive direct effect on BI (=0.118), EE has positive direct effect on BI (=0.904***). SI has positive indirect effect on BI (=0.107**). FC has positive direct effect on UB (=0.157***). BI has positive direct effect on UB (=0.264***). It is indicated that PE, SI with the context of BI and FC has positive effect on UB.

Table 4.17 The standard direct and indirect, and total effect of Model Two

Dependent Variable	R^2	Direct Effect					Indirect Effect				
		PE	EE	SI	FC	BI	PE	EE	SI	FC	BI
BI	.400	.118	.904	.107							
UB	.153				.157	.264	.031	.239	.028		

Table 4.18 The standard total effect of Model Two.

Dependent Variable	R^2	Total Effect				
		PE	**EE**	**SI**	**FC**	**BI**
BI	.400	.118	.904	.107		
UB	.153	.031	.239	.028	.157	.264

According to the information in Table 4.18, it can be expressed by equation as follows.

BI=0.118PE+0.904EE+0.107SI; R^2=0.400

UB=0.031PE+0.239EE+0.028SI+0.157FC+0.264BI; R^2=0.153

The coefficient of determinant (R^2) shown that performance expectancy, effort expectancy and social influence have effect on behavioral intention to use with the accuracy of 40 %. The performance expectancy, effort expectancy, social influence, facilitating conditions and behavioral intention to use have effect on usage behavior with the accuracy of 15.3 %.

4.6.3 Model Three: the relationship between PE, EE, SI, FC and UB with the context of BI

The objective of creating model one is to develop the relationship between PE, EE, SI, FC and UB with the context of BI.

After model two has been created, the result shown that PE is not suitable for estimate BI at p-value=0.145, thus model three has to be created, which presented in Table 4.19. Next, the model fit testing was tested following the methodology that stated as the analysis of Structure Equation Model in chapter three. The result of model fit

testing showed as follow: Chi-Square=328.843, df=165, p-value= .000 , GFI=0.936, AGFI=0.901, RMSR=0.032, RMSEA= 0.049 (PCLOSE=1.00), NFI=0.949, CFI=0.974 and Hoelter=262(0.01), as presented in Table 4.20.

Table 4.19 Regression Estimate Value for Model Two

			Estimate	S.E.	C.R.	P
BI	<---	PE	.118	.081	1.459	.145
BI	<---	EE	.904	.131	6.911	***
BI	<---	SI	.107	.046	2.309	.021
UB	<---	FC	.157	.054	2.885	.004
UB	<---	BI	.264	.046	5.795	***
PE4	<---	PE	1.000			
PE3	<---	PE	1.050	.054	19.333	***
PE2	<---	PE	.628	.056	11.265	***
PE1	<---	PE	.593	.053	11.229	***
EE4	<---	EE	1.000			
EE3	<---	EE	.852	.073	11.722	***
EE2	<---	EE	1.739	.142	12.224	***
EE1	<---	EE	1.796	.131	13.657	***
FC4	<---	FC	1.000			
FC3	<---	FC	.666	.053	12.570	***
FC2	<---	FC	1.371	.086	15.932	***

Table 4.19 Regression Estimate Value for Model Two (Cont.)

			Estimate	S.E.	C.R.	P
FC1	<---	FC	1.158	.074	15.711	***
SI4	<---	SI	1.000			
SI3	<---	SI	1.105	.078	14.088	***
BI1	<---	BI	1.000			
BI2	<---	BI	.869	.060	14.502	***
BI3	<---	BI	.882	.042	20.777	***
BI4	<---	BI	.531	.042	12.589	***
UB1	<---	UB	1.000			
UB2	<---	UB	1.064	.053	20.197	***
UB3	<---	UB	1.035	.049	21.204	***
BI5	<---	BI	.401	.038	10.685	***

Table 4.20 Measuring of Model Fit of Model Three

Model Fit Criteria	Value	Acceptable Level Value
Chi-Square	328.843	
Degree of freedom	165	
Chi-Square/Degree of freedom	1.993	Less than 2
p-value	0.000	P > 0.05

Table 4.20 Measuring of Model Fit of Model Three (Cont.)

Model Fit Criteria	Value	Acceptable Level Value
GFI	0.936	>=0.90
AGFI	0.901	>=0.80
RMSR	0.032	Next to zero
RMSEA	0.049	<0.10
NFI	0.949	>0.90
CFI	0.974	>0.90
Hoelter	262	>200

According to Table 4.20, the result of model fit testing is shown that they were consistent with data. The diagram of model three was depicted as Figure 4.4.

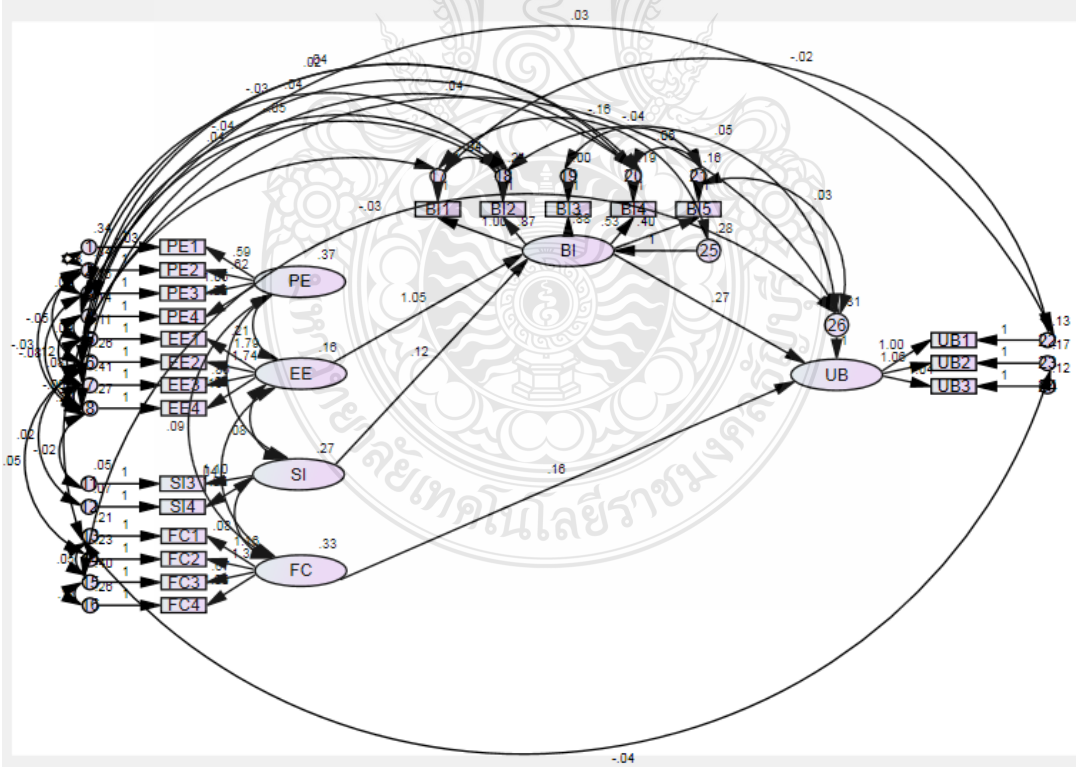

Figure 4.4 Model Three

According to Figure 4.4, Factor Loading presented the observed variables as the member of latent variable. The Factor Loading of Performance Expectancy (PE) is presented as below, whereas the rest of other latent variables are shown in Appendix F.

Table 4.21 Factor loading of indicator of the PE Latent variable

Latent Variable	Observe Variable	Factor Loading
PE	Find the web-based learning useful (PE1)	0.591
	Accomplish tasks more quickly (PE2)	0.625
	Increases productivity (PE3)	1.050
	Increase chances of getting a good score (PE4)	1.000

After analyzing the model, it is found that effort expectancy (EE) has positive direct effect on behavioral intention to use (BI) (=0.610***). Social influence (SI) has positive direct effect on behavioral intention to use (BI) (=0.0.90***). Facilitating conditions (FC) has positive direct effect on usage behaviour (UB) (=0.152***). Behavioral intention to use (BI) has positive direct effect on usage behaviour (UB) (=0.310***). It is indicated that social influence (SI) with the context of behavioral intention to use (BI) and facilitating conditions (FC) has positive effect on usage behaviour (UB).

Table 4.22 The standard direct and indirect of Model Three

Dependent Variable	R^2	**Direct Effect**					**Indirect Effect**				
		PE	**EE**	**SI**	**FC**	**BI**	**PE**	**EE**	**SI**	**FC**	**BI**
BI	.420		.610	.090							
UB	.132				.152	.310		.189	.028		

Table 4.23 The standard total effect of Model Three

Dependent Variable	R^2	**Total Effect**				
		PE	**EE**	**SI**	**FC**	**BI**
BI	.420		.610	.090		
UB	.132		.189	.028	.152	.310

According to the information in Table 4.23, it can be expressed by equation as follows.

$BI=0.610EE+0.090SI$; $R^2=0.420$

$UB=0.189EE+0.028SI+0.152FC+0.310BI$; $R^2=0.132$

The coefficient of determinant (R^2) shown that effort expectancy and social influence have effect on behavioral intention to use with the accuracy of 42 %. The effort expectancy, social influence, facilitating conditions and behavioral intention to use have effect on usage behavior with the accuracy of 13.2 %.

4.7 Hypothesis Testing

According to the research question What are factors affecting the use of web-based learning for universities in Thailand?, the hypotheses were created to answer the research questions, as shown below:

H1: The influence of performance expectancy on behavioral intention will be varied by gender and age, such that the effect will be stronger for men and particularly for younger men.

H2: The influence of effort expectancy on behavioral intention will be varied by gender, age, experience, and university policies, such that the effect will be stronger for women, particularly younger women, and particularly at early stages of experience.

H3: The influence of social influence on behavioral intention will be varied by gender, age, experience, and university policies, such that the effect will be stronger for women, particularly for older women, and particularly in mandatory at early stages of experience.

H4a: Facilitating conditions will not have a significant influence on behavioral intention.

H4b: The influence of facilitating conditions on usage will be varied by age, experience, and university policies, such that the effect will be stronger for older student, particularly with increasing experience.

H5: Behavioral intention will have significant positive influence on usage.

4.7.1 H1: The influence of performance expectancy on behavioral intention will be varied by gender and age, such that the effect will be stronger for men and particularly for younger men.

An analysis of the relationship between performance expectancy and behavioral intention is performed and found that model one has $\beta = 0.729$ ($p<.01$), model two has $\beta = 0.118$. However, model three has no relationship between PE and BI. It indicated that the influence of performance expectancy on behavioral intention will be varied by gender and age, such that the effect will be stronger for men and particularly for younger men., thus hypothesis H1 was rejected.

4.7.2 H2: The influence of effort expectancy on behavioral intention will be varied by gender, age, experience, and university policies, such that the effect will be stronger for women, particularly younger women, and particularly at early stages of experience.

An analysis of the relationship between effort expectancy and behavioral intention is performed and found that model one has $\beta = 0.239$ ($p<.05$), model two has $\beta = 0.904$ ($p<.01$) and model three has $\beta = 0.610$ ($p<.01$). It indicated that the influence of effort expectancy on behavioral intention will be varied by gender, age, experience, and university policies, such that the effect will be stronger for women, particularly younger women, and particularly at early stages of experience., thus hypothesis H2 was accepted.

4.7.3 H3: The influence of social influence on behavioral intention will be varied by gender, age, experience, and university policies, such that the effect will be stronger for women, particularly for older women, and particularly in mandatory at early stages of experience.

An analysis of the relationship between social influence and behavioral intention is performed and found that model one has $\beta = 0.218$ ($p<.05$), model two has $\beta = 0.107$

($p<.01$) and model three has $\beta = 0.090$ ($p<.01$). It indicated that the influence of social influence on behavioral intention will be varied by gender, age, experience, and university policies, such that the effect will be stronger for women, particularly for older women, and particularly in mandatory at early stages of experience, thus hypothesis H3 was accepted.

4.7.4 H4a: Facilitating conditions will not have a significant influence on behavioral intention.

An analysis of the relationship between facilitating conditions and on behavioral intention is performed and found that model one has $\beta = 0.90$ ($p<.05$), model two has $\beta = 0.057$ ($p>.1$). It indicated that facilitating conditions will not have significant influence on behavioral intention, thus hypothesis H4a was accepted.

4.7.5 H4b: The influence of facilitating conditions on usage will be varied by age, experience, and university policies, such that the effect will be stronger for older student, particularly with increasing experience.

An analysis of the relationship between facilitating conditions and use behavior is performed and found that model one has $\beta = 0.195$ ($p<.05$), model two has $\beta = 0.157$ ($p<.01$) and model three has $\beta = 0.152$ ($p<.01$). It indicated that the influence of facilitating conditions on usage will be varied by age, experience, and university policies, such that the effect will be stronger for older student, particularly with increasing experience, thus hypothesis H4b was accepted.

4.7.6 H5: Behavioral intention will have significant positive influence on usage.

An analysis of the relationship between behavioral intention and use behavior is performed and found that model one has $\beta = 0.442$ ($p<.01$), model two has $\beta = 0.264$

($p<.01$) and model three has $\beta = 0.310$ ($p<.01$). It indicated that behavioral intention will have significant positive influence on usage behavior, thus hypothesis H5 was accepted.

The summary of hypothesis testing is presented in Table 4.24.

Table 4.24 The summary of hypothesis testing.

Hypothesis	Result
H1: The influence of performance expectancy on behavioral intention will be varied by gender and age, such that the effect will be stronger for men and particularly for younger men	Not accepted
H2: The influence of effort expectancy on behavioral intention will be varied by gender, age, experience, and university policies, such that the effect will be stronger for women, particularly younger women, and particularly at early stages of experience	Accepted
H3: The influence of social influence on behavioral intention will be varied by gender, age, experience, and university policies, such that the effect will be stronger for women, particularly for older women, and particularly in mandatory at early stages of experience	Accepted
H4a: Facilitating conditions will not have a significant influence on behavioral intention	Accepted
H4b: The influence of facilitating conditions on usage will be varied by age, experience, and university policies, such that the effect will be stronger for older student, particularly with increasing experience	Accepted
H5: Behavioral intention will have significant positive influence on usage	Accepted

4.8 Quantitative Result for Focus Group

Based on the result of hypothesis testing, performance expectancy has no significant positive influence on behavioral intention to use; therefore, researcher attempted to study the students' behavior of Faculty of Science and Technology on the use of web-based learning in public universities with high usage on web-based learning. The 5 universities have been selected as follows: Kasetsart University, Chiang Mai University, Mahidol University, Maejo University and Rajamangala University of Technology Thanyaburi.

4.8.1 Response Rate

The questionnaires have been collected from 500 people. The 400 people had responded to the questionnaires. It is equivalent to 80.0% of 500.

Table 4.25 Response rate for focus group

Type of University	Faculty	Sent	Return
Public universities	Faculty of Science	500	400

4.9 Demographic Data for Focus Group

Questionnaire that sent to research sample defined the respondent as students who use web-based learning. The questions asking about demographical data consist of six parts: gender, age, faculty, using experience, university type and frequency in using web-based learning. After receiving the filled-in questionnaires, the demographic data is collected and the detail can be summarized and presented in Table 4.26.

Table 4.26 Demography summary for focus group

	Frequency	Percentage
Gender		
Female	200	50.0
Male	200	50.0
Age		
Younger than or equal to 19 years old	149	37.3
20 years old	30	7.5
21 years old	65	16.3
22 years old	20	5.0
Older than or equal to 23 years old	136	34.0
Faculty		
Faculty of Science	400	100.0
Using experience		
Less than 1 year	150	37.5
Between 1 – 2 years	30	7.5
Between 2 – 3 years	65	16.3
Between 3 – 4 years	20	5.0
More than 5 years	135	33.8
Frequency in using web-based learning		
Less than 1 time per week	18	4.5
1 or 2 times per week	62	15.5
3 to 5 times per week	135	33.8
1 per day	56	14.0
More than 1 per day	129	32.3

In Table 4.26, the result of demographic data of respondent consisted of seven parts can be show as following.

4.9.1 Gender

According to demographic data, 200 (50.0%) of the respondents were female, and 200 (50.0%) were male. It showed that female and male respondents are the same portion.

4.9.2 Age

According to demographic data, 149 (37.3%) of the respondents were younger than or equal to 19 years old, 30 (7.5%) of them were 20 years old, 65 (16.3%) of them were 21 years old, 20 (5.0%) of them were 22 years old, and 136 (34.0%) of them older than or equal to 23 years old. It showed that the majority of web-based learning respondents was younger than or equal to 19 years old.

4.9.3 Faculty

According to demographic data, 400 (100.0%) of the respondents were students in Faculty of Science. It showed that the majority of respondents were students in Faculty of Science.

4.9.4 Using experience

According to demographic data, 150 (37.5%) of the respondents had less than 1 year using experience, 30 (7.5%) of the respondents had between 1 or 2 years, 65 (16.3%) of the respondents had between 2 to 3 years, 20 (5.0%) of the respondents had between 3 to 4 years, and 135 (33.8%) of the respondents had more than 5 years. It showed that the majority has less than 1 year experience in using web-based learning.

4.9.5 Frequency use web-based learning

According to demographic data, 18 (4.5%) of the respondents were used web-based learning less than 1 time per week, 62 (15.5%) of them between 1 or 2 times per week, 135 (33.8%) of them between 3 to 5 times per week, 56 (14.0%) of them once per day, and 129 (32.3%) of them more than once per day. It showed that the majority had the frequency of using web-based learning between 3 to 5 times per week.

4.10 Descriptive Statistic for Focus Group

4.10.1 Performance Expectancy

The giving agree to performance expectancy is independent variable of the study. The questions asked the degree to which individual believes using the web-based learning will help him/her attain gains in job performance. The results presented in Table 4.27.

Table 4.27 The performance expectancy descriptive statistic for focus group

Variable	Min	Max	Mean	S.D.	Result
PE1 (Find the web-based learning useful)	2	5	4.51	0.664	Strongly Agree
PE2 (Accomplish tasks more quickly)	2	5	4.45	0.761	Strongly Agree
PE3 (Increases productivity)	2	5	4.39	0.764	Strongly Agree
PE4 (Increase chances of getting a good score)	3	5	4.55	0.639	Strongly Agree

According to Table 4.27, the results of statistical analysis of giving agree are:

Respondents find the web-based learning useful was strongly agree level ($\bar{x}$ = 4.51) with S.D. of 0.664, respondents accomplish tasks more quickly when using web-based learning was strongly agree level ($\bar{x}$ = 4.45) with S.D. of 0.761, respondents using web-based learning for increases productivity was strongly agree level ($\bar{x}$ = 4.39) with S.D. of 0.764, and respondents using web-based learning to increase chances of getting a good score was strongly agree level ($\bar{x}$ = 4.55) with S.D. of 0.639.

4.10.2 Effort Expectancy

The giving agree to effort expectancy is independent variable of the study. The questions asked the degree of ease associated with use of web-based learning. The results presented in Table 4.28.

Table 4.28 The effort expectancy descriptive statistic for focus group

Variable	**Min**	**Max**	**Mean**	**S.D.**	**Result**
EE1 (Web-based learning would be clear and understandable)	3	5	4.73	0.491	Strongly Agree
EE2 (Easy to become skillful)	3	5	4.67	0.537	Strongly Agree
EE3 (Web-based learning is easy to use)	3	5	4.75	0.457	Strongly Agree
EE4 (Operate the web-based learning is easy)	3	5	4.67	0.511	Strongly Agree

According to Table 4.28, the results of statistical analysis of giving agree are:

Web-based learning would be clear and understandable was strongly agree level ($\bar{x}$ = 4.73) with S.D. of 0.491. Easy to become skillful was strongly agree level ($\bar{x}$ = 4.67) with S.D. of 0.537. Web-based learning is easy to use was strongly agree level ($\bar{x}$ = 4.75) with S.D. of 0.457, and Operate the web-based learning is easy also was strongly agree level ($\bar{x}$ = 4.67) with S.D. of 0.511.

4.10.3 Social Influence

The giving agree to social influence is independent variable of the study. The questions asked the degree to which individual perceives that important others believe he/she should use the web-based learning system. The results presented in Table 4.29.

Table 4.29 The social influence descriptive statistic for focus group

Variable	**Min**	**Max**	**Mean**	**S.D.**	Result
SI1 (People who influence my behavior think that I should use it)	3	5	4.63	0.678	Strongly Agree
SI2 (People who are important to me think that I should use it)	3	5	4.63	0.569	Strongly Agree
SI3 (The senior management of this university has been helpful)	3	5	4.37	0.612	Strongly Agree
SI4(The university has provided supports)	3	5	4.42	0.587	Strongly Agree

According to Table 4.29, the results of statistical analysis of giving agree are:

People who influence them behavior think that they should use it was strongly agree level ($\bar{x}$ = 4.63) with S.D. of 0.678. People who are important to them think that they should use it was strongly agree level ($\bar{x}$ = 4.63) with S.D. of 0.569. The senior management of this university has been helpful was strongly agree level ($\bar{x}$ = 4.37) with S.D. of 0.612, and the university has provided supports also was strongly agree level ($\bar{x}$ = 4.42) with S.D. of 0.587.

4.10.4 Facilitating Conditions

The giving agree to facilitating conditions is independent variable of the study. The questions asked the degree to which an individual believes that organizational and technical infrastructure exists to support use of the web-based learning system. The results presented in Table 4.30.

Table 4.30 The facilitating conditions descriptive statistic for focus group

Variable	Min	Max	Mean	S.D.	Result
FC1 (I have the necessary resources to use it)	2	5	4.19	0.808	Agree
FC2 (I have the necessary knowledge to use it)	1	5	3.97	0.931	Agree
FC3 (The web-based learning is not compatible with other systems)	1	5	4.09	0.741	Agree
FC4 (A specific person or group is available for assistance with web-based learning difficulties)	1	5	4.07	0.777	Agree

According to Table 4.30, the results of statistical analysis of giving agree are:

Respondents have the necessary resources to use it was agree level ($\bar{x}$ = 4.19) with S.D. of 0.808. Respondents have the necessary knowledge to use it was agree level ($\bar{x}$ = 3.97) with S.D. of 0.931. The web-based learning is not compatible with other systems was agree level ($\bar{x}$ = 4.09) with S.D. of 0.741, and a specific person or group is available for assistance with web-based learning difficulties also was agree level ($\bar{x}$ = 4.07) with S.D. of 0.777.

4.10.5 Behavioral Intention

The giving agree to behavioral intention is independent variable of the study. The questions asked the behavioral intentions to use a web-based learning system. The results presented in Table 4.31.

Table 4.31 The behavioral intention descriptive statistic for focus group

Variable	Min	Max	Mean	S.D.	Result
BI1 (I intend to use the web-based learning in the next 6 months)	3	5	4.55	0.607	Strongly Agree
BI2 (I predict I would use the web-based learning in the next 6 months)	3	5	4.32	0.747	Strongly Agree
BI3 (I plan to use the web-based learning in the next 6 months)	2	5	4.42	0.612	Strongly Agree

Table 4.31 The behavioral intention descriptive statistic for focus group (Cont.)

Variable	Min	Max	Mean	S.D.	Result
BI4 (Assuming I had access to the web-based learning, I intend to use it)	2	5	4.23	0.571	Strongly Agree
BI5 (Given that I had access to the web-based learning, I predict that I would use it)	3	5	4.16	0.492	Agree

According to Table 4.31, the results of statistical analysis of giving agree are:

Respondents intend to use the web-based learning in the next 6 months was strongly agree level ($\bar{x}$ = 4.55) with S.D. of 0.607. Respondents predict they would use the web-based learning in the next 6 months was strongly agree level ($\bar{x}$ = 4.32) with S.D. of 0.747. Respondents plan to use the web-based learning in the next 6 months was strongly agree level ($\bar{x}$ = 4.42) with S.D. of 0.612. Assuming respondents had access to the web-based learning, they intend to use it was strongly agree level ($\bar{x}$ = 4.23) with S.D. of 0.571. Given that respondents had access to the web-based learning, they predict that I would use it was agree level ($\bar{x}$ = 4.16) with S.D. of 0.492.

4.10.6 Use Behavior

The giving agree to use behavior is dependent variable of the study. The questions asked about the actual use of a web-based learning system. The results presented in Table 4.32.

Table 4.32 The use behavior descriptive statistic for focus group

Variable	Min	Max	Mean	S.D.	Result
UB1 (I do not evaluate costs and benefits of using the web-based learning before every use)	3	5	4.35	0.710	Strongly Agree
UB2 (I carefully think about using the web-based learning before every use)	3	5	3.90	0.765	Agree
UB3 (My use of the web-based learning is automatic)	3	5	4.22	0.712	Strongly Agree

According to Table 4.32, the results of statistical analysis of giving agree are:

Respondents do not evaluate costs and benefits of using the web-based learning before every use was strongly agree level ($\bar{x}$ = 4.35) with S.D. of 0.710. Respondents carefully think about using the web-based learning before every use was agree level ($\bar{x}$ = 3.90) with S.D. of 0.765, and respondents use of the web-based learning is automatic was strongly agree level ($\bar{x}$ = 4.22) with S.D. of 0.712.

4.10.7 University Policies

The giving agree to university policies is moderator variable of the study. The questions asked about the policy of using web-based learning system. The results presented in Table 4.33.

Table 4.33 The university policies descriptive statistic for focus group

	Frequency	**Percentage**
UP1 (Portion of lecturers told respondents that they can using the web-based learning)		
Less than or equal to 20 %	120	30.00
Between 21 - 40 %	70	17.50
Between 41- 60%	149	37.25
Between 61 - 80%	53	13.25
More than or equal to 80%	8	2.00
UP2 (Portion of subjects in semester that using the web-based learning)		
Less than or equal to 20 %	15	3.75
Between 21 - 40 %	50	12.50
Between 41- 60%	144	36.00
Between 61 - 80%	70	17.50
More than or equal to 80%	121	30.25
UP3 (Portion of fail connections to system during semester)		
Less than or equal to 20 %	99	24.75
Between 21 - 40 %	120	30.00
Between 41- 60%	131	32.75
Between 61 - 80%	39	9.75
More than or equal to 80%	11	2.75

According to Table 4.33, the results shown that 149 (37.25%) of the respondents answered the portion of lecturers told them that they can use the web-based learning between 41- 60%, 144 (36.00%) of the respondents found the portion of subjects in semester that using the web-based learning between 41- 60%, and 131 (32.75%) of the respondents found that they had fail connections to web-based learning system between 41- 60% during semester.

4.11 Structural Equation Model for Focus Group

4.11.1 Normal Distribution Testing

The Structural Equation Model Analysis requires that all variables should be normal distribution. The normality testing measured from skewness and kurtosis must be between -2 and +2(Division of Statistic Scientific Computation College of Natural Sciences The University of Texas at Austin, 2011; Stahl, 2011). After testing, the researcher found that all variables are normal distribution. The result of testing is shown in Appendix G.

4.11.2 Reliability Testing

One of Structural Equation Model Analysis requirement is the observe variables should have reliability. The Cronbach's alpha above 0.7 is a criterion to accept the reliability. After testing, the reliability testing result is shown in table below; and the result of individual questions is presented in Appendix I.

Table 4.34 Reliability Statistic for focus group

Variable	Cronbach's alpha
Performance expectancy	0.813
Effort expectancy	0.910
Social influence	0.813
Facilitating conditions	0.860
Behavioral intention	0.861
Use behavior	0.894
University policies	0.854

The analysis result of reliability testing have the following details: performance expectancy has a Cronbach's alpha of .813, effort expectancy has Cronbach's alpha of .910, social influence has Cronbach's alpha of .813, facilitating conditions has Cronbach's alpha of .860, behavioral intention has Cronbach's alpha of 0.861, use behavior has Cronbach's alpha of .894, and university policies has Cronbach's alpha of .854. From the test results, Cronbach's alpha scored more than 0.7 on all variables, thus it indicated that they are reliable.

4.11.3 Multicollinearlity Testing

Since the Structural Equation Model is based on regression analysis, thus this research must go through Multicollinearity testing. The assumption of regression analysis has a limitation that each variable should not be highly correlate with others. The Tolerance and Variance Inflation Factor (VIF) measurement used for testing. The Tolerance should be more than 0.1 or VIF should be less than 10 (VIF = 1 / Tolerance)

to accept that they have no Multicollinearity problems. The result of Multicollinearity of PE1 testing with PE2, PE3, and PE4 has shown in Table below. The rest of Multicollinearity testing of other variables has shown in Appendix J.

Table 4.35 Multicollinearity statistics testing with PE1 for focus group

Variable	Collinearity Statistic	
	Tolerance	**VIF**
PE2(Accomplish tasks more quickly)	.324	3.091
PE3(Increases productivity)	.274	3.656
PE4(Increase chances of getting a good score)	.489	2.045

4.11.4 Construct Validity

The researchers measured convergent validity with Confirmatory Factor Analysis. If observe variable is the best represent of latent variable, Factor Loading should be above 0.6. The result of independent variable testing is presented in Figure 4.5 and Table 4.36.

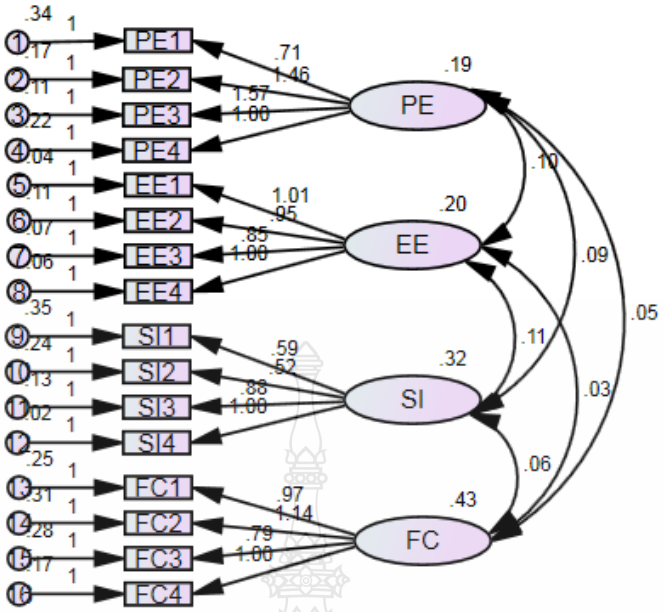

Figure 4.5 Factor loading of all variables for Focus Group

Table 4.36 Factor Loading of Independent variables for focus group

Variable	Factor Loading
PE (Performance Expectancy)	
PE1	0.706
PE2	1.464
PE3	1.574
PE4	1.000
EE (Effort Expectancy)	
EE1	1.009
EE2	0.953
EE3	0.853

Table 4.36 Factor Loading of Independent variables for focus group (Cont.)

Variable	Factor Loading
EE4	1.000
SI (Social Influence)	
SI1	0.591
SI2	0.520
SI3	0.877
SI4	1.000
FC (Facilitating Conditions)	
FC1	0.967
FC2	1.135
FC3	0.794
FC4	1.000

After Convergent Validity Testing, SI1 and SI2 were not convergent. It was dropped and not brought to Structural Equation Model Analysis.

Discriminant Validity Testing uses Statistic Method for the test by constructing pair of models from latent variable. A criterion of assessment is that the correlation should not be higher than 0.85. This model is accepted. The model fit testing confirmed the model consistency with data. The criteria for model fit testing are chi-square, p-value, GFI, AGFI, RMR, CFI, and NFI that mentioned in chapter three. If model fit testing is not accepted, one of observed variable should be dropped out until the test is accepted.

Discriminant Validity testing result shown that correlation was not higher than 0.85, it indicates that both latent do not have Discriminant Validity. Correlation testing results are shown in Appendix H.

4.11.5 Research Sample Assumption

To analyze Structure Equation Model, the data have to be sufficient and suitable with indicator in the model. The minimum of data can be computed from formula p(p+1)/2; where p is an indicator in the model. The filled-in and submission of 400 questionnaires can reverse equation, thus (p+1) equal 27, specified that the indicator of the model should not be more than 27.

4.12 Construct Research Model for Focus Group

The research constructed two models for hypothesis testing and for answer research questions as following: 1) Model of the relationship between PE, EE, SI, FC and UB with the context of BI. 2) Model adjusted fit of the relationship between PE, EE, SI, FC and UB with the context of BI.

4.12.1 Model One: the relationship between PE, EE, SI, FC and UB with the context of BI for Focus Group

The objective of creating Model one is to develop the relationship between PE, EE, SI, FC and UB with the context of BI.

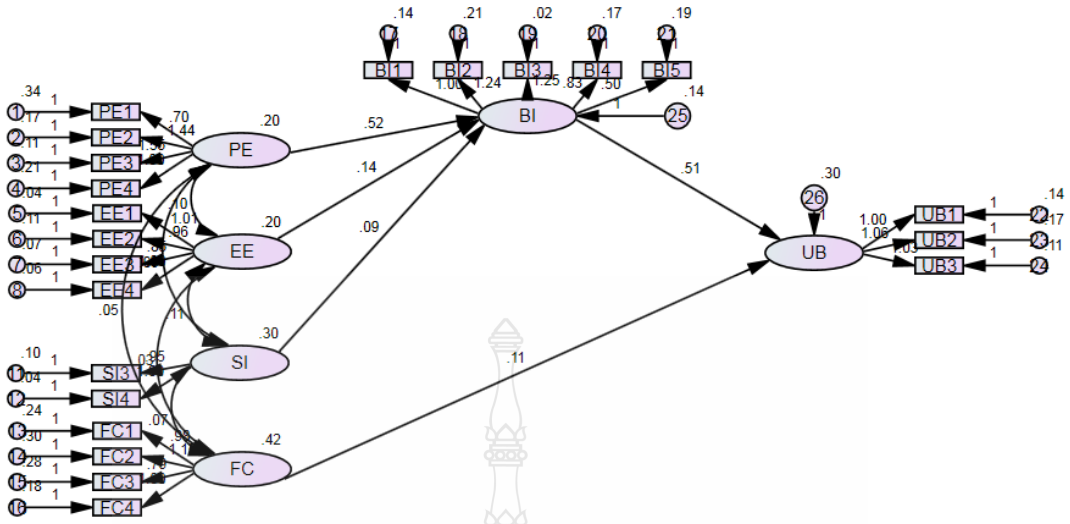

Figure 4.6 Model One for Focus Group

According to Figure 4.6, Factor Loading presented observed variables are the member of latent variable. The Factor Loading of PE is presented as below, whereas the rest of other latent variables are shown in Appendix L.

Performance Expectancy variables compose of observed variables: find the web-based learning useful has factor loading of 0.469, find the web-based learning accomplish tasks more quickly has factor loading of 0.838, find the web-based learning increases productivity has factor loading of 0.899, and find the web-based learning increase chances of getting a good score has factor loading of 0.693, as shown in Table 4.37.

Table 4.37 Factor Loading of indicator of the PE Latent variable for focus group

Latent Variable	Observe Variable	Factor Loading
PE	Find the web-based learning useful (PE1)	0.469
	Accomplish tasks more quickly (PE2)	0.838
	Increases productivity (PE3)	0.899
	Increase chances of getting a good score (PE4)	0.693

4.12.2 Model Two: the relationship between PE, EE, SI, FC and UB with the context of BI for focus group

The objective of creating model one is to develop the relationship between PE, EE, SI, FC and UB with the context of BI.

After creating the model, the model fit testing was tested following the methodology that stated as the analysis of Structure Equation Model in chapter three. The result of model fit testing showed as follow: Chi-Square=352.843, df=177, p-value= .000 , GFI=0.928, AGFI=0.897, RMSR=0.027, RMSEA= 0.050 (PCLOSE=1.00), NFI=0.940, CFI=0.969 and Hoelter=237(0.01), as presented in Table 4.38.

Table 4.38 Measuring of Model Fit of Model Two for focus group

Model Fit Criteria	Value	Acceptable Level Value
Chi-Square	352.843	
Degree of freedom	177	
Chi-Square/Degree of freedom	1.993	Less than 2
p-value	0.000	P > 0.05
GFI	0.928	>=0.90
AGFI	0.897	>=0.80
RMSR	0.027	Next to zero
RMSEA	0.050	<0.10
NFI	0.940	>0.90
CFI	0.969	>0.90
Hoelter	237	>200

According to Table 4.38, the result of model fit testing is shown that they were consistent with data. The diagram of model two for focus group was depicted as Figure 4.7.

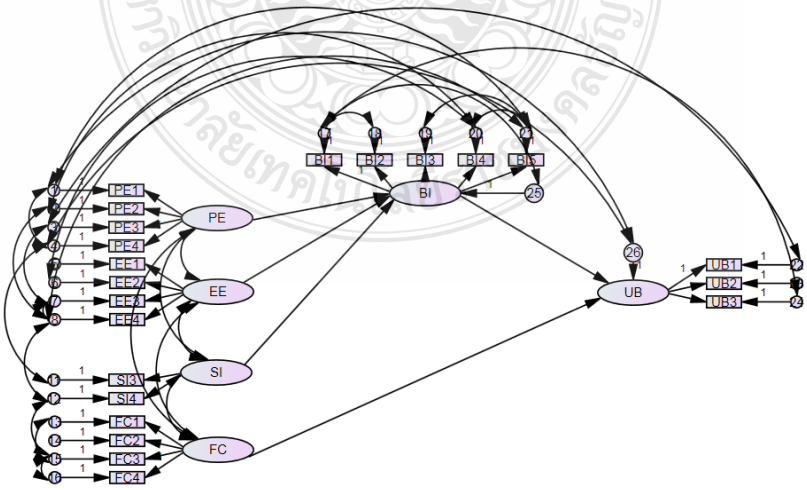

Figure 4.7 Model Two for Focus Group

According to Figure 4.7, Factor Loading presented observed variables are the member of latent variable. The Factor Loading of PE is presented as below, whereas the rest of other latent variables are shown in Appendix L.

4.12.2.1 Performance expectancy latent variable. Performance expectancy variables comprise of observed variables: find the web-based learning useful has factor loading of 0.438, accomplish tasks more quickly has factor loading of 0.837, increases productivity has factor loading of 0.902 and increase chances of getting a good score has factor loading of 0.688.

Table 4.39 Factor loading of indicator of the PE Latent variable for focus group

Latent Variable	Observe Variable	Factor Loading
PE	Find the web-based learning useful (PE1)	0.438
	Accomplish tasks more quickly (PE2)	0.837
	Increases productivity (PE3)	0.902
	Increase chances of getting a good score (PE4)	0.688

Table 4.40 Regression Estimate Value for Model Two for focus group

			Estimate	S.E.	C.R.	P
BI	<---	PE	0.440	0.078	8.868	***
BI	<---	EE	0.145	0.073	3.323	***
BI	<---	SI	0.089	0.053	2.207	0.027
UB	<---	FC	0.140	0.055	2.652	0.008
UB	<---	BI	0.367	0.048	6.735	***
PE4	<---	PE	0.688			
PE3	<---	PE	0.902	0.099	15.675	***
PE2	<---	PE	0.837	0.094	15.097	***
PE1	<---	PE	0.438	0.073	9.018	***
EE4	<---	EE	0.811			
EE3	<---	EE	0.780	0.037	23.592	***
EE2	<---	EE	0.791	0.056	18.41	***
EE1	<---	EE	0.950	0.052	22.022	***
FC4	<---	FC	0.749			
FC3	<---	FC	0.522	0.052	12.802	***
FC2	<---	FC	0.871	0.088	15.772	***
FC1	<---	FC	0.821	0.073	15.521	***
SI4	<---	SI	0.893			
SI3	<---	SI	0.886	0.075	13.803	***

Table 4.40 Regression Estimate Value for Model Two for focus group (Cont.)

			Estimate	S.E.	C.R.	P
BI1	<---	BI	1.142			
BI2	<---	BI	0.786	0.065	13.057	***
BI3	<---	BI	1.005	0.05	17.897	***
BI4	<---	BI	0.663	0.046	11.896	***
UB1	<---	UB	0.858			
UB2	<---	UB	0.834	0.052	20.056	***
UB3	<---	UB	0.881	0.048	21.318	***
BI5	<---	BI	0.549	0.039	9.896	***

Note: *. Correlation is significant at the 0.05 level (2-tailed),
**. Correlation is significant at the 0.01 level (2-tailed).
***. Correlation is significant at the 0.001 level (2-tailed).

After analyzing the model two, it is found that performance expectancy (PE) has positive direct effect on behavioral intention to use (BI) (=0.440**), effort expectancy (EE) has positive direct effect on behavioral intention to use (BI) (=0.145**). Social influence (SI) has positive indirect effect on behavioral intention to use (BI) (=0.089*). Facilitating conditions (FC) has positive direct effect on usage behaviour (UB) (=0.140**). Behavioral intention to use (BI) has positive direct effect on usage behaviour (UB) (=0.367**). It is indicated that performance expectancy (PE), social influence (SI) with the context of behavioral intention to use (BI) and facilitating conditions (FC) has positive effect on usage behaviour (UB).

Note: *. Correlation is significant at the 0.05 level (2-tailed),
**. Correlation is significant at the 0.01 level (2-tailed).

Table 4.41 The standard direct and indirect, and total effect of Model Two for focus group

Dependent Variable	**R^2**	**Direct Effect**					**Indirect Effect**				
		PE	**EE**	**SI**	**FC**	**BI**	**PE**	**EE**	**SI**	**FC**	**BI**
BI	.331	.440	.145	.089							
UB	.168				.140	.367	.161	.053	.033		

Table 4.42 The standard total effect of Model Two for focus group

Dependent Variable	**R^2**	**Total Effect**				
		PE	**EE**	**SI**	**FC**	**BI**
BI	.331	.440	.145	.089		
UB	.168	.161	.053	.033	.140	.367

According to the information on Table 4.42, it can be expressed by equation as follows.

BI=0.440PE+0.145EE+0.089SI; R^2=0.331

UB=0.161PE+0.053EE+0.033SI+0.140FC+0.367BI; R^2=0.168

The coefficient of determinant (R^2) shown that, performance expectancy, effort expectancy and social influence have effect on behavioral intention to use with the accuracy of 33.1 %. The performance expectancy, effort expectancy, social influence, facilitating conditions and behavioral intention to use have effect on usage behavior with the accuracy of 16.8 %.

4.13 Hypothesis Testing for Focus Group

According to the research question What are factors affecting the use of web-based learning for universities in Thailand?, the hypotheses were created to answer the research questions, as shown below:

H1: The influence of performance expectancy on behavioral intention will be varied by gender and age, such that the effect will be stronger for men and particularly for younger men.

H2: The influence of effort expectancy on behavioral intention will be varied by gender, age, experience, and university policies, such that the effect will be stronger for women, particularly younger women, and particularly at early stages of experience.

H3: The influence of social influence on behavioral intention will be varied by gender, age, experience, and university policies, such that the effect will be stronger for women, particularly for older women, and particularly in mandatory at early stages of experience.

H4a: Facilitating conditions will not have a significant influence on behavioral intention.

H4b: The influence of facilitating conditions on usage will be varied by age, experience, and university policies, such that the effect will be stronger for older student, particularly with increasing experience.

H5: Behavioral intention will have significant positive influence on usage.

4.13.1 H1: The influence of performance expectancy on behavioral intention will be varied by gender and age, such that the effect will be stronger for men and particularly for younger men.

An analysis of the relationship between performance expectancy and behavioral intention is perform and found that model one has $\beta = 0.484$ ($p<.01$), model two has $\beta = 0.440$($p<0.01$). It indicated that the influence of performance expectancy on behavioral intention will be varied by gender and age, such that the effect will be stronger for men and particularly for younger men., thus hypothesis H1 was accepted.

4.13.2 H2: The influence of effort expectancy on behavioral intention will be varied by gender, age, experience, and university policies, such that the effect will be stronger for women, particularly younger women, and particularly at early stages of experience.

An analysis of the relationship between effort expectancy and behavioral intention is perform and found that model one has $\beta = 0.128$ ($p<.05$), model two has $\beta = 0.145$ ($p<.01$). It indicated that The influence of effort expectancy on behavioral intention will be varied by gender, age, experience, and university policies, such that the effect will be stronger for women, particularly younger women, and particularly at early stages of experience., thus hypothesis H2 was accepted.

4.13.3 H3: The influence of social influence on behavioral intention will be varied by gender, age, experience, and university policies, such that the effect will be stronger for women, particularly for older women, and particularly in mandatory at early stages of experience.

An analysis of the relationship between social influence and behavioral intention is perform and found that model one has $\beta = 0.102$ ($p<.05$), model two has $\beta = 0.089$ ($p<.05$). It indicated that the influence of social influence on behavioral intention will be varied by gender, age, experience, and university policies, such that the effect will be

stronger for women, particularly for older women, and particularly in mandatory at early stages of experience, thus hypothesis H3 was accepted.

4.13.4 H4a: Facilitating conditions will not have a significant influence on behavioral intention.

An analysis of the relationship between facilitating conditions and on behavioral intention is perform and found that model one has $\beta = 0.60$ ($p<.05$), model two has $\beta = 0.045$ ($p>.1$). It indicated that facilitating conditions will not have significant influence on behavioral intention, thus hypothesis H4a was accepted

4.13.5 H4b: The influence of facilitating conditions on usage will be varied by age, experience, and university policies, such that the effect will be stronger for older student, particularly with increasing experience.

An analysis of the relationship between facilitating conditions and use behavior is perform and found that model one has $\beta = 0.122$ ($p<.05$), model two has $\beta = 0.140$ ($p<.01$). It indicated that the influence of facilitating conditions on usage will be varied by age, experience, and university policies, such that the effect will be stronger for older student, particularly with increasing experience, thus hypothesis H4b was accepted.

4.13.6 H5: Behavioral intention will have significant positive influence on usage.

An analysis of the relationship between behavioral intention and use behavior is perform and found that model one has $\beta = 0.403$ ($p<.01$), model two has $\beta = 0.367$ ($p<.01$). It indicated that behavioral intention will have significant positive influence on uasge behavior, thus hypothesis H5 was accepted.

The summary of hypothesis testing is presented in Table 4.43.

Table 4.43 The summary of hypothesis testing for focus group

Hypothesis	Result
H1: The influence of performance expectancy on behavioral intention will be varied by gender and age, such that the effect will be stronger for men and particularly for younger men	Accepted
H2: The influence of effort expectancy on behavioral intention will be varied by gender, age, experience, and university policies, such that the effect will be stronger for women, particularly younger women, and particularly at early stages of experience	Accepted
H3: The influence of social influence on behavioral intention will be varied by gender, age, experience, and university policies, such that the effect will be stronger for women, particularly for older women, and particularly in mandatory at early stages of experience	Accepted
H4a: Facilitating conditions will not have a significant influence on behavioral intention	Accepted
H4b: The influence of facilitating conditions on usage will be varied by age, experience, and university policies, such that the effect will be stronger for older student, particularly with increasing experience	Accepted
H5: Behavioral intention will have significant positive influence on usage	Accepted

4.14 The Qualitative Result

This section presents the qualitative research result from the in-depth interview. It is an evidence to confirm the result of quantitative research. The Research samples of the interview were Dean or Associate Dean for Academic Affairs whom have responsibility of steering the policies. The core five questions of the interview are as follows.

1. Currently, which areas do your faculty applied the web-based learning?

2. Which of your faculty's strategies those emphasize to web-based learning?

3. What importance functions do the web-based learning provides in the viewpoint of executive?

4. What are benefits receives from the web-based learning?

5. How do you allocate the existing resources and staff to correspond with web-based learning strategic planning?

The grounded theory method is used to analyze the results obtained from the interview. After the first interview has been conducted and the information was gathered, the result of the first interview has been used to create the working hypothesis. The result of the following interview was then used to test the working hypothesis. This study interviewed three separate interviewees. The results of all interviews are shown in Appendix M.

After the first interview, the working hypothesis have been created as shown below:

Working Hypothesis 1: Faculty launches web-based learning to archive students' learning performance. The working Hypothesis analyzed from the answer of:

1) question number one; Deans or Associate Dean for Academic Affairs response that they applied it to students' learning system, and organization's knowledge management 2) question number three; Students can use web-based learning to review their lessons, and share their knowledge with each other.

Working Hypothesis 2: Student using web-based learning with less effort. This working hypothesis analyzed from the answer of question number five; University use proprietary software that easy to use and managed by IT center department.

Working Hypothesis 3: Faculty launch web-based learning by using social influence. This working hypothesis analyzed from the answer of question number five; University and faculty assign team to be responsible for managing their resources on the site and made announcement to students with information on how to use the system.

Working Hypothesis 4: Faculty provide facility sufficient for using web-based learning. This working hypothesis analyzed from the answer of question number two; Faculty provide facilities such as computer, land line and WIFI that convenience for students and staffs to connect with web site via the Internet.

Working Hypothesis 5: Student feels satisfied in using web-based learning. This working hypothesis analyzed from the answer of question number four; Students' satisfaction from using web-based learning.

Then the results from the second interview has been brought to test with working hypothesis and found that all hypotheses were accepted. The third interview also confirmed the working hypothesis testing's result. It indicated that the result of the interviewing was justified. The conclusion of hypothesis testing is presented in Table 4.44.

Table 4.44 Working hypotheses testing

Working Hypothesis	**Hypothesis testing with the interview result of the second interview**	**Hypothesis testing with the interview result of the third interview**
Faculty launch web-based learning to archive students' learning performance	Supported	Supported
Student using web-based learning with less effort	Supported	Supported
Faculty launch web-based learning by using social influence	Supported	Supported
Faculty provide facility sufficient to use web-based learning	Supported	Supported
Student feels satisfied in using web-based learning	Supported	Supported

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This chapter was divided into four parts. The first part was a summary of the methodology and research findings. The second part was the discussion of each research question. The next section was the limitation of the study and the last section was the implication of the practical that presents benefits from finding and guideline to university operation and suggestions for future research.

This research was done based on the question "What were the factors affecting the use of web-based learning for universities in Thailand?" Therefore, the three main purposes were initiated. The first objective was to investigate the effects of the influential factors, namely, performance expectancy, effort expectancy, social influence, and facilitating conditions on behavioral intention to use and usage behavior of web-based learning system. The second aim was to establish the web-based learning adoption models, and the last objective was to explore how universities adjust their policies to increase the usage of web-based learning systems for universities in Thailand. The study suggested the hypothesis that usage behavior was affected by performance expectancy, effort expectancy, social influence, facilitating conditions, and behavioral intention to use web-based learning system where gender, age, experience, and university policies were employed as control variables.

The methodology used was both quantitative and qualitative researches. Quantitative research utilized the questionnaire as a tool to survey students in the

Faculty of Business Administration as social science representation and the Faculty of Science and Technology as science representation. The questions asked about performance expectancy, effort expectancy, social influence, facilitating conditions, behavioral intention to use, usage behavior on web-based learning and university policies.

Research findings indicated that effort expectancy, social influence, and facilitating conditions had a positive effect on usage behavior through behavioral intention to use. Qualitative research used in-depth interviews with the Dean or Associate Dean for Academic Affairs. The inductive descriptions analyzed the interview to confirm the result of quantitative research.

The Independent variables included performance expectancy, effort expectancy, social influence and facilitating conditions whereas usage behavior was the dependent variable. The mediator was the behavioral intention to use the web-based learning system.

Five hypotheses were proposed as follows. H1: The influence of performance expectancy on behavioral intention was varied by gender and age, such that the effects were stronger for men and particularly for younger men, H2: The influence of effort expectancy on behavioral intention to use web-based learning was varied by gender, age, experience, and university policies, such that the effects were stronger for women, particularly younger women, and particularly at early stages of experience, H3: The influence of social influence on behavioral intention to use web-based learning was varied by gender, age, experience, and university policies, such that the effects were stronger for women, particularly for older women, and particularly in mandatory at

early stages of experience, H4: Facilitating conditions had significant positive influence on usage behavior, and H5: Behavioral intention to use web-based learning had significant positive influence on usage behavior.

The research populations were the students who studied in Faculty of Business Administration and Faculty of Science and Technology in list of universities by the Office of the Higher Education Commission of Thailand. And those two faculties had launched their web-based learning systems for more than one year. There were 10 public universities and 10 private universities.

The questionnaire was assessed for the content validity by five scholars and was tested for reliability prior to mailing to the research sample. The questionnaires were filled-in and submitted by 410 students. According to demographic data, 222 (54.7%) of the respondents were female and 184 (45.3%) were male, 161 (39.7.0%) of them were younger than or equal to 19 years old, 130 (32.0%) of them were older than or equal to 23 years old, 65 (16.0%) of them were 21 years old, 31 (7.6%) of them were 20 years old, and 19 (4.7%) of them were 22 years old, 162 (39.9%) of the respondents had experience in using web-based learning for less than 1 year, 129 (31.8%) of the respondents had experience using for more than 5 years, 65 (16.0%) of the them had experience using for between 2 to 3 years, 31 (7.6%) of the them had between 1 or 2 years, and 19 (4.7%) of the respondents had between 3 to 4 years.

The descriptive statistics of this study can be divided into seven parts as follows:

In relation to performance expectancy, all observed was indicated in the strongly agree level, respondents accomplished tasks more quickly when using web-

based learning ($\bar{x}$ = 4.56) with S.D. of 0.708, respondents who found the web-based learning useful ($\bar{x}$ = 4.50) with S.D. of 0.686, respondents using web-based learning to increase chances of getting a good score ($\bar{x}$ = 4.50) with S.D. of 0.707, and respondents used web-based learning for increasing productivity ($\bar{x}$ = 4.38) with S.D. of 0.769.

Relating to effort expectancy, respondents who thought that web-based learning had to be clear and understandable was at the strongly agree level ($\bar{x}$ = 4.43) with S.D. of 0.798, respondents who thought that web-based learning had to become skillful easily was at the strongly agree level ($\bar{x}$ = 4.20) with S.D. of 0.880, web-based learning had to use easily was at the agree level ($\bar{x}$ = 4.19) with S.D. of 0.727, and the thought that operating the web-based learning had to be easy was also rated at the agree level ($\bar{x}$ = 4.02) with S.D. of 0.665.

Regarding social influence, all observed was indicated in the strongly agree level, people who were important to them think that they should use web-based learning systems ($\bar{x}$ = 4.63) with S.D. of 0.597, people who influence their behavior think that they should use web-based learning systems ($\bar{x}$ = 4.62) with S.D. of 0.700, the university had provided supports ($\bar{x}$ = 4.40) with S.D. of 0.585, and the senior management of their university had been helpful ($\bar{x}$ = 4.36) with S.D. of 0.616.

Concerning the facilitating conditions, all observed was indicated in agree level, respondents had the necessary resources to use the web-based learning ($\bar{x}$ = 4.19) with S.D. of 0.809, the web-based learning was not compatible with other systems ($\bar{x}$ = 4.08) with S.D. of 0.738, a specific person or group was available for assistance with

web-based learning difficulties ($\bar{x}$ = 4.06) with S.D. of 0.769, and respondents had the necessary knowledge to use the web-based learning ($\bar{x}$ = 3.94) with S.D. of 0.930.

In relation to behavioral intention to use the web-based learning, respondents intended to use the web-based learning in the next 6 months was at the strongly agree level ($\bar{x}$ = 4.53) with S.D. of 0.618, respondents planned to use web-based learning in the next 6 months was at the strongly agree level ($\bar{x}$ = 4.41) with S.D. of 0.612, respondents predicted that they would use web-based learning in the next 6 months was at the strongly agree level ($\bar{x}$ = 4.29) with S.D. of 0.755, assuming respondents had access to the web-based learning, they intended to use web-based learning was strongly agree level ($\bar{x}$ = 4.21) with S.D. of 0.575, and given that respondents had access to the web-based learning, they predicted that they would use web-based learning was also at the agree level ($\bar{x}$ = 4.15) with S.D. of 0.499.

According to usage behavior, respondents did not evaluate costs and benefits of using web-based learning before every use was at the strongly agree level ($\bar{x}$ = 4.35) with S.D. of 0.711, respondents use of web-based learning was automatic was at the strongly agree level ($\bar{x}$ = 4.21) with S.D. of 0.715, and respondents who carefully thought about using web-based learning before every use was at the agree level ($\bar{x}$ = 3.89) with S.D. of 0.765.

Along with the university policies, 35.71% of respondents notified that 41 – 60% of lecturers informed their students should use web-based learning, 37.68% of the respondents agreed that web-based learning was used in 41 – 60% of subjects per

semester, and 36.95% of the respondents reported that they had experienced about 41-60% with the connection failures.

The results of the hypothesis testing indicated that the relationship between performance expectancy and behavioral intention was performed and found that model one had $\beta = 0.729$ ($p<.01$), model two had $\beta = 0.118$. However, model three had no relationship between performance expectancy and behavioral intention to use web-based learning. It indicated that the performance expectancy did not have an impact on behavioral intention to use web-based learning, thus hypothesis H1 was rejected.

The relationship between effort expectancy and behavioral intention was performed and found that model one had $\beta = 0.239$ ($p<.05$), model two had $\beta = 0.904$ ($p<.01$) and model three had $\beta = 0.610$ ($p<.01$). It indicated that the influence of effort expectancy on behavioral intention to use web-based learning was positive and was varied by gender, age, experience, and university policies, such that the effects were stronger for women, particularly younger women, and particularly at early stages of experience, thus hypothesis H2 was accepted.

The relationship between social influence and behavioral intention was performed and found that model one had $\beta = 0.218$ ($p<.05$), model two had $\beta = 0.107$ ($p<.01$) and model three had $\beta = 0.090$ ($p<.01$). It indicated that the influence of social influence on behavioral intention was positive and varied by gender, age, experience, and university policies, such that the effects were stronger for women, particularly for older women, and particularly in mandatory at early stages of experience, thus hypothesis H3 was accepted.

The relationship between facilitating conditions and usage behavior was performed and found that model one had $\beta = 0.195$ ($p<.05$), model two had $\beta = 0.157$ ($p<.01$) and model three had $\beta = 0.152$ ($p<.01$). It indicated that the influence of facilitating conditions on usage behavior was varied by age, experience, and university policies, such that the effects were stronger for older students, particularly with increasing experience, thus hypothesis H4 was accepted.

The relationship between behavioral intention to use web-based learning and usage behavior was performed and found that model one had $\beta = 0.442$ ($p<.01$), model two had $\beta = 0.264$ ($p<.01$) and model three had $\beta = 0.310$ ($p<.01$). It indicated that behavioral intention to use web-based learning had significant positive influence on usage behavior, thus hypothesis H5 was accepted.

Since the performance expectancy did not have the relationship on behavioral intention to use web-based learning; the focus group had been conducted. The focus group populations were the students in the Faculty of Science and Technology in 5 public universities in Thailand that had high usage of web-based learning.

The questionnaires were filled-in and submitted by 400 students, constituting 80%. The demographic data of the focus group were as follows. Fifty percent of the respondents were female, 149 (37.3%) of the respondents were younger than or equal to 19 years old, 136 (34.0%) of them were older than or equal to 23 years old, 65 (16.3%) of them were 21 years old, 20 (5.0%) of them were 22 years old, and 20 (5.0%) of them were 22 years old. Out of the respondents, 150 persons (37.5%) had a using experience of less than 1 year, 135 (33.8%) of the respondents had a using experience of more than 5 years, 65 (16.3%) of the respondents had a using experience of between 2 to 3 years,

135 (33.8%) of them used web-based learning systems between 3 to 5 times per week, 129 (32.3%) of them used them more than once a day, and 18 (4.5%) of the respondents had used web-based learning less than 1 time per week.

The descriptive statistics of this study was divided into seven parts as follows.

Regarding performance expectancy, all observed was indicated in the Strongly Agree Level, respondents using web-based learning to increase chances of getting a good score ($\bar{x}$ = 4.55) with S.D. of 0.639, respondents found the web-based learning useful ($\bar{x}$ = 4.51) with S.D. of 0.664, respondents accomplish tasks more quickly when using web-based learning ($\bar{x}$ = 4.45) with S.D. of 0.761, and respondents using web-based learning for increasing productivity ($\bar{x}$ = 4.39) with S.D. of 0.764.

In relation to effort expectancy, all observed was indicated in the Strongly Agree Level, respondents who thought web-based learning had to use easily ($\bar{x}$ = 4.75) with S.D. of 0.457, web-based learning had to be clear and understandable ($\bar{x}$ = 4.73) with S.D. of 0.491, respondents who thought web-based learning had to become skillful easily ($\bar{x}$ = 4.67) with S.D. of 0.537, and operating the web-based learning was easy ($\bar{x}$ = 4.67) with S.D. of 0.511.

Concerning social influence, all observed was indicated in the Strongly Agree Level, people who influence their behavior thought that they should use it ($\bar{x}$ = 4.63) with S.D. of 0.678. People who were important to them thought that they should use it ($\bar{x}$ = 4.63) with S.D. of 0.569, and the senior management of their university had been helpful ($\bar{x}$ = 4.37) with S.D. of 0.612.

According to facilitating conditions, all observed was indicated in the Agree Level, respondents had the necessary resources to use web-based learning ($\bar{x}$ = 4.19) with S.D. of 0.808, the web-based learning was not compatible with other systems ($\bar{x}$ = 4.09) with S.D. of 0.741, and a specific person or group was available for assistance with web-based learning difficulties ($\bar{x}$ = 4.07) with S.D. of 0.777.

Relating to behavioral intention, respondents intend to use the web-based learning in the next 6 months were at the Strongly Agree Level ($\bar{x}$ = 4.55) with S.D. of 0.607, they planned to use the web-based learning in the next 6 months was at the Strongly Agree Level ($\bar{x}$ = 4.42) with S.D. of 0.612, and given that respondents had access to the web-based learning, they predict that they would use it was also at the Agree Level ($\bar{x}$ = 4.16) with S.D. of 0.492.

With regard to usage behavior, respondents did not evaluate costs and benefits of using the web-based learning before every use was at the Strongly Agree Level ($\bar{x}$ = 4.35) with S.D. of 0.710, respondents use of the web-based learning was automatic was at the Strongly Agree Level ($\bar{x}$ = 4.22) with S.D. of 0.712, and respondents who carefully thought about using the web-based learning before every use was at the Agree Level ($\bar{x}$ = 3.90) with S.D. of 0.765.

Pertaining university policies, 37.25% of the respondents notified that 41 – 60% of lecturers informed their students that they should use the web-based learning, 36.00% of the respondents agreed that web-based learning was used in 41 – 60% of subjects per semester, and 32.75% of the respondents reported that they had experienced about 41- 60% with the connection failures.

The hypothesis testing from the focus group data were indicated as follows.

The relationship between performance expectancy and behavioral intention to use web-based learning was performed and found that model one had $\beta = 0.484$ ($p<.01$), model two had $\beta = 0.440$($p<0.01$). It indicated that the influence of performance expectancy on behavioral intention to use web-based learning was varied by gender and age, such that the effects were stronger for men and particularly for younger men, thus hypothesis H1 was accepted.

The relationship between effort expectancy and behavioral intention to use web-based learning was performed and found that model one had $\beta = 0.128$ ($p<.05$), model two had $\beta =0.145$ ($p<.01$). It indicated that the influence of effort expectancy on behavioral intention to use web-based learning was varied by gender, age, experience, and university policies, such that the effects were stronger for women, particularly for younger women, and particularly at early stages of experience, thus hypothesis H2 was accepted.

The relationship between social influence and behavioral intention to use web-based learning was performed and found that model one had $\beta = 0.102$ ($p<.05$), model two had $\beta = 0.089$ ($p<.05$). It indicated that the influence of social influence on behavioral intention to use web-based learning was varied by gender, age, experience, and university policies, such that the effects were stronger for women, particularly for older women, and particularly in mandatory at early stages of experience, thus hypothesis H3 was accepted.

The relationship between facilitating conditions and usage behavior was performed and found that model one had $\beta = 0.122$ ($p<.05$), and model two had $\beta =$

0.140 ($p<.01$). It indicated that the influence of facilitating conditions on usage behavior was varied by age, experience, and university policies, such that the effects were stronger for older student, particularly with increasing experience, thus hypothesis H4 was accepted.

The relationship between behavioral intention to use web-based learning and usage behavior was performed and found that model one had $\beta = 0.403$ ($p<.01$), model two had $\beta = 0.367$ ($p<.01$). It indicated that behavioral intention to use web-based learning had significant positive influence on usage behavior, thus hypothesis H5 was accepted.

The results of interviews conducted with Deans or the Associate Dean for Academic Affairs was applied to five working hypothesis: H1: Faculty launch web-based learning to archive students' learning performance, H2: Student using web-based learning with less effort, H3: Faculty launch web-based learning by using social influence, H4: Faculty provide facility enough for using web-based learning, and H5: Student had satisfaction to use web-based learning. The working hypotheses were tested with the interview of the second and the third Deans or Associate Dean for Academic Affairs. All hypotheses were accepted. The result confirmed that the relationship among performance expectancy, effort expectancy, social influence, facilitating conditions and usage behavior with behavioral intention to use web-based learning were supported.

5.2 Discussion of Findings

This research focused on key factors that related to technology acceptance model based on the research question: "What are factors affecting the use of web-based learning for universities in Thailand?"

Based on the key factors described by Venkatesh, the factors included performance expectancy, effort expectancy, social influence, facilitating condition, behavioral intention to use web-based learning and usage behavior.

H1 indicated that the performance expectancy of focus group had positively affected on behavioral intention to use web-based learning with a path coefficient of 0.440. The finding consistently confirmed to a number of previous studies about acceptance technology. For example, Chen, et.al (2004), Chiu and Wang (2008), Im, et.al (2007), Kijsanayotina, et.al (2009), Konradt, et.al (2006), Machewka, et.al (2007), Venkatesh, et.al (2003, 2010) presented the positive impacts of performance expectancy on positive increasing of behavioral intention to use web-based learning and also supported Venkatesh, et.al (2003, 2010) who found that effects of gender and age on performance expectancy with behavioral intention to use were stronger for men and particularly for younger men. Behavioral intention to use the web-based learning would increase when students recognized the performance of using the web-based learning system. However, the finding of the first study indicated that the performance expectancy had no effect on behavioral intention to use web-based learning. The finding supported Hamburg, et.al (2003) who found that students did not use the web-based learning due to the feelings of isolation and they felt that the use of web-based learning cannot increase their performance.

H2 indicated that the effort expectancy had positively affected on behavioral intention to use web-based learning with a path coefficient of 0.145. The finding well supported Chiu and Wang (2008), Kijsanayotina, et.al (2009), Konradt, et.al (2006), Venkatesh, et.al (2003, 2010) who presented the positive impacts of effort expectancy on positive increasing of behavioral intention to use web-based learning and also supported Chang (2008), Venkatesh, et.al (2003, 2010) who found that effects of gender, age and use experience on effort expectancy with behavioral intention to use web-based learning were stronger for women, particularly for younger women, and particularly at early stages of experience. Furthermore, the findings showed the relationship of university policies on effort expectancy with behavioral intention to use web-based learning that effect of effort expectancy with behavioral intention to use web-based learning had stronger for high control of university policies. This finding also supported work of Suanpang and Petocz (2006) that the policies had affected on behavioral intention to use system. Behavior intention to use the web-based learning would increase when students pay their effort less. Then, university should provide the web-based learning system that easy to understood and easy to use and should provide a specific person or team available for assistance when web-based learning difficulties.

H3 indicated that the social influence had positively affected on behavioral intention to use with a path coefficient of 0.089. The finding supported Chen, et.al (2004), Chiu and Wang (2008), Im, et.al (2007), Kijsanayotina, et.al (2009), Konradt, et.al (2006), Machewka, et.al (2007), Venkatesh, et.al (2003, 2010) who presented the positive impacts of social influence on positive increasing of behavioral intention to use web-based learning and also supported Chang (2008), Venkatesh, et.al (2003) who

found that the effects of gender, age and use experience on social influence with behavioral intention to use web-based learning were stronger for women, particularly for older women, and particularly in mandatory at early stages of experience. Furthermore, this finding also supported the findings of Suanpang and Petocz (2006), Saekow and Samson (2011a, 2011b) that the policies had an effect on behavioral intention to use web-based learning system. Behavior intention to use the web-based learning would increase when the ones they loved notified them that they should use web-based learning system. Then, university should inform students through university brochure, teacher should advise students that they could use the web-base learning or the senior students informed the junior students that they could use the web-base learning system.

H4 indicated that the facilitating conditions had positive effect on usage behavior with a path coefficient of 0.140. The finding supported Chen, et.al (2004), Chiu and Wang (2008), Im, et.al (2007), Kijsanayotina, et.al (2009), Konradt, et.al (2006), Machewka, et.al (2007), Venkatesh, et.al (2003, 2010) who presented the positive impacts of social influence on positive increasing of behavioral intention to use web-based learning and also supported Venkatesh, et.al (2003) who found that effect of age and use experience on facilitating conditions with use behavior were stronger for older student, particularly with increasing experience. Furthermore, the findings showed the relationship of university policies on facilitating conditions with use behavior that effect of facilitating conditions with use behavior had stronger for high control of university policies. This finding also supported work of Suanpang and Petocz (2006), Saekow and Samson (2011a, 2011b) that the policies were an

importance part in the implementation of goal and bring organization to achieve its goal. Then, university should provide the necessary resources to use web-based learning and provided a specific person or team available for assistance when web-based learning system or data network had problem. University should provide the stable data network or provided good equipments because students emphasize on their failure connection to the web-based learning system. Finally, university should provide the web-based learning manuals for both students and teachers.

H5 indicated that the behavioral intention to use web-based learning had positive effect on usage behavior with a path coefficient of 0.367. The finding supported Chen, et.al (2004), Chiu and Wang (2008), Im, et.al (2007), Kijsanayotina, et.al (2009), Konradt, et.al (2006), Machewka, et.al (2007), Venkatesh, et.al (2003, 2010) who found the positive impacts of behavioral intention to use web-based learning on positive increasing of use behavior web-based learning. Then, the greater student' behavioral intention to use the web-based learning, the more increase in student' usage behavior.

5.3 Limitations of the Study

This research was studied based on the four major limitations. Firstly, the research samples consisted of undergraduate students from Faculty of Business Administration who's represented social science student and the students from Faculty of Science and Technology who's represented the science students. The next constraint was that the samples were selected from these two faculties that their web-based learning systems were implemented for at least one year. The third limitation was about

the population. Population in this work consisted of twenty universities including ten public universities and ten private universities whereas each university used different web-based learning platforms and managed their resources distinctively. Hence, the facilitating conditions and university policies should be greatly varied from each other. The last limitation was that this study based on the four key influential factors where age, gender, experience, and university policies were treated as control variables. Since the usage behavior was not only affected by performance expectancy, effort expectancy, social influence and facilitating conditions, but they could be caused by other factors. Therefore, future work should include others relevance factors.

5.4 Research Contributions and Future Research

This study formulated several contributions which were divided into two folds, the theoretical contribution and practical implication. The details of these contributions were as follows.

5.4.1 Theoretical Contribution

The most important aspect of the research was its contribution to theories. The theoretical contribution was to explain the technology adoption of web-based learning for universities in Thailand. This study indicated that performance expectancy, effort expectancy, social influence and facility conditions had effects to behavioral to use web-based learning and usage behavior. This findings supported Unified Theory of Acceptance and Use of Technology (UTAUT) which was presented by Venkatesh (2003, 2010). These findings were consistent to the studies of Chen, et.al (2004), Chiu and Wang (2008), Im, et.al (2007), Kijsanayotina, et.al (2009), Konradt, et.al (2006),

Machewka, et.al (2007). According to the first study, it found that the performance expectancy did not have an effect to behavioral intention to use web-based learning. The result might come from the users' only need to pass the examination or only interested in superficial learning. The finding supported Hamburg, et al. (2003) who found that students did not use the web-based learning owing to the use of web-based learning was not of assistance to increase their performance and might isolated them from others. Moreover, the effects of gender and age on performance expectancy and behavioral intention to use web-based learning were found that the effect was stronger in partially young men. This finding supported Venkatesh (2003, 2010). This study indicated that gender, age, use experience and university policies had effects to effort expectancy and behavioral intention to use web-based learning such that effect was stronger in partially younger women at early stages of experience. This finding was consistent to the results of Chang (2008), Venkatesh (2003, 2010). The finding of an effect between effort expectancy and behavioral intention to use web-based learning was stronger for high control of university policies was consistent to the study of Suanpang and Petocz (2006). This study indicated that gender, age, use experience and university policies had effects to social influence and behavioral intention to use web-based learning such that effect was stronger in particularly older women at early stages of experience. This finding supported Chang (2008), Venkatesh (2003). The effect of social influence to behavioral intention to use web-based learning was stronger in high control university policies. This finding supported Suanpang and Petocz (2006). Finally, these findings indicated that age, use experience and university policies had effects to university' facilitating conditions and usage behavior such that the effect was

stronger in older student with early stage of experience. This finding supported Venkatesh (2003, 2010). The effect of facilitating conditions on usage behavior was stronger for high control university policies. This finding was consistent to the result of Suanpang and Petocz (2006).

The results from this research indicated that not only student gender, age and use experience affect students' behavioral intention to use web-based learning and usage behavior but university policies also had an effect on student' behavioral intention to use web-based learning and usage behavior. The effect was stronger for universities with high levels of control policies.

5.4.2 Practical Implication

The results of the study contribute several benefits to the universities in Thailand. The first contribution was the findings would guide the management teams to understand the relationship between university policies and usage behavior and would assist universities in better preparation for their operation resources for web-based learning system. The results would assist teachers in preparation their lessons in order to fulfill the student's needs.

The findings can be applied to contribute some advantages for universities, instructors, and students. As regard to the university level, the findings provide some guidelines for executives on how to managing the web-based learning systems in order to accomplish effectiveness as follows. Firstly, universities should inform their students in accordance with the advantages of using web-based learning since some students grasp that they do not get any benefit from using web-based learning. Secondly, university managements should inform their students with regard to the use of web-

based learning and how to access the university websites. Thirdly, universities should provide adequacy and efficiently equipments and facilities for their students and staffs in order to access web-based learning systems such as the land line and wireless system. All of these have to be in good quality as students' intention to use the system are lessen when they stumble upon the higher failure connection. The fourth implication is that universities should launch the policies that provide teacher motivation to create courses on web-based learning. The last implication for university level is university should provide yearly training plan for instructors and students about the use of web-based learning system.

In relation to the practical implications at the instructor level, it should provide a guideline for instructors to manage their web-based learning courses. Firstly, instructors should inform students about the use of web-based learning through a website. Secondly, instructors should facilitate the inquiry system for students in order to provide a quick response to them. Thirdly, the course should be easy to understand with small size. Fourthly, instructors should use social system to encourage students to use web-based learning system. It is noted that men had higher performance expectancy for using web-based learning than women; instructors should pay more attention to men. It is suggested that junior students had less performance expectancy for using web-based learning than senior students; instructors should pay attention to junior students.

Regarding the practical implications at the student level, it provides a guideline for students to prepare themselves as follow. Firstly, the awareness of web-based learning of student, there is benefit of using web-based learning for student such

as understanding the lesson. The final is readiness of students; students should have internet connecting devices such as smart phones or notebooks.

5.4.3 Future Research

The results from this study shown that it could be extended in many directions. Firstly, the model could be tested with other groups such as companies which achieved by using web-based learning, or to be examined in primary schools or in secondary schools. Secondly, each level of management policies may cause different effects to the use of web-based learning. Hence, future study should focus on 1) the comparison among the use of web-based learning system regarding the levels of management policies, and 2) types of management level such as strategic level, managerial level, and operational level and how do they affect to usage behavior of web-based learning. Lastly, the important factors that lead to the success in the use of web-based learning system are considered to be of interests. Therefore, future works should concentrate on 1) the success factors of using web-based learning by focus groups companies and 2) the success factors of using web-based learning in primary school or in secondary school.

List of Bibliography

AbuShanab, E., Pearson, J. M., & Setterstrom, A. J. (2010). Internet Banking and Customers' Acceptance in Jordan: The Unified Model's Perspective. *Communications of the Association for Information Systems, 26*(1), 493-524.

Adamson, I., & Shine, J. (2003). Extending the new technology acceptance model to measure the end user information systems satisfaction in a mandatory environment: A bank's treasury. *Technology Analysis & Strategic Management, 15*(4), 441-455.

Ajzen, I. (1985). From Intentions to Actions: A Theory of Planned Behavior. In J. K. J. B. (Eds.) (Ed.), *Action Control: From Cognition to Behavior* (pp. 11-39). New York: Springer Verlag.

Ajzen, I., & Fishbein, M. (1980). *Understanding Aftitzmdes and Predicting Social Behavior.* Englewood Cliffs, New Jersey: Prentice-Hall.

Alenezi, A. R. A. K., Abdul Malek ; Veloo, Arsaythamby (2010). An Empirical Investigation into the Role of Enjoyment, Computer Anxiety, Computer Self-Efficacy and Internet Experience in Influencing the Students' Intention to Use E-Learning: A Case Study from Saudi Arabian Governmental Universities. *Turkish Online Journal of Educational Technology - TOJET, 9*(4), 22-34.

Babbie, E. R. (2007). *The practice of social research* (Eleventh ed.): Thomson Learning, Inc.

Beare, P. L. (1989). The comparative effectiveness of videotape, audiotape and telelecture in delivering continuing teacher education. *American journal of distance education, 3*(2), 57-66.

Beek, M. V. (2011). *Virtual Learning in Michigan's Schools*. Midland: Mackinac Center for Public Policy.

Biner, P. M., Dean, Raymond S. , and Mellinger, Anthony E. . (1994). Factors Underlying Distance Learner Satisfaction with Televised College-Level Courses. *The American Journal of distance Education, 8*(1), 60-71.

Cameron, C. A. (2006). *Examining the relationship that Age, Gender, Experience and Communication Technology has on acceptance and use of Information Technology: Using the Unified Theory of Acceptance and Use of Technology (UTAUT) model.*, Touro University.

Chang, P.-C. (2008). *2Drivers and Moderators of Consumer Behaviour in the Multiple Use of Mobile Phone*. Paper presented at the 19th Australasian Conference on Information Systems.

Chen, N.-S., Lin, K.-M., & Kinshuk. (2004, April,2004). *Assessment of E-Learning Satisfaction from Critical Incidents Perspective.* Paper presented at the International Conference on Enterprise Information Systems.

Chiu, C.-M., & Wang, E. T. G. (2008). Understanding Web-based learning continuance intention: The role of subjective task value. *Information & Management, 45*(3), 194-201.

Chute, A. G., Thompson, M. M., & Hancock, B. W. (1999). *The McGraw-Hill handbook of distance learning.* New York: McGraw-Hill.

Coates, H. (2006). *Student Engagement in Campus-Based and Online Education: University Connections.* USA.: Routledge.

Colderway, D. O. (1987). Behavior Analysis in Distance Education: A Systems Perspective. *The American Journal of Distance Learning., 1*.

Coleman, G., & O'Connor, R. (2007). Using grounded theory to understand software process improvement: A study of Irish software product companies. *Information and Software Technology, 49*(6), 654-667.

Compeau, D. R., & Higgins, C. A. (1991). *A Social Cognitive Theory Perspective on Individual Reactions to Computing Technology*. Paper presented at the International Conference on Information Systems.

Crawford, C. M., Ed. . (2000, February 8-12, 2000). *Collected Papers on Graduate & Inservice Teacher Education and Technology.* Paper presented at the Society for Information Technology & Teacher Education International Conference, San Diego, California.

Davis, F. D. (1989). Percieved usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319-340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). Extrinsic and Intrinsic Motivation to Use Computers in the Workplace. *Journal of Applied Social Psychology, 22*(14), 1111-1132.

Denscombe, M. (2007). *The Good Research Guide for small-scale social research projects* (Third ed.). England: the McGraw Hill companies.

E.Owen, W. (2003). A Case Study of Distance Education at The Naval Postgraduate School: Assessing the Effectiveness of Video Tele-Education (VTE) as a Distance Learning Instructional Delivery Mode in Graduate Degree Programs. *Golden Gate University*.

Hamburg, I., Lindecke, C., & Thij, H. t. (2003). *Social aspects of e-learning and blending learning methods.* Paper presented at the Proceedings of the 4th European Conference E-Comm-Line, Bucharest, Romania.

Hill, J. R. (1997). Distance learning environments via world wide web. In B. H. Khan (Ed.), *Web_Based Instruction* (pp. 75-80). New Jersey: Educational Technology Publications, Inc.

Im, I., Hong, S., & Kang, M. S. (2007). *An International Comparison of Technology Adoption.* Paper presented at the Proceedings of the 13th Asia Pacific Management Conference, Melbourne, Australia.

Intanam, N., Wongwanich, S., & Lawthong, N. (2012). Development of a model for building professional learning communities in schools: teachers' perspectives in Thai educational context. *Journal of Case Studies in Education, 3*, 1-11.

Kijsanayotina, B., Pannarunothai, S., & Speedie, S. M. (2009). Factors influencing health information technology adoption in Thailand's community health centers: Applying the UTAUT model. *international journal of medical informatics, 78*, 404-416.

Kim, J.-A. (2005). *User acceptance of Web-based subscription databases: Extending the technology acceptance model.* Unpublished Ph.D., The Florida State University, United States -- Florida.

Konradt, U., Christophersen, T., & Schaeffer-Kuelz, U. (2006). Predicting user satisfaction, strain and system usage of employee self-services. *International Journal of Human-Computer Studies, 64*(11), 1141-1153.

Lloyd, L. (2000). *Teaching With Technology: Rethinking Tradition.*: Information today, Inc.

Marchewka, J. T., Liu, C., & Kostiwa, K. (2007). An Application of the UTAUT Model for Understanding Student Perceptions Using Course Management Software. *Communications of the IIMA, 7*(2).

Merisotis, J. P., & Phipps, R. A. (1999). What's the Difference? Outcomes of Distance vs. Traditional Classroom-Based Learning., *31*(3).

Moore, G. C., & Benbasat, I. (1991). Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation. *Information Systems Research. , 2*, 192-222.

NECTEC. (2005). *Thailand ICT Indicators 2005* (Vol. 21). Thailand: National Electronics and Computer Technology Center (NECTEC)

NSO. (2006). *Report ICT 49*.

Park, J., et al. (2007). Adoption of Mobile Technologies for Chinese Consumers. *Journal of Electronic Commerce Research., 8*(3), 196-206.

Peng, H., Tsai, C. C., & Wu, Y. T. (2006). University students' self-effectiveness and their attitudes toward the Internet: The role of students' perceptions of the Internet. *Educational Studies, 32*(1), 73-86.

Pergola, T. M., & Walters, L. M. (2011). Evaluating Web-Based Learning Systems. *Journal of Instructional Pedagogies, 5*, 1-1-17.

Petrides, L. A. (2002). Web-based technologies for distributed (or distance) learning: creating learning-centered educational experiences in the higher education classroom. *International Journal of Instructional Media, 29*(1), 69-77.

Pruett, T. (2000). Southwest Virginia Community College Technology Master Plan. . *Southwest Virginia Community College*, 17.

Ramayah, T. (2010). The Role of Voluntariness in Distance Education Students' Usage of a Course Website *Turkish Online Journal of Educational Technology - TOJET, 9*(3), 96-105.

Rogers, E. M. (1995). *Diffusion of Innovations* (4 ed.). New York: Free Press.

Rosen, P. A. (2005). *The effect of personal innovativeness on technology acceptance and use*. Unpublished Ph.D., Oklahoma State University, United States -- Oklahoma.

Saekow, A., & Samson, D. (2011a). E-learning Readiness of Thailand's UniversitiesComparing to the USA's Cases. *International Journal of e-Education, e-Business, e-Management and e-Learning, 1*(2), 126.

Saekow, A., & Samson, D. (2011b). E-learning readiness of Thailand's universities comparing to the USA's cases. *International Journal of e-Education, e-Business, e-Management and e-Learning, 1*(2), 126-131.

Sanserm, S. K. (2010). *Student and instructor perceptions of using ATutor as the learning content management system for learning at a distance in Thailand.* Unpublished Ph.D., Oklahoma State University, Ann Arbor.

Schlosser, C. (1996). Distance Education: What the Literature Says Works. *Research Institute for Studies in Education,Iowa State University*, 553-555.

Sher, A. (2009). Assessing the relationship of student-instructor and student-student interaction to student learning and satisfaction in Web-based Online Learning Environment. *Journal of Interactive Online Learning, 8*(2).

Siritongthaworn, S., Krairit, D., Dimmitt, N., & Paul, H. (2006). The study of e-learning technology implementation: A preliminary investigation of universities in Thailand. *Education and Information Technologies, 11*(2), 137-160.

Sivo, S. A. C.-C., Pan. (2005). Undergraduate Engineering and Psychology Students' Use of a Course Management System: A Factorial Invariance Study of User Characteristics and Attitudes. *Journal of Technology Studies, 31*(2), 94-103.

Sorensen, C. K. (1996). Evaluation of Distance Education Instruction: An Evaluation Case Study. *Research Institute for Studies in Education,Iowa State University, 2*, 560 - 564.

Suanpang, P., & Petocz, P. (2006). E-Learning in Thailand: An Analysis and Case Study. *International Journal on E-Learning, 5*(3), 415-438.

Šumak, B., Polančič, G., & Heričko, M. (2010). *An Empirical Study Of Virtual Learning Environment Adoption Using UTAUT*. Paper presented at the International Conference on Mobile, Hybrid, and On-Line Learning. Retrieved from http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=05430017

Taylor, S., & Todd, P. A. (1995). Assessing IT Usage: The Role of Prior Experience. *MIS Quarterly, 19*(2), 561-570.

Thompson, R. L., Higgins, C. A., & Howell, J. M. (1991). Personal Computing: Toward a Conceptual Model of Utilization. *MIS Quartery, 15*(1), 124-143.

Trangratapit, P. (2010). *Faculty perceptions about the implementation of e-learning in Thailand: An analysis of cultural factors.* Unpublished Ed.D., Northern Illinois University, Ann Arbor.

Venkatesh, V., & Davis, F. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science, 45*(2), 186-204.

Venkatesh, V., Morris, M., Davis, G., & Davis, F. (2003). User acceptance of information technology: toward a unified view. *MIS Quarterly 27*(3), pp. 425-478.

Venkatesh, V., & Zhang, X. (2010). Unified Theory of Acceptance and Use of Technology: U.S. Vs. China. *Journal of Global Information Technology Management, 13*(1), 5.

Wagner, J. G. (2001). *Assessing Online Learning*. Reston: National Business Education Association.

Wang, Y.-S. (2003). Assessment of learner satisfaction with asynchronous electronic learning systems. *Information & Management, 41*(1), 75-86.

Wijekumar, K. (2005). Creating Effective Web-Based Learning Environments:Relevant Research and Practice. *Journal of Online Education, 1*(5).

APPENDICES

APPENDIX A

The Normality Distribution Testing

Variables	Skewness	Kurtosis
PE1	-1.055	.023
PE2	-1.319	.413
PE3	-.985	.129
PE4	-1.280	.972
EE1	-1.116	.043
EE2	-.872	.123
EE3	-.799	1.264
EE4	-.620	1.770
SI1	-1.570	.871
SI2	-1.377	.842
SI3	-.386	-.661
SI4	-.359	-.712
FC1	-.378	-1.294
FC2	-.255	-.973
FC3	-.561	.436
FC4	-.680	.748
BI1	-.955	-.119
BI2	-.542	-1.061
BI3	-.648	.150
BI4	-.272	.840
BI5	.280	.527
UB1	-.614	-.831

Variables	Skewness	Kurtosis
UB2	.197	-1.269
UB3	-.341	-1.002
UP1	.170	-.463
UP2	.116	-.480
UP3	-.098	.198

APPENDIX B

The Reliability Testing

Variable	Mean	S.D.	Cronbach's alpha
Performance Expectancy			0.847
PE1 (Find the web-based learning useful)	4.50	0.686	
PE2 (Accomplish tasks more quickly)	4.56	0.708	
PE3 (Increases productivity)	4.38	0.769	
PE4 (Increase chances of getting a good score)	4.50	0.707	
Effort Expectancy			0.839
EE1 (Web-based learning would be clear and understandable)	4.43	0.798	
EE2 (Easy to become skillful)	4.20	0.880	
EE3 (Web-based learning is easy to use)	4.19	0.727	
EE4 (Operate the web-based learning is easy)	4.02	0.665	
Social Influence			0.802
SI1 (People who influence my behavior think that I should use it)	4.62	0.700	
SI2 (People who are important to me think that I should use it)	4.63	0.597	
SI3 (The senior management of this university has been helpful)	4.35	0.616	
SI4 (The university has provided supports)	4.40	0.585	
Facilitating Conditions			0.857
FC1 (I have the necessary resources to use it)	4.19	0.809	
FC2 (I have the necessary knowledge to use it)	3.94	0.930	

Variable	Mean	S.D.	Cronbach's alpha
FC3 (The web-based learning is not compatible with other systems)	4.08	0.738	
FC4 (A specific person or group is available for assistance with web-based learning difficulties)	4.06	0.769	
Self Efficacy			0.810
SE1 (I could complete a job or task using the web-based learning)	3.49	0.751	
SE2 (If there was no one around to tell me what to do as I go)	3.37	0.684	
SE3 (If I could call someone for help if I got stuck)	3.59	0.908	
SE4 (If I had a lot of time to complete the learning for which the software was provided)	3.57	0.808	
SE5 (If I had just the built-in help facility for assistance)	3.21	0.963	
Behavioral Intention			0.866
BI1 (I intend to use the web-based learning in the next 6 months)	4.53	0.618	
BI2 (I predict I would use the web-based learning in the next 6 months)	4.29	0.755	
BI3 (I plan to use the web-based learning in the next 6 months)	4.41	0.612	

Variable	Mean	S.D.	Cronbach's alpha
BI4 (Assuming I had access to the web-based learning, I intend to use it)	4.21	0.575	
BI5 (Given that I had access to the web-based learning, I predict that I would use it)	4.15	0.499	
Use Behavior			0.892
UB1 (I do not evaluate costs and benefits of using the web-based learning before every use)	4.35	0.711	
UB2 (I carefully think about using the web-based learning before every use)	3.89	0.765	
UB3 (My use of the web-based learning is automatic)	4.21	0.715	
University Policies			0.876
UP1 (Portion of lecturers told me that I can using the web-based learning)	3.64	0.735	
UP2 (Portion of subjects in semester that using the web-based learning)	3.62	0.767	
UP3 (Portion of fail connections to system during semester)	3.51	0.849	

APPENDIX C

Multicollinearity Testing

Variable	Collinearity Statistic	
	Tolerance	**VIF**
PE2 (Accomplish tasks more quickly)	0.590	1.696
PE3 (Increases productivity)	0.289	3.460
PE4 (Increase chances of getting a good score)	0.293	3.418
EE1 (Web-based learning would be clear and understandable)	0.197	5.079
EE2 (Easy to become skillful)	0.319	3.135
EE3 (Web-based learning is easy to use)	0.304	3.285
EE4 (Operate the web-based learning is easy)	0.324	3.087
SI1 (People who influence my behavior think that I should use it)	0.241	4.150
SI2 (People who are important to me think that I should use it)	0.255	3.923
SI3 (The senior management of this university has been helpful)	0.253	3.956
SI4 (The university has supported)	0.231	4.331
FC1 (I have the necessary resources to use it)	0.383	2.610
FC2 (I have the necessary knowledge to use it)	0.379	2.638
FC3 (The web-based learning is not compatible with other systems)	0.453	2.208
FC4 (A specific person or group is available for assistance with web-based learning difficulties)	0.349	2.867

Variable	Collinearity Statistic	
	Tolerance	**VIF**
SE1 (I could complete a job or task using the web-based learning)	0.588	1.700
SE2 (If there was no one around to tell me what to do as I go)	0.621	1.610
SE3 (If I could call someone for help if I got stuck)	0.475	2.103
SE4 (If I had a lot of time to complete the learning for which the software was provided)	0.472	2.117
SE5 (If I had just the built-in help facility for assistance)	0.471	2.122
BI1 (I intend to use the web-based learning in the next 6 months)	0.260	3.847
BI2 (I predict I would use the web-based learning in the next 6 months)	0.265	3.772
BI3 (I plan to use the web-based learning in the next 6 months)	0.136	7.336
BI4 (Assuming I had access to the web-based learning, I intend to use it)	0.359	2.789
BI5 (Given that I had access to the web-based learning, I predict that I would use it)	0.467	2.140
UB1 (I do not evaluate costs and benefits of using the web-based learning before every use)	0.293	3.418

Variable	Collinearity Statistic	
	Tolerance	**VIF**
UB2 (I carefully think about using the web-based learning before every use)	0.360	2.780
UB3 (My use of the web-based learning is automatic)	0.318	3.142
UP1 (Portion of lecturers told me that I can using the web-based learning)	0.415	2.411
UP2 (Portion of subjects in semester that using the web-based learning)	0.323	3.095
UP3 (Portion of fail connections to system during semester)	.397	2.522

APPENDIX D

The Discriminant Validity Testing

Correlation

	PE1	PE2	PE3	PE4	EE1	EE2	EE3	EE4	SI1	SI2	SI3	SI4	FC1	FC2	FC3	FC4
PE1	1															
PE2	.775**															
PE3	.513**	.571**														
PE4	.449**	.456**	.717**													
EE1	.379**	.363**	.637**	.743**												
EE2	.327**	.251**	.601**	.626**	.747**											
EE3	.178**	.132**	.212**	.499**	.582**	.413**										
EE4	.201**	.130**	.193**	.413**	.575**	.399**	.742**									
SI1	.118*	.122*	.077	.111*	.091	.117*	-.079	.024								
SI2	.139**	.125*	.112*	.124*	.118*	.135**	-.106*	-.021	.849**							
SI3	.256**	.227**	.327**	.282**	.288**	.351**	-.057	-.009	.242**	.286**						
SI4	.242**	.200**	.294**	.287**	.302**	.380**	-.040	.039	.417**	.414**	.838**					
FC1	.125*	.152**	.159**	.136**	.106*	.175**	-.108*	.003	.058	.097*	.164**	.124*	**1**			

	PE1	PE2	PE3	PE4	EE1	EE2	EE3	EE4	SI1	SI2	SI3	SI4	FC1	FC2	FC3	FC4
FC2	.120*	.148**	.166**	.155**	.086	.196**	-.075	.009	.167**	.165**	.222**	.194**	.716**	1		
FC3	.027	.027	.049	.049	-.010	.030	-.031	.052	.036	.025	.028	.027	.509**	.455**		
FC4	.128**	.113*	.121*	.114*	.076	.132**	-.054	.079	.117*	.136**	.196**	.190**	.608**	.644**	.691**	1
BI1	.349**	.343**	.563**	.593**	.683**	.603**	.364**	.412**	.082	.136**	.323**	.326**	.097	.107*	.014	.133**
BI2	.187**	.143**	.282**	.306**	.377**	.329**	.209**	.229**	.093	.100*	.195**	.219**	.203**	.226**	.030	.144**
BI3	.279**	.263**	.493**	.495**	.581**	.548**	.280**	.343**	.069	.129**	.288**	.291**	.207**	.195**	.012	.159**
BI4	.288**	.253**	.442**	.384**	.404**	.457**	.104*	.061	.025	.104*	.230**	.227**	.188**	.164**	-.021	.111*
BI5	.263**	.243**	.287**	.245**	.304**	.272**	.011	.118*	.146**	.177**	.292**	.275**	.270**	.260**	.049	.201**
UB1	.224**	.175**	.307**	.271**	.294**	.203**	.088	.101*	.075	.107*	.243**	.223**	.237**	.207**	-.008	.134**
UB2	.197**	.158**	.231**	.242**	.246**	.146**	.091	.119*	.066	.094	.210**	.211**	.188**	.211**	.067	.206**
UB3	.172**	.145**	.213**	.231**	.290**	.173**	.116*	.121*	.044	.049	.174**	.177**	.151**	.110*	-.012	.107*
UP1	-.045	-.085	-.056	.009	-.039	.024	.044	.073	-.009	-.024	.005	-.018	.015	.009	.078	.066
UP2	-.083	-.105*	-.010	.024	-.021	.032	.083	.085	-.039	-.053	-.050	-.046	-.028	-.020	.073	.020
UP3	-.080	-.129**	-.060	.010	-.048	.029	.041	.063	-.037	-.053	-.068	-.050	-.070	-.057	.048	.005

	BI1	BI2	BI3	BI4	BI5	UB1	UB2	UB3	UP1	UP2	UP3
BI1	1										
BI2	.501**										
BI3	.770**	.799**									
BI4	.554**	.520**	.667**								
BI5	.418**	.455**	.432**	.587**							
UB1	.199**	.357**	.308**	.290**	.344**						
UB2	.227**	.321**	.304**	.267**	.320**	.711**					
UB3	.235**	.323**	.296**	.245**	.314**	.753**	.742**				
UP1	.010	-.059	-.032	-.012	.041	-.100*	-.039	-.061			
UP2	.039	-.052	-.021	-.014	-.011	-.112*	-.070	-.083	.734**		
UP3	.028	-.122*	-.058	-.043	-.057	-.110*	-.091	-.083	.645**	.741**	1

* = p<0.10 ** = P<0.05 *** = P<0.01

APPENDIX E

Factor Loading of All Latent Variables

Variable	Factor Loading
Performance Expectancy	
PE1 (Find the web-based learning useful)	0.593
PE2 (Accomplish tasks more quickly)	0.628
PE3 (Increases productivity)	1.050
PE4 (Increase chances of getting a good score)	1.000
Effort Expectancy	
EE1 (Web-based learning would be clear and understandable)	1.796
EE2 (Easy to become skillful)	1.739
EE3 (Web-based learning is easy to use)	0.852
EE4 (Operate the web-based learning is easy)	1.000
Social Influence	
SI3 (The senior management of this university has been helpful)	1.105
SI4 (The university has provided supports)	1.000
Facilitating Conditions	
FC1 (I have the necessary resources to use it)	1.158
FC2 (I have the necessary knowledge to use it)	1.371
FC3 (The web-based learning is not compatible with other systems)	0.666
FC4 (A specific person or group is available for assistance with web-based learning difficulties)	1.000
Behavioral Intention	
BI1 (I intend to use the web-based learning in the next 6 months)	1.000

Variable	Factor Loading
BI2 (I predict I would use the web-based learning in the next 6 months)	0.869
BI3 (I plan to use the web-based learning in the next 6 months)	0.882
BI4 (Assuming I had access to the web-based learning, I intend to use it)	0.531
BI5 (Given that I had access to the web-based learning, I predict that I would use it)	0.401
Use Behavior	
UB1 (I do not evaluate costs and benefits of using the web-based learning before every use)	1.000
UB2 (I carefully think about using the web-based learning before every use)	0.869
UB3 (My use of the web-based learning is automatic)	1.035

APPENDIX F

Factor Loading of Variables

Factor Loading of Variables of Model One

Latent Variable	Observe Variable	Factor Loading
PE1	Find the web-based learning useful	0.694
PE2	Accomplish tasks more quickly	0.735
PE3	Increases productivity	1.078
PE4	Increase chances of getting a good score	1.000
EE1	Web-based learning would be clear and understandable	1.945
EE2	Easy to become skillful	1.720
EE3	Web-based learning is easy to use	1.107
EE4	Operate the web-based learning is easy	1.000
SI3	The senior management of this university has been helpful	0.893
SI4	The university has provided supports	1.000
FC1	I have the necessary resources to use it	1.008
FC2	I have the necessary knowledge to use it	1.172
FC3	The web-based learning is not compatible with other systems	0.791
FC4	A specific person or group is available for assistance with web-based learning difficulties	1.000
BI1	I intend to use the web-based learning in the next 6 months	1.000
BI2	I predict I would use the web-based learning in the next 6 months	1.235
BI3	I plan to use the web-based learning in the next 6 months	1.216

Latent Variable	Observe Variable	Factor Loading
BI4	Assuming I had access to the web-based learning, I intend to use it	0.817
BI5	Given that I had access to the web-based learning, I predict that I would use it	0.497
UB1	UB1 (I do not evaluate costs and benefits of using the web-based learning before every use)	1.000
UB2	UB2 (I carefully think about using the web-based learning before every use)	1.061
UB3	UB3 (My use of the web-based learning is automatic)	1.037

Factor Loading of Variables of Model Two

Latent Variable	Observe Variable	Factor Loading
PE1	Find the web-based learning useful	0.593
PE2	Accomplish tasks more quickly	0.628
PE3	Increases productivity	1.050
PE4	Increase chances of getting a good score	1.000
EE1	Web-based learning would be clear and understandable	1.796
EE2	Easy to become skillful	1.739
EE3	Web-based learning is easy to use	0.852
EE4	Operate the web-based learning is easy	1.000
SI3	The senior management of this university has been helpful	1.105

Latent Variable	Observe Variable	Factor Loading
SI4	The university has provided supports	1.000
FC1	I have the necessary resources to use it	1.158
FC2	I have the necessary knowledge to use it	1.371
FC3	The web-based learning is not compatible with other systems	0.666
FC4	A specific person or group is available for assistance with web-based learning difficulties	1.000
BI1	I intend to use the web-based learning in the next 6 months	1.000
BI2	I predict I would use the web-based learning in the next 6 months	0.869
BI3	I plan to use the web-based learning in the next 6 months	0.882
BI4	Assuming I had access to the web-based learning, I intend to use it	0.531
BI5	Given that I had access to the web-based learning, I predict that I would use it	0.401
UB1	UB1 (I do not evaluate costs and benefits of using the web-based learning before every use)	1.000
UB2	UB2 (I carefully think about using the web-based learning before every use)	0.869
UB3	UB3 (My use of the web-based learning is automatic)	1.035

Factor loading of Variables of Model Three

Latent Variable	Observe Variable	Factor Loading
PE1	Find the web-based learning useful	0.591
PE2	Accomplish tasks more quickly	0.625
PE3	Increases productivity	1.050
PE4	Increase chances of getting a good score	1.000
EE1	Web-based learning would be clear and understandable	1.787
EE2	Easy to become skillful	1.739
EE3	Web-based learning is easy to use	0.845
EE4	Operate the web-based learning is easy	1.000
SI3	The senior management of this university has been helpful	1.102
SI4	The university has provided supports	1.000
FC1	I have the necessary resources to use it	1.159
FC2	I have the necessary knowledge to use it	1.373
FC3	The web-based learning is not compatible with other systems	0.666
FC4	A specific person or group is available for assistance with web-based learning difficulties	1.000
BI1	I intend to use the web-based learning in the next 6 months	1.000
BI2	I predict I would use the web-based learning in the next 6 months	0.869
BI3	I plan to use the web-based learning in the next 6 months	0.882

Latent Variable	Observe Variable	Factor Loading
BI4	Assuming I had access to the web-based learning, I intend to use it	0.528
BI5	Given that I had access to the web-based learning, I predict that I would use it	0.400
UB1	UB1 (I do not evaluate costs and benefits of using the web-based learning before every use)	1.000
UB2	UB2 (I carefully think about using the web-based learning before every use)	1.064
UB3	UB3 (My use of the web-based learning is automatic)	1.035

APPENDIX G

The Normality Distribution Testing for Focus Group

Variables	Skewness	Kurtosis
PE1	-1.078	0.185
PE2	-1.134	0.256
PE3	-1.029	0.261
PE4	-1.114	0.112
EE1	-1.613	1.698
EE2	-1.321	0.784
EE3	-1.455	0.903
EE4	-1.185	0.315
SI1	-1.561	0.954
SI2	-1.274	0.643
SI3	-0.425	-0.657
SI4	-0.442	-0.691
FC1	-0.393	-1.277
FC2	-0.287	-0.964
FC3	-0.583	0.457
FC4	-0.706	0.729
BI1	-0.993	-0.032
BI2	-0.591	-0.992
BI3	-0.681	0.195
BI4	-0.279	0.896
BI5	0.333	0.559
UB1	-0.628	-0.816
UB2	0.18	-1.271
UB3	-0.342	-0.986
UP1	0.141	-0.516
UP2	0.038	-0.547
UP3	-0.219	0.372

APPENDIX H

The Discriminant Validity Testing for Focus Group

Correlation

	PE1	PE2	PE3	PE4	EE1	EE2	EE3	EE4	SI1	SI2	SI3	SI4	FC1	FC2
PE1	1													
PE2	.361**													
PE3	.395**	.779**												
PE4	.421**	.546**	.601**											
EE1	.329**	.370**	.432**											
EE2	.279**	.345**	.423**	.443**	.752**									
EE3	.221**	.320**	.268**	.425**	.747**	.593**								
EE4	.274**	.232**	.309**	.407**	.778**	.668**	.782**							
SI1	.113*	.068	.073	.138**	.279**	.303**	.278**	.305**						
SI2	.155**	.094	.129**	.130**	.293**	.293**	.249**	.284**	.769**					
SI3	.281**	.328**	.326**	.225**	.307**	.289**	.247**	.279**	.281**	.358**				
SI4	.234**	.280**	.274**	.261**	.384**	.370**	.333**	.396**	.472**	.489**	.795**			
FC1	.180**	.112*	.191**	.188**	.061	.091	.044	.086	.031	.116*	.144**	.119*	1	

	PE1	PE2	PE3	PE4	EE1	EE2	EE3	EE4	SI1	SI2	SI3	SI4	FC1	FC2
FC2	.163**	.118*	.160**	.180**	.078	.127*	.115*	.092	.142**	.118*	.181**	.146**	.716**	1
FC3	.018	.008	.034	.060	.028	.059	.027	.060	-.037	-.051	.057	.009	.513**	.470**
FC4	.132**	.068	.108*	.126*	.090	.088	.108*	.110*	.104*	.123*	.185**	.169**	.613**	.655**
BI1	.347**	.518**	.570**	.533**	.467**	.379**	.337**	.337**	.083	.141**	.333**	.313**	.158**	.101*
BI2	.146**	.251**	.292**	.284**	.266**	.247**	.235**	.247**	.096	.092	.196**	.208**	.202**	.225**
BI3	.283**	.433**	.490**	.459**	.391**	.353**	.272**	.297**	.064	.121*	.290**	.286**	.211**	.184**
BI4	.300**	.433**	.445**	.370**	.306**	.355**	.182**	.196**	.019	.088	.237**	.221**	.209**	.166**
BI5	.301**	.282**	.306**	.215**	.245**	.264**	.163**	.263**	.144**	.142**	.324**	.285**	.285**	.258**
UB1	.254**	.239**	.263**	.284**	.249**	.166**	.159**	.167**	.164**	.204**	.274**	.237**	.244**	.212**
UB2	.249**	.223**	.186**	.247**	.218**	.140**	.189**	.181**	.151**	.142**	.255**	.244**	.199**	.206**
UB3	.251**	.194**	.171**	.249**	.217**	.132**	.154**	.155**	.127*	.118*	.234**	.217**	.154**	.114*
UP1	-.036	-.058	-.098*	-.057	-.008	.008	.010	.017	-.053	-.036	-.068	-.049	-.018	-.025
UP2	-.011	.020	-.028	.033	.080	.110*	.082	.094	-.049	-.001	-.070	-.060	-.006	.000
UP3	-.019	-.005	-.105*	.019	.065	.095	.060	.056	-.013	.008	-.086	-.067	-.021	-.019

	FC2	FC3	FC4	BI1	BI2	BI3	BI4	BI5	UB1	UB2	UB3	UP1	UP2	UP3
FC3	.470**	1												
FC4	.655**	.699**												
BI1	.101*	.036	.133**											
BI2	.225**	.033	.163**	.489**										
BI3	.184**	-.002	.152**	.769**	.788**									
BI4	.166**	.007	.126*	.536**	.500**	.665**								
BI5	.258**	.053	.207**	.404**	.425**	.433**	.579**							
UB1	.212**	-.019	.126*	.266**	.346**	.362**	.314**	.331**						
UB2	.206**	.064	.190**	.259**	.313**	.319**	.290**	.317**	.714**					
UB3	.114*	-.035	.094	.310**	.322**	.342**	.272**	.319**	.755**	.746**				
UP1	-.025	.061	.013	-.078	-.065	-.059	-.006	-.016	-.097	-.054	-.065			
UP2	.000	.063	.021	.008	-.010	-.025	.002	-.005	-.084	-.051	-.078	.663**		
UP3	-.019	.054	.021	-.009	-.079	-.071	-.022	-.020	-.080	-.060	-.072	.562**	.767**	1

* = P<0.05 ** = P<0.01

APPENDIX I

The Reliability Testing for Focus Group

Variable	Mean	S.D.	Cronbach's alpha
Performance Expectancy			0.813
PE1 (Find the web-based learning useful)	4.51	0.664	
PE2 (Accomplish tasks more quickly)	4.45	0.761	
PE3 (Increases productivity)	4.39	0.764	
PE4 (Increase chances of getting a good score)	4.55	0.639	
Effort Expectancy			0.910
EE1 (Web-based learning would be clear and understandable)	4.73	0.491	
EE2 (Easy to become skillful)	4.67	0.537	
EE3 (Web-based learning is easy to use)	4.75	0.457	
EE4 (Operate the web-based learning is easy)	4.67	0.511	
Social Influence			0.813
SI1 (People who influence my behavior think that I should use it)	4.63	0.678	
SI2 (People who are important to me think that I should use it)	4.63	0.569	
SI3 (The senior management of this university has been helpful)	4.37	0.612	
SI4 (The university has provided supports)	4.42	0.587	
Facilitating Conditions			0.860
FC1 (I have the necessary resources to use it)	4.19	0.808	
FC2 (I have the necessary knowledge to use it)	3.97	0.931	

Variable	Mean	S.D.	Cronbach's alpha
FC3 (The web-based learning is not compatible with other systems)	4.09	0.741	
FC4 (A specific person or group is available for assistance with web-based learning difficulties)	4.07	0.777	
Behavioral Intention			0.861
BI1 (I intend to use the web-based learning in the next 6 months)	4.55	0.607	
BI2 (I predict I would use the web-based learning in the next 6 months)	4.32	0.747	
BI3 (I plan to use the web-based learning in the next 6 months)	4.42	0.612	
BI4 (Assuming I had access to the web-based learning, I intend to use it)	4.23	0.571	
BI5 (Given that I had access to the web-based learning, I predict that I would use it)	4.16	0.492	
Use Behavior			0.894
UB1 (I do not evaluate costs and benefits of using the web-based learning before every use)	4.35	0.701	
UB2 (I carefully think about using the web-based learning before every use)	3.90	0.765	
UB3 (My use of the web-based learning is automatic)	4.22	0.712	
University Policies			0.854

Variable	Mean	S.D.	Cronbach's alpha
UP1 (Portion of lecturers told me that I can using the web-based learning)	3.54	0.809	
UP2 (Portion of subjects in semester that using the web-based learning)	3.58	0.819	
UP3 (Portion of fail connections to system during semester)	3.45	0.932	

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APPENDIX J

Multicollinearity Testing for Focus Group

Variable	Collinearity Statistic	
	Tolerance	VIF
PE2 (Accomplish tasks more quickly)	.324	3.091
PE3 (Increases productivity)	.274	3.656
PE4 (Increase chances of getting a good score)	.489	2.045
EE1 (Web-based learning would be clear and understandable)	.233	4.295
EE2 (Easy to become skillful)	.364	2.746
EE3 (Web-based learning is easy to use)	.290	3.453
EE4 (Operate the web-based learning is easy)	.252	3.970
SI1 (People who influence my behavior think that I should use it)	.336	2.973
SI2 (People who are important to me think that I should use it)	.347	2.880
SI3 (The senior management of this university has been helpful)	.317	3.159
SI4 (The university has provided supports)	.275	3.631
FC1 (I have the necessary resources to use it)	.382	2.615
FC2 (I have the necessary knowledge to use it)	.370	2.706
FC3 (The web-based learning is not compatible with other systems)	.436	2.294
FC4 (A specific person or group is available for assistance with web-based learning difficulties)	.343	2.917

Variable	Collinearity Statistic	
	Tolerance	VIF
BI1 (I intend to use the web-based learning in the next 6 months)	.281	3.564
BI2 (I predict I would use the web-based learning in the next 6 months)	.304	3.291
BI3 (I plan to use the web-based learning in the next 6 months)	.148	6.769
BI4 (Assuming I had access to the web-based learning, I intend to use it)	.397	2.516
BI5 (Given that I had access to the web-based learning, I predict that I would use it)	.515	1.943
UB1 (I do not evaluate costs and benefits of using the web-based learning before every use)	.326	3.064
UB2 (I carefully think about using the web-based learning before every use)	.367	2.729
UB3 (My use of the web-based learning is automatic)	.316	3.166
UP1 (Portion of lecturers told me that I can using the web-based learning)	.529	1.890
UP2 (Portion of subjects in semester that using the web-based learning)	.318	3.146
UP3 (Portion of fail connections to system during semester)	.381	2.622

APPENDIX K

Factor Loading of All Latent Variables for Focus Group

Variable	Factor Loading
Performance Expectancy	
PE1 (Find the web-based learning useful)	0.469
PE2 (Accomplish tasks more quickly)	0.838
PE3 (Increases productivity)	0.899
PE4 (Increase chances of getting a good score)	0.693
Effort Expectancy	
EE1 (Web-based learning would be clear and understandable)	0.915
EE2 (Easy to become skillful)	0.789
EE3 (Web-based learning is easy to use)	0.827
EE4 (Operate the web-based learning is easy)	0.869
Social Influence	
SI3 (The senior management of this university has been helpful)	0.851
SI4 (The university has provided supports)	0.834
Facilitating Conditions	
FC1 (I have the necessary resources to use it)	0.790
FC2 (I have the necessary knowledge to use it)	0.804
FC3 (The web-based learning is not compatible with other systems)	0.696
FC4 (A specific person or group is available for assistance with web-based learning difficulties)	0.839
Behavioral Intention	
BI1 (I intend to use the web-based learning in the next 6 months)	0.785

Variable	Factor Loading
BI2 (I predict I would use the web-based learning in the next 6 months)	0.788
BI3 (I plan to use the web-based learning in the next 6 months)	0.972
BI4 (Assuming I had access to the web-based learning, I intend to use it)	0.692
BI5 (Given that I had access to the web-based learning, I predict that I would use it)	0.481
Use Behavior	
UB1 (I do not evaluate costs and benefits of using the web-based learning before every use)	0.854
UB2 (I carefully think about using the web-based learning before every use)	0.840
UB3 (My use of the web-based learning is automatic)	0.882

APPENDIX L

Factor Loading of Variables for Focus Group

Factor Loading of Variables of Model One

Latent Variable	Observe Variable	Factor Loading
PE1	Find the web-based learning useful	0.469
PE2	Accomplish tasks more quickly	0.838
PE3	Increases productivity	0.899
PE4	Increase chances of getting a good score	0.693
EE1	Web-based learning would be clear and understandable	0.915
EE2	Easy to become skillful	0.789
EE3	Web-based learning is easy to use	0.827
EE4	Operate the web-based learning is easy	0.869
SI3	The senior management of this university has been helpful	0.851
SI4	The university has supported	0.834
FC1	I have the necessary resources to use it	0.790
FC2	I have the necessary knowledge to use it	0.804
FC3	The web-based learning is not compatible with other systems	0.696
FC4	A specific person or group is available for assistance with web-based learning difficulties	0.839
BI1	I intend to use the web-based learning in the next 6 months	0.785
BI2	I predict I would use the web-based learning in the next 6 months	0.788
BI3	I plan to use the web-based learning in the next 6 months	0.972

Latent Variable	Observe Variable	Factor Loading
BI4	Assuming I had access to the web-based learning, I intend to use it	0.692
BI5	Given that I had access to the web-based learning, I predict that I would use it	0.481
UB1	UB1 (I do not evaluate costs and benefits of using the web-based learning before every use)	0.854
UB2	UB2 (I carefully think about using the web-based learning before every use)	0.840
UB3	UB3 (My use of the web-based learning is automatic)	0.882
PE1	Find the web-based learning useful	0.438
PE2	Accomplish tasks more quickly	0.837
PE3	Increases productivity	0.902
PE4	Increase chances of getting a good score	0.688
EE1	Web-based learning would be clear and understandable	0.950
EE2	Easy to become skillful	0.791
EE3	Web-based learning is easy to use	0.780
EE4	Operate the web-based learning is easy	0.811
SI3	The senior management of this university has been helpful	0.886
SI4	The university has provided supports	0.893
FC1	I have the necessary resources to use it	0.821
FC2	I have the necessary knowledge to use it	0.871

Latent Variable	Observe Variable	Factor Loading
FC3	The web-based learning is not compatible with other systems	0.522
FC4	A specific person or group is available for assistance with web-based learning difficulties	0.749
BI1	I intend to use the web-based learning in the next 6 months	1.142
BI2	I predict I would use the web-based learning in the next 6 months	0.786
BI3	I plan to use the web-based learning in the next 6 months	1.005
BI4	Assuming I had access to the web-based learning, I intend to use it	0.663
BI5	Given that I had access to the web-based learning, I predict that I would use it	0.549
UB1	UB1 (I do not evaluate costs and benefits of using the web-based learning before every use)	0.858
UB2	UB2 (I carefully think about using the web-based learning before every use)	0.834
UB3	UB3 (My use of the web-based learning is automatic)	0.881

APPENDIX M

The In-Depth Interview Results of Dean or Associate Dean for Academic Affairs

In-Depth Interview Results

Question	Interview Result (first interviewee)	Interview Result (second interviewee)	Interview Result (third interviewee)
1. Currently, which areas do your faculty applied the web-based learning?	Applied for students' learning system, and organization's knowledge management.	Applied for students' learning system.	Applied in two parts of faculty: students' learning system and knowledge management.
2. Which of your faculty's strategies that emphasize to web-based learning?	Focus on convenience for students and staffs to download any document and share their knowledge through website.	Focus on convenience for students and lecturers.	Focus on convenience for students and all staffs so they can share their knowledge through website.
3. What importance functions do the web-based learning provides in the viewpoint of executive?	Students can use web-based learning to review their lessons. Lecturers can share their knowledge with each other.	Students can use web-based learning to review their lessons, ask questions, and submit their assignments.	Everyone can use web-based learning to review their lessons, ask questions, and submit their assignments.

Question	Interview result (first interviewee)	Interview result (second interviewee)	Interview result (third interviewee)
4. What are the benefits received from the web-based learning?	Reduce cost of announcements. Students' satisfaction. Share knowledge with each other.	Reduce cost of announcements. Students' satisfaction.	Reduce cost of announcements. Students' satisfaction.
5. How do you allocate the existing resources and staff to correspond with web-based learning strategic planning?	Main site is managed by IT center department. Using proprietary software that easy to use. Everyone can use their ID and password to connect. Assign team to be responsible; such as KM team manage KM for faculty, and lecturers manage their resources on the site	Main site and main infrastructure are managed by IT center department, single platform. Assign team to be responsible for managing.	Main site and main infrastructure are managed by IT center department. Assign team to be responsible for managing.

APPENDIX N

The Sample Population

Sample Populations

University	Faculty of Business Administration	Faculty of Science and Technology
Bangkok University	10	10
Chaopraya University	10	10
Mahanakorn University of Technology	10	10
Stamford International University (Thailand)	10	10
Rangsit University	10	10
University of the Thai Chamber of Commerce	10	10
Hatyai University	10	10
Bangkokthonburi University	10	10
College of Asian Scholars	10	10
Rajapark Institute	10	10
Kasetsart University	10	10
Chiang Mai University	10	10
Thaksin University	10	10
Mahidol University	10	10
Maejo University	10	10
Rajamangala University of Technology Thanyaburi	10	10

University	Faculty of Business Administration	Faculty of Science and Technology
Rajamangala University of Technology Krungthep	10	10
Rajamangala University of Technology Tawan-ok	10	10
Rajamangala University of Technology Phra Nakhon	10	10
Rajamangala University of Technology Lanna	10	10
Total	200	200

Sample Population for Focus Group

University	Faculty of Science and Technology
Kasetsart University	100
Chiang Mai University	100
Mahidol University	100
Maejo University	100
Rajamangala University of Technology Thanyaburi	100
Total	500

APPENDIX O

The Questionnaire

Section 1

A questionnaire survey has been developed, which based on the instrument developed from Venkatesh, et. al. (2003)

Five-point scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Moderately Agree, 4 = Agree and 5 = Strongly Agree.

Performance expectancy

Question	**1**	**2**	**3**	**4**	**5**
I would find the web-based learning useful for my learning.					
Using the web-based learning enables me to accomplish tasks more quickly.					
Using the web-based learning in my learning increases my productivity.					
If I use the web-based learning, I could increase my chances of getting a pay-raise.					

Effort expectancy

Question	**1**	**2**	**3**	**4**	**5**
My interaction with the web-based learning would be clear and understandable.					
It would be easy for me to become skillful at using the web-based learning.					
I would find the web-based learning easy to use.					
Learning to operate the web-based learning is easy for me.					

Social influence

Question	**1**	**2**	**3**	**4**	**5**
People who influence my behavior think that I should use the web-based learning.					
People who are important to me think that I should use the web-based learning.					
The senior management of this university has been helpful in the use of the web-based learning.					
In general, the university has provided supports for the use of the web-based learning.					

Facilitating conditions

Question	**1**	**2**	**3**	**4**	**5**
I have the necessary resources to use the web-based learning.					
I have the necessary knowledge to use the web-based learning.					
The web-based learning is not compatible with other systems I use.					
A specific person (or group) is available for assistance with web-based learning difficulties.					

Behavioral intention to use

Question	1	2	3	4	5
I intend to use the web-based learning in the next 6 months.					
I predict I would use the web-based learning in the next 6 months.					
I plan to use the web-based learning in the next 6 months.					
Assuming I had access to the web-based learning, I intend to use it.					
Given that I had access to the web-based learning, I predict that I would use it.					

Use Behavior

Question	1	2	3	4	5
I do not evaluate costs and benefits of using the web-based learning before every use.					
I carefully think about using the web-based learning before every use.					
My use of the web-based learning is automatic.					

University policy

Portion of teachers told me that I can use the web-based learning system for learning.

□ Less than or equal to 20 % □ Between 21 - 40 % □ Between 41- 60%

□ Between 61 - 80% □More than or equal to 80%

Portion of subject in this semester that use web-based learning system

□ Less than or equal to 20 % □ Between 21 - 40 % □ Between 41- 60%

□ Between 61 - 80% □ More than or equal to 80%

Portion of failure connection with web-based learning system, which occurred during this semester

□ Less than or equal to 20 % □ Between 21 - 40 % □ Between 41- 60%

□ Between 61 - 80% □ More than or equal to 80%

Section 2: General information

Gender □ Male □ Female

Age

□ Younger than or equal to 19 years old □ 20 years old □ 21 years old

□ 22 years old □ Older than or equal to 23 years old

Faculty

□ Faculty of Business Administration □ Faculty of Science and Technology

Education level □ Lower than Bachelor □ Bachelor's degree

□ Graduate degree

User's Status □ Student □ Teacher

Experience:

□ Less than or equal 1 year □ 2 years □ 3 years

□ 4 year □ More than or equal to 5 years

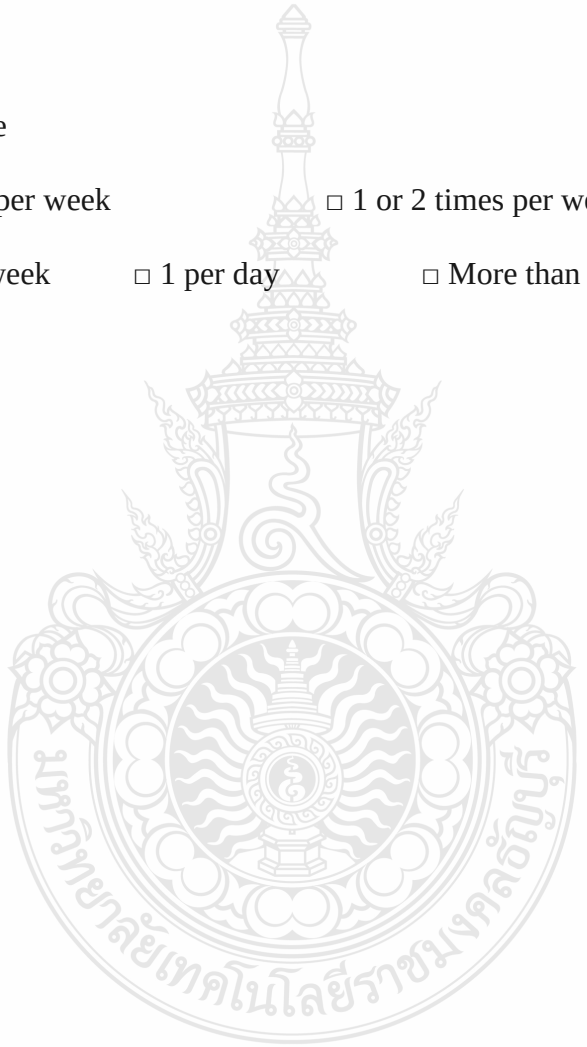
Does the university offer distance learning course? □ Yes □ No

What is the university's type? □ Public university □ Private university

Frequency of IT use

□ Less than 1 time per week □ 1 or 2 times per week

□ 3 to 5 times per week □ 1 per day □ More than 1 per day



APPENDIX P

The Name list and Amount of Students of Population

Name List of Universities in Thailand

Name List	Social Science						Science			
	Faculty of Business Administration	School of Accounting	School of Liberal Arts	School of Economics	Faculty of Humanities	Faculty of Law	Faculty of Science and Technology	Faculty of Information and Communication	Faculty of Engineering	
Bangkok University	4620	1259	1990	271	4387	876	1059			
Chaopraya University	657		52			132	106			
Mahanakorn University of Technology	513						1006		4572	
Stamford International University	207		234				53			
Rangsit University	2329	319	2165			366	408	646	1372	
University of the Thai Chamber of Commerce	7672	2719			2167	365	1036		800	
Hadyai University	2933		128			318	332			
Bangkok Thonburi University	2199	463					488		910	
College of Asian Scholars	821		109			172	32			
Rajapark Institute	1425		80				5	8	188	
Kasetsart University	2328		3371	2465	2197		9709		8921	
Chiang Mai University	1710			1415		779	3031		3628	
Thaksin University	2364		494			1416	1485			
Mahidol University	263		213		60		1136	736	1563	

Name List	Social Science					Science		
	Faculty of Business Administration	School of Accounting	School of Liberal Arts	School of Economics	Faculty of Humanities	Faculty of Law	Faculty of Science and Technology	Faculty of Information and Communication	Faculty of Engineering
Maejo University	2682		527	1640			1698	114	1040
Rajamangala University of Technology Thanyaburi	5611		2717				1870		5364
Rajamangala University of Technology Krungthep	7456		3604				2974		4480
Rajamangala University of Technology Tawan-ok	4827		403		1198		475		804
Rajamangala University of Technology Phra Nakhon	2987		527				397		2426
Rajamangala University of Technology Lanna	2298		126				981		2356

Source: Office of the Higher Education Commission (Trangratapit, 2010)

Biography

Name – Surename	Mr. Rungsan Suwannahong
Date of Birth	November 05, 1969
Address	Faculty of Business Administration, Rajamangala University of Technology Thanyaburi, Pathumtani, 12110
Education	M.Sc.Information Technology, (1985)
Experiences Work	Lecturer, Faculty of Business Administration, Rajamangala University of Technology Thanyaburi (2003 - Present) Paint Supervisor, Paints Department, Thonburi Automotive Assembly Plant (1995 – 2003) ICI Paints (Thailand) Co, Ltd. (1993 – 1995) SISSONS Paints (Thailand) Ltd. (1991 – 1993)
Telephone Number	08-1779-8082
Email Address	RUNGSANSU@GMAIL.COM

Declaration

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and beliefs, contains no material previously published or written by another person, except where due reference has been made in the text.

I hereby give consent to this copy of my dissertation, when deposited in the university library, to be available for loan and photocopying.

Mr. Rungsan Suwannahong

มหาวิทยาลัยเทคโนโลยีราชมงคลธัญบุรี