DEVELOPING AN ONLINE EDUCATION MODEL FOR THE NEXT NEW NORMAL: AN EMPIRICAL STUDY OF THE LEARNING SATISFACTION OF THAI HIGH SCHOOL STUDENTS

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ABSTRACT

The purpose of this study is to undertake an empirical analysis of Thai high school students' learning satisfaction with online education. The objectives of this study are 1) to study performance expectancy, effort expectancy, social influence, learner interaction, facilitating conditions, behavioral intention to use, actual use, and student satisfaction. 2) to analyse the component of performance expectancy, effort expectancy, social influence, learner interaction, facilitating conditions, behavioral intention to use, actual use, and student satisfaction 3) to analyse direct effects between each variable mentioned in 1). 4) to develop high school student satisfaction on online learning model in Thailand. This study used a mixed method approach that included both quantitative and qualitative methods. The data will be collected through an online questionnaire for quantitative data and an interview for qualitative data, with content analysis used to evaluate the results. As a result, commencing in June 2021, a sample of 270 Thai high school students from the population of 1,509,524 from five regions in Thailand was selected using multiple-stage random sampling and simple random sampling. Students were aided with their questionnaire entry using Google Form by a network of Thai teachers. LISREL 9.1 was used to conduct the subsequent goodness-of-fit (GOF) evaluation and confirmatory factor analysis, questionnaire review the validity by a panel of five experts, and a 30-student pilot-test with the reliability of 0.91. The 69-item questionnaire, which contained eight latent variables, 18 observable variables, and seven main hypotheses

(16 sub hypotheses), was analyzed using a structural equation model (SEM). Descriptive statistics were used to analyze the SEM's output and ten hypotheses. The model's causal variables were then calculated to have a positive effect on student satisfaction, which had an R^2 of 54 percent. Performance expectancy (PE=0.43) was shown to be the most significant when rated by total effect (TE) values, followed by actual usage (AU=0.30), learner interaction (LI=0.18), and behavioral intention (BI=0.12). Overall, PE, AU, LI, and BI were the effective predictor to online learning student satisfaction. This paper contributes to the online education domain by providing research directions and implications for future researchers. In conclusion, the study confirmed that the model adequately explained causal relationships between variables and presented direct and indirect significant impacts on online student satisfaction, promoting learners' better academic performance and knowledge acquisition.

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Piriyakorn Kornpitack

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LIST OF SYMBOLS

β	Beta
Δ	Change
χ^2	Chi-square
μ	Mean value
χ^2/df	Relative Chi-square
□	Square Root
σ	Standard deviation
Σ	Summation
α	Coefficient of reliability

CHAPTER 1

INTRODUCTION

1.1 Research Background and Problem Statement

In December 2019, Covid-19 has been spread to the world. As this study was written, it was reported that nearly 166 million cases were detected (WHO, 2021). The outbreak of this pandemic has changed almost every aspect of our life. World Health Organization advised people to keep social distancing, physical distancing and wearing a mask in public in order to reduce the spread of the virus (WHO, 2020). Schools across the world had been ordered to closed to prevent the virus from spreading. These closures had affected more than 91% of the world's student population. It was reported that approximately 1.7 billion students had been impacted. Still, almost half of the world's students suffer from partial or full school closures (UNESCO, 2021). Likewise, in Thailand, students in some parts of the country were not allowed to come to schools. The Ministry of Education ordered schools in those parts to use only distance education including online education (Ministry of Education, 2021). From the beginning of the pandemic, schools in Thailand have been partially and fully closed for 29 weeks in total (UNESCO, 2021). It was unavoidable for schools to use online education for students, as they must be self-isolated, and keep social distancing.

Interestingly, online education has been studied for nearly three decades. The first complete online education program was originated in the United States in the university level in 1981, but it was just a mini non-credit executive training program (Sun & Chen, 2016). However, it had to wait until the period of 1989-1991, University of Pheonix became one of the first to offer online degree program (Kentnor, 2015). Nevertheless, in 1998, when New York University launched NYU Online to public, it is argued to be the actual beginning of the rise of online education (Palvia et al., 2018). It is approximated that more than thirty per cent of American students were enrolled in at least one online course (Palvia et al., 2018). In 2021, according to figure 1.1, Technavio (2021) has predicted that the world market size of online education will reach 247.46 billion US dollars by 2024, which is quicker than Syngene Research (2021) predicted in 2019 before the pandemic. Kotler, Kartajaya & Setiawan (2021) stated that Covid-19 was like the digitalization accelerator. The pandemic forced business to be digitalised faster, and it will not only

change the behavior during the pandemic time but also after that as well. Presently, most students are unavoidable to study through online platforms. Thus, it can be argued that online education has become the important education instruments in present day. Regarding figure 1.2, ETDA (2022) showed that in 2021, studying online was the most popular activities Thai people did on the internet. In 2021, students in Thailand studied fully online. However, in the early 2022, their academic performance was decreased in comparison with 2021. (Figure 1.3 and 1.4) As a result, it can mark a question to the quality of the online education system in the country. In addition, many countries are actively studying how to effectively educate students through online education, and many reliable examples have emerged, which result in a variety of factors that can influence the intention to use in online education. Even though online education has been studied since 1998, there is less research on intention to use in online education or distance education in lower education (high school). Most of the research studied in higher education. It is interesting if a variety of factors which affected intention to use online education in higher education is also influenced high school students.

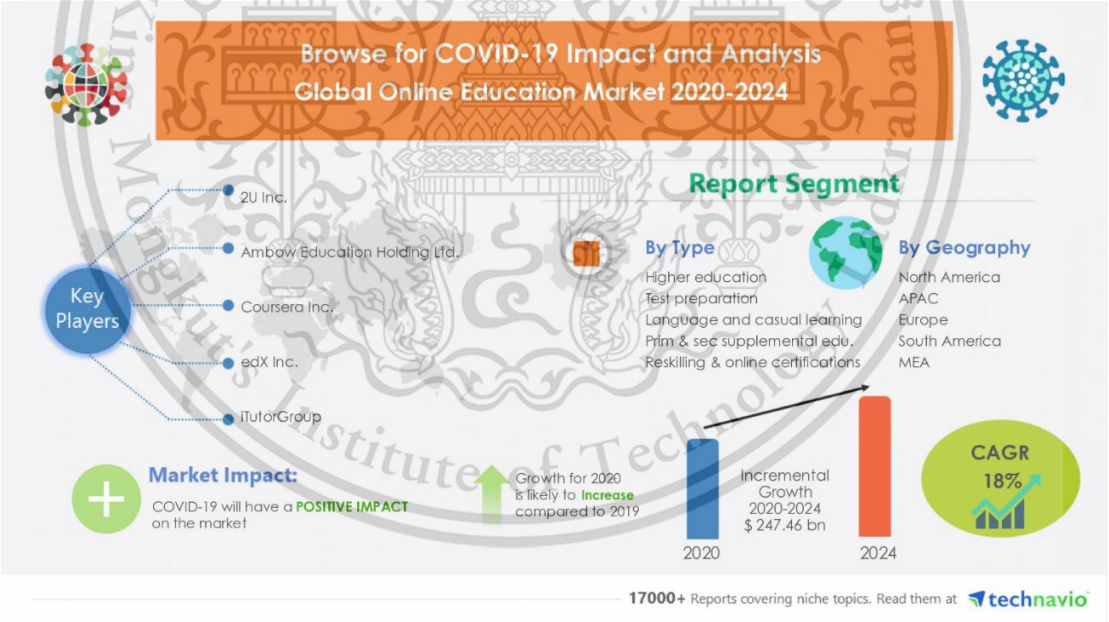

Figure 1.1 : Overview of COVID-19 Impact and Analysis on Global Online Education Market 2020-2024 (Technavio, 2021)

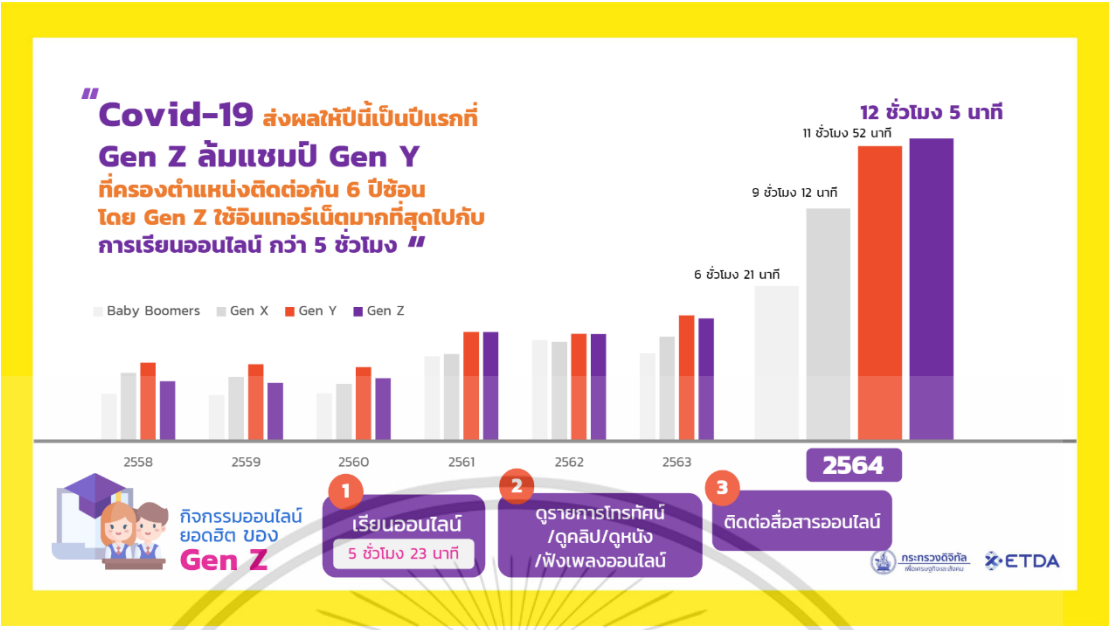

Figure 1.2: Overview of COVID-19 Impact and Analysis on Thai People (ETDA, 2022)

TCAS65-สถิติคะแนนสอบ V01-18เมย65.xlsx ความถี่ของช่วงคะแนน วิชาสามัญ

รายงานความถี่ของช่วงคะแนนสอบ วิชาสามัญ ประจำปี 2565

รหัสวิชา	ชื่อวิชา	จำนวนคนตามช่วงคะแนน										รวม
		0.000 - 10.000	10.001 - 20.000	20.001 - 30.000	30.001 - 40.000	40.001 - 50.000	50.001 - 60.000	60.001 - 700.000	70.001 - 80.000	80.001 - 90.000	90.001 - 100.000	
09	ภาษาไทย	35	1,036	6,995	23,897	45,512	38,870	10,810	547	1	-	127,703
	(ร้อยละ)	0.027%	0.811%	5.478%	18.713%	35.639%	30.438%	8.465%	0.428%	0.001%	0.000%	
19	สังคมศึกษา	120	4,886	23,788	41,730	35,675	15,892	3,188	218	3	-	125,500
	(ร้อยละ)	0.096%	3.893%	18.955%	33.251%	28.426%	12.663%	2.540%	0.174%	0.002%	0.000%	
29	ภาษาอังกฤษ	212	18,386	52,429	30,860	17,173	10,209	5,338	1,247	31	-	135,885
	(ร้อยละ)	0.156%	13.531%	38.583%	22.710%	12.638%	7.513%	3.928%	0.918%	0.023%	0.000%	
39	คณิตศาสตร์ 1	14,135	42,653	26,655	8,556	3,261	1,748	824	544	247	123	98,746
	(ร้อยละ)	14.315%	43.195%	26.993%	8.665%	3.302%	1.770%	0.834%	0.551%	0.250%	0.125%	
49	ฟิสิกส์	7,650	29,697	22,464	6,757	3,007	1,746	1,024	636	248	95	73,324
	(ร้อยละ)	10.433%	40.501%	30.637%	9.215%	4.101%	2.381%	1.397%	0.867%	0.338%	0.130%	
59	เคมี	8,630	40,288	16,693	3,718	1,548	782	337	145	42	7	72,190
	(ร้อยละ)	11.955%	55.808%	23.124%	5.150%	2.144%	1.083%	0.467%	0.201%	0.058%	0.010%	
69	ชีววิทยา	575	16,459	32,846	15,394	5,274	2,122	940	415	146	19	74,190
	(ร้อยละ)	0.775%	22.185%	44.273%	20.749%	7.109%	2.860%	1.267%	0.559%	0.197%	0.026%	
89	คณิตศาสตร์ 2	1,430	5,368	4,765	1,759	835	347	171	92	46	23	14,836
	(ร้อยละ)	9.639%	36.182%	32.118%	11.856%	5.628%	2.339%	1.153%	0.620%	0.310%	0.155%	
99	วิทยาศาสตร์ทั่วไป	649	5,112	8,162	4,726	1,706	237	58	16	1	-	20,667
	(ร้อยละ)	3.140%	24.735%	39.493%	22.867%	8.255%	1.147%	0.281%	0.077%	0.005%	0.000%	

Figure 1.3: Score distribution of Wicha Saman in 2022 (TCAS, 2022)

รายงาน Score Distribution
การทดสอบวิชาสามัญ ปีการศึกษา 2564

วิชา	ช่วงคะแนน	0.00-10.00	10.01-20.00	20.01-30.00	30.01-40.00	40.01-50.00	50.01-60.00	60.01-70.00	70.01-80.00	80.01-90.00	90.01-100.00	รวม
ภาษาไทย	จำนวนคน	53	1,876	8,880	19,360	28,797	32,472	25,909	9,959	844	3	128,153
	ร้อยละ	0.04	1.46	6.93	15.11	22.47	25.34	20.22	7.77	0.66	0.00	100.00
สังคมศึกษา	จำนวนคน	68	3,220	23,282	50,328	36,504	10,577	1,576	155	3	-	125,713
	ร้อยละ	0.05	2.56	18.52	40.03	29.04	8.41	1.25	0.12	0.00	0.00	100.00
ภาษาอังกฤษ	จำนวนคน	459	24,454	43,325	23,654	14,767	10,121	6,362	4,024	2,111	359	129,636
	ร้อยละ	0.35	18.86	33.42	18.25	11.39	7.81	4.91	3.10	1.63	0.28	100.00
คณิตศาสตร์ 1	จำนวนคน	17,839	46,667	26,597	7,005	3,016	1,455	822	521	279	201	104,402
	ร้อยละ	17.09	44.70	25.48	6.71	2.89	1.39	0.79	0.50	0.27	0.19	100.00
ฟิสิกส์	จำนวนคน	10,360	36,365	23,193	4,622	2,222	1,375	885	654	321	106	80,103
	ร้อยละ	12.93	45.40	28.95	5.77	2.77	1.72	1.11	0.82	0.40	0.13	100.00
เคมี	จำนวนคน	4,767	36,420	22,784	5,849	2,636	1,384	695	332	133	42	75,042
	ร้อยละ	6.35	48.53	30.36	7.79	3.51	1.84	0.93	0.44	0.18	0.06	100.00
ชีววิทยา	จำนวนคน	737	14,892	30,394	17,491	8,211	4,148	2,065	935	289	32	79,194
	ร้อยละ	0.93	18.80	38.38	22.09	10.37	5.24	2.61	1.18	0.37	0.04	100.00
คณิตศาสตร์ 2	จำนวนคน	114	511	575	353	254	104	60	37	20	15	2,043
	ร้อยละ	5.58	25.01	28.15	17.28	12.43	5.09	2.94	1.81	0.98	0.73	100.00
วิทยาศาสตร์ทั่วไป	จำนวนคน	-	63	350	804	420	186	60	15	8	1	1,907
	ร้อยละ	0.00	3.30	18.35	42.16	22.02	9.75	3.15	0.79	0.42	0.05	100.00

Figure 1.4: Score distribution of Wicha Saman in 2021 (NIETS, 2022)

Customer satisfaction is the primary goal for all incoming marketing plan promotion campaigns (Sawmong, 2021). Likewise, when it comes to student satisfaction, student satisfaction is argued to be one of the main factors in evaluating the quality of an education program in today's markets, because it is regarded as an important predictor of the quality of academic experiences (Parahoo, Santally, Rajabalee & Harvey, 2015; Eom & Ashill, 2016; Faize & Nawaz, 2020). There was a rich source of student satisfaction literature; however, when online learning emerged, the empirical settings in recent studies have changed from physical to online settings (Parahoo et al., 2015; Alqurashi, 2018; Baber, 2020). The emergence of online learning changed the way students interact with instructors and their peers (Parahoo et al., 2015). These could lead to a question if the factors influencing student satisfaction are different in physical and online settings. Several researchers (e.g., Kuo et al., 2013; Al-Rahmi, Shamsuddin & Alismaiel, 2020; Baber, 2020) have studied about this regard, and they come up with several factors emerged as affecting student satisfaction. Moreover, most of these researches have been conducted in Western cultures, and the findings may not be applicable to emerging countries with diverse cultural, economic, and technological situations. As a result, doing similar studies in developing countries like Thailand would be appropriate (Parahoo et al., 2015; Darawong & Widayati, 2021).

This research will use high school students in Thailand as a population to study the student satisfaction on online education model. Also, the supported theories such as satisfaction,

motivation, Technology Acceptance Model and UTAUT Model will be discussed. Since during the Covid-19 pandemic in the early 2020, Thai students have more experienced with online education more than before. Schools had to move their instruction to online platform completely for several months in 2020 and 2021, and perhaps more in the future. Thus, it is a great opportunity to do empirical analysis of high school student satisfaction on online educational in Thailand also revealed its challenges.

1.2 Research Questions

This research title developing an online education model for the next new normal: an empirical study of the learning satisfaction of Thai high school students has the research questions as following.

1.2.1 What are performance expectancy, effort expectancy, social influence, learner interaction, facilitating conditions, behavioral intention to use, and actual use to student satisfaction in online education?

1.2.2 What are the components of performance expectancy, effort expectancy, social influence, learner interaction, facilitating conditions, behavioral intention to use, actual use, and student satisfaction?

1.2.3 How each variable has direct effects and indirect effects on each other?

1.2.3.1 How performance expectancy has direct effects and indirect effects on behavioral intention to use and student satisfaction?

1.2.3.2 How effort expectancy has direct effects and indirect effects on actual usage and student satisfaction?

1.2.3.3 How social influence has direct effects and indirect effects on behavioral intention to use and student satisfaction?

1.2.3.4 How learner interaction has direct effects and indirect effects on behavioral intention to use and student satisfaction?

1.2.3.5 How facilitating conditions has direct effects and indirect effects on actual usage and student satisfaction?

1.2.3.6 How behavioral intention to use has direct effects and indirect effects on actual usage and student satisfaction?

1.2.3.7 How actual usage has a direct effect on student satisfaction?

1.2.4 How high school student satisfaction with online education helps in developing an online education model for the next new normal?

1.3 Research Objectives

This research title developing an online education model for the next new normal: an empirical study of the learning satisfaction of Thai high school students as following.

1.3.1. To study performance expectancy, effort expectancy, social influence, learner interaction, facilitating conditions, behavioral intention to use, actual use, and student satisfaction

1.3.2. To analyse the components of performance expectancy, effort expectancy, social influence, learner interaction, facilitating conditions, behavioral intention to use, actual use, and student satisfaction

1.3.3. To analyse direct effects and indirect effects of the variables.

1.3.3.1 To analyse direct and indirect effects of performance expectancy and student satisfaction

1.3.3.2 To analyse indirect effects of effort expectancy and student satisfaction

1.3.3.3 To analyse indirect effects of social influence and student satisfaction

1.3.3.4 To analyse direct and indirect effects of learner interaction and student satisfaction

1.3.3.5 To analyse direct and indirect effects of facilitating conditions and student satisfaction

1.3.3.6 To analyse direct and indirect effects of behavioral intention to use and student satisfaction

1.3.3.7 To analyse direct effects of actual usage and student satisfaction

1.3.4. To develop an online education model for the next new normal

1.4 Research Hypotheses

The research title developing an online education model for the next new normal: an empirical study of the learning satisfaction of Thai high school students consists of 16 hypotheses as following

H1: Performance Expectancy has a direct and indirect effect to student satisfaction.

H1a: Performance Expectancy (PE) directly affects Behavioral Intention (BI).

H1b: Performance Expectancy (PE) indirectly affects Student Satisfaction (SS).

H1c: Performance Expectancy (PE) directly affects Student Satisfaction (SS).

H2: Effort Expectancy has an indirect effect to student satisfaction.

H2a: Effort Expectancy (EE) directly affects Actual Use (AU).

H2b: Effort Expectancy (EE) indirectly affects Student Satisfaction (SS).

H3: Social Influence has an indirect effect to student satisfaction.

H3a: Social Influence (SI) directly affects Behavioral Intention (BI).

H3b: Social Influence (SI) indirectly affects Student Satisfaction (SS).

H4: Learner Interaction has a direct and indirect effect to student satisfaction.

H4a: Learner Interaction (LI) directly affects Behavioral Intention (BI).

H4b: Learner Interaction (LI) indirectly affects Student Satisfaction (SS).

H4c: Learner Interaction (LI) directly affects Student Satisfaction (SS).

H5: Facilitating Conditions have a direct and indirect effect to student satisfaction.

H5a: Facilitating Conditions (FC) directly affects Actual Usage (AU).

H5b: Facilitating Conditions (FC) indirectly affects Student Satisfaction (SS).

H5c: Facilitating Conditions (FC) directly affects Student Satisfaction (SS).

H6: Behavioral Intention to use has an indirect effect to student satisfaction.

H6a: Behavioral Intention (BI) directly affects Actual Use (AU).

H6b: Behavioral Intention to use (BI) indirectly affects Student Satisfaction (SS).

H7: Actual Use (AU) directly affects Student Satisfaction (SS).

1.5 Research Conceptual Framework

Based on the related theories and articles supported. This research empirical analysis of high school student satisfaction on online educational in Thailand has drawn out the research conceptual framework as figure 1.2

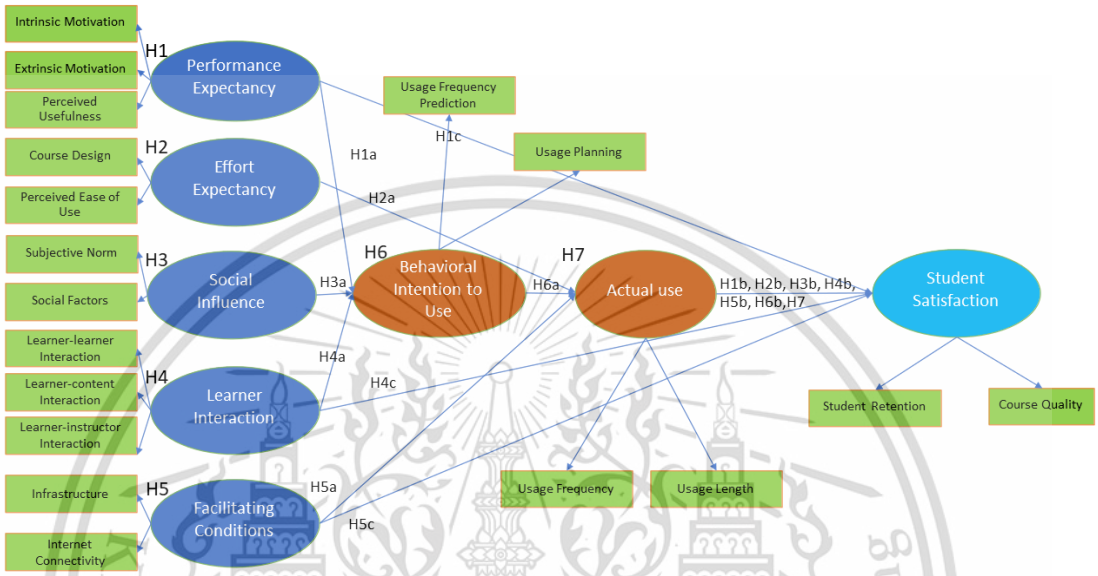

Figure 1.5: Research Conceptual Framework

1.6 Research Benefits

This research developing an online education model for the next new normal: an empirical study of the learning satisfaction of Thai high school students has provide the benefit to schools to student and to society as following.

- Benefit to students

With the improvement of the online education system at schools and there will be more choice for student to study online, students will have a chance to get high quality knowledge as there are no physical barrier. Also, students will have an ability to learn anything they want, and students will access the convenience of learning from the comfort of their own home. Moreover, when they study online, they are free to study at their own pace. Furthermore, regardless of the online course, students can learn new computing skills, such as dealing with cloud-based documents and integrating video and audio materials into their course materials.

- Benefit to Schools

This research will illustrate an effective model to explain student satisfaction in online education. Thus, schools can gather this information to improve the quality of the online learning system of each school and help students to gain as much knowledge as possible. As presently, with covid situation, online learning will become normal for both students and schools. Furthermore, there is less pressure to involve students in online learning because tablets, software, and digital resources are available to make learning a more immersive and enjoyable experience. Online education could be a great tool for school to boost student academic performance.

Moreover, with an effective online education, teachers will have a chance to engage with some students who are so shy that they find it difficult to participate in actual class discussions. Such students may feel more at ease and open to participating in discussions and course activities with online learning. As a result, instructors will engage with a broader variety of students, gaining a diverse range of perspectives on course topics. This not only results in deeper, more engaging courses, but it also allows teachers to bond with students as teachers get to know them better and gain an understanding of how they are dealing with the class and course materials.

- Benefit to online education industry

At the end, this research will illustrate the appropriate online education model for the next new normal. With this information, the online learning industry will have an information to develop and improve the quality of their products or their programs. Consequently, there will be a higher competition level in the industry as all companies can manufacture a high-quality online course that match with student needs.

- Benefit to Thai government

At the end, this research will show the appropriate online education model for the next new normal. As a result, the government can provide a policy to improve the online learning system using this model as a focus. Also, this research will point out the issue and the state of current online education system in Thailand, so the government can tackle with. Students will have the opportunity to obtain high quality instruction with the improved online education system, and as a result, the society will have more knowledgeable graduates with high capability. These people are therefore more likely to secure well-paying jobs. They will have more career prospects the more educated and accomplished they are. Because education is about gaining knowledge and using it

intelligently in our lives while also improving the lives of others, it contributes to the economic growth of nations.

- Benefit to Countries across the world

With the improved online education system, students will have a chance to access high quality instruction, as a result, more knowledgeable graduates with high capability will be in the society. As a result, these people are more likely to get well-paying jobs. The higher their education and achievements, the more job opportunities they will have. People who grew up poor but trained themselves will have a high chance of changing their lives and leading to a reduction in poverty rates in society. Education helps countries develop economically because it is about acquiring knowledge and being able to apply it wisely to our lives while also enhancing the lives of others.

1.7 Scope of Research

This research has a three scope of studying, which are scope of contents, scope of population and scope of timeline as following.

1.7.1 Scope of contents

This research is to study, compile, review of concepts, theories, literature, and various research related to the development of structural equation model of influencing factors that affect users' behavioral intention to use online education and then student satisfaction. This research will firstly discuss about online education in general. After that, technology acceptance model and the UTAUT model will be evaluated. Performance expectancy, effort expectancy, social influence, and facilitating conditions regarding the UTAUT model will be discussed briefly. Then, constructivist learning model will be illustrated in term of online learning and introduce to possible influencing factors. Subsequently, student motivation, course design, learner interaction, and technology readiness will be discussed regarding student satisfaction in online education. Lastly, student satisfaction will be concluded and combined the influencing factors with the UTAUT model to study users' intention to use online education with student satisfaction as a consequence.

1.7.2 Scope of population

Population is from public high school students in Thailand which consist of 62 areas of high school educational service area office and the total number of public high students is 1,509,524 students in public schools (as on May 20, 2021) (National Statistical Office, 2021). This research sample will focus only on large public high schools in order to reduce the bias from inequality and inconsistent of standard between small schools and large schools.

1.7.3 Scope of research study period

This research study started from October 2020 until March 2022. The data collection process was in September to October 2021.

1.8 Operative Definitions of Terms

Empirical analysis of high school student satisfaction on online learning model in Thailand

1.8.1 Online Education

Online education is defined as education being delivered in an online environment with the internet for teaching and learning. The teaching content is delivered online, and the instructors develop teaching modules that enhance learning and interactivity in the synchronous or asynchronous environment (Singh and Thurman, 2019). In this research, the term online education and online learning will be used interchangeably.

1.8.2 High School

In Thai Education System (Ministry of Education, 2021), the Basic Education Core Curriculum covers three educational levels which are primary education level, lower secondary education level, and upper secondary education level. Upper secondary education level (high school) consists of 3 levels including Mattayom 4 to 6 (Grade 10 to 12). Office of the Basic Education Commission categorised high schools into 62 areas of secondary educational service area office (Ministry of Education, 2021). Each area consists of schools from 1 to 2 provinces. This research will focus only on public schools.

1.8.3 Performance Expectancy

Performance expectancy (PE) is a degree to which a person believes that using this technology will accommodate him or her to achieve work performance enhancement (Venkatesh et al., 2003). Performance expectancy (PE) consisted of observable variables as following:

1.8.3.1 Intrinsic Motivation

Intrinsic Motivation is the psychological force that makes a person do an activity for its own satisfaction for their feelings rather than for some other results (Eom and Ashill, 2016).

1.8.3.2 Extrinsic Motivation

Extrinsic motivation makes a person to do something toward its goal to attain a separable result such as reward or recognition (Eom and Ashill, 2016).

1.8.3.3 Peceived Usefulness

Perceived usefulness is the degree to which a person believes that using a particular system would boost his or her work performance (Davis, 1989).

1.8.4 Effort Expectancy

The degree of ease associated with using the system is argued to be referred as effort expectancy (Venkatesh et al., 2003). In the other word, the degree of effort expectancy can be seen as the perceived ease of use for the users. Effort expectancy (EE) consisted of observable variables as following:

1.8.4.1 Course Design

Course design is the deliberate preparation of a course to help students achieve significant learning. It starts with defining the course's basic learning objectives (or "learning outcomes"), and then developing tests to demonstrate student achievement of those goals (Halverson, 2021).

1.8.4.2 Perceived Ease of Use

Perceived Ease of Use is the degree to which a person feels that utilising a certain system would be free of effort (Davis, 1989).

1.8.5 Social Influence

Social influence (SI) is defined as the extent to which a person believes important, others think he or she should use the new system (Venkatesh et al., 2003). Social influence (SI) consisted of observable variables as following:

1.8.5.1 Subjective Norm

Subjective Norm is the person's view of how most people who matter to individual believe he or she should or should not perform the behavior in question (Venkatesh et al., 2003).

1.8.5.2 Social Factors

Social factors are individual internalization of the reference group's subjective culture, as well as specific interpersonal agreements made with others in specific social settings (Thompson, Higgins & Howell, 1991).

1.8.6 Learner Interaction

This study will separate learner interaction into three category which are learner-learner interaction, learner-instructor interaction, and learner-content interaction which based on Moore (1989). Learner interaction (LI) consisted of observable variables as following:

1.8.6.1 Learner-learner interaction

With or without the involvement of a teacher, learner-learner interaction refers to two-way reciprocal contact between or among learners who share information, knowledge, thoughts, or ideas about course material (Moore, 1989).

1.8.6.2 Learner-content interaction

Learner-content interaction is the mechanism by which individual students elaborate and focus on the subject matter or course content (Moore, 1989).

1.8.6.3 Learner-instructor interaction

Learner-instructor interaction is described as two-way contact between a course's instructor and students (Moore, 1989).

1.8.7 Facilitating Conditions

Facilitating conditions (FC) is defined as the degree to which a person believes that an organizational and technological infrastructure exists to facilitate system use (Venkatesh et al., 2003). Facilitating conditions (FC) consisted of observable variables as following: infrastructure, and internet connectivity.

1.8.7.1 Infrastructure

Infrastructure refers to the fundamental tools and services that a country or organization needs to operate, such as transportation and power sources. Infrastructure in

this study included all equipment, including computers, iPads, and other mobile and desktop devices that allow students to study online effectively.

1.8.7.2 Internet connectivity

Internet connectivity is the capacity of users to connect to the Internet through computer terminals, computers, and other devices. In this study, internet connectivity refers to a signal that enables students to study online.

1.8.8 Behavioral Intention to Use

Behavioral Intention is argued to capture the motivational factors that affect a behavior. Intention is an indicator of how far people are willing to go to fulfill the behavior, and how much effort they want to put in (Lakhal, Khechine & Pascot, 2013). Behavioral Intention consisted of observable variables as following: usage frequency prediction, and usage planning.

1.8.8.1 Usage frequency prediction

Usage frequency prediction is the prediction of a person's (a student's) rate of use of online learning, as shown by the frequency of use over the course of a day, week, or month, as appropriate.

1.8.8.2 Usage planning

Usage planning refers to a person's (a student's) strategy for using online learning, which may include a study schedule and other online learning activities.

1.8.9 Actual Use

Actual Use can be described as the extent to which individuals employ the features of information systems (Al-Rahmi, Shamsuddin & Alismaiel, 2020), as measured by the usage frequency and duration of their use of certain technologies. Actual use consisted of observable variables as following: usage frequency, and usage length.

1.8.9.1 Usage frequency

Usage frequency is the rate of use of online learning, as shown by the frequency of use over the course of a day, week, or month, as appropriate.

1.8.9.2 Usage length

Usage length refers to the optimal amount of time for each student to use online learning. It can be measured by hour each day.

1.8.10 Student Satisfaction

Student satisfaction is a key measure of how well students are learning. It can refer to student views of learning experiences and how they value a course while attending an educational institution (Bolliger and Martindale, 2004; Kuo, Walker, Belland & Schroder, 2013; Kuo, Walker, Schroder & Belland, 2014). Student satisfaction consisted of observable variables as following: student retention, and course quality.

1.8.10.1 Student retention

Student retention refers to the percentage of students who enroll in a high school or college and successfully complete their courses through graduation. If a school has a high retention rate, then a significant portion of enrolled students will graduate, and if it has a low retention rate, then only a small portion of students will finish their degrees.

1.8.10.2 Course quality

Course quality is an important aspect of the instructional design process. Course quality indicates how successfully teachers give knowledge to students in a variety of ways, including academic performance.

1.9 Summary

To conclude, with the pandemic of COVID-19, students across the world are forced to move to study through online platform. Moreover, in Thailand, schools have been closed for more than 29 weeks. In term of online education, there are a lot of research regarding online education in higher education. However, there are very less in term of lower education level, and far less in Thailand. Furthermore, student satisfaction is argued to be one of the main factors in evaluating the quality of any education. Thus, it is important to evaluate the level of student satifaction with online education in Thailand at the end. The aim of this study is to how public high school student satisfaction with online education helps in developing an online education model for the next new normal. This research intend to study performance expectancy, effort expectancy, social influence, learner interaction, facilitating conditions, behavioral intention to use, actual use, and student satisfaction. Also, this research aims to analyse direct and indirect effects of the variables and lastly to develop an online education model for the next new normal.

CHAPTER 2

LITERATURE REVIEW

This chapter reviews related literatures on online education, technology acceptance model, UTAUT model, factors influenced behavioral intention to use including the traditional factors from Venkatesh et al. (2003) work, and also other factors like intrinsic motivation and extrinsic interaction. All of the literatures occurred in international context and national context. Lastly, conceptual research framework will be illustrated. This chapter consists of the following topics.

2.1 General Information on Online Education Up to 2021

2.2 Technology Acceptance Model and UTAUT Model

2.3 Constructivist Learning Models

2.4 Motivation Theory

2.5 Course Design

2.6 Learner Interaction

2.7 Technology as Facilitating Condition

2.8 Student Satisfaction

2.9 Related Framework

2.10 Conceptual Framework

2.11 Summary

2.1 General Information on Online Education Up to 2021

2.1.1 Definition of Online Education

In this section, the author has written about the definition of online education, mooc, and other online learning platform. Firstly, there are several terms that can describe online education, which are online learning, distance learning and e-learning. The term online learning was first used in 1995 (Singh and Thurman, 2019). Researchers have been discussed about the ambiguity and confusion around the concept and the interpretation of the definition of online learning for many years. Interestingly, from Singh and Thurman (2019) 's systematic literature review of definitions of online learning, they found that 19 different terms had been used to define online learning since 1988. For instance, some researchers used the term online education and e- learning

interchangeably, whereas others defined these two terms differently (Lee, 2017). They described e-learning as education that delivered through medium like internet combine with cd-roms or sometimes satellite. On the other hand, online education was defined education delivered through internet medium solely.

Technology was the term which researchers agreed that was the vital part in their definition regardless the difference in their definition. Technology is the medium for delivering education or increasing interaction (Singh and Thurman, 2019). They (Singh and Thurman, 2019) concluded that there are three important components for defining online education which are the use of technology, time element (synchronous or asynchronous), and synonymous terms and overlapping concepts. Physical distance used to be the key concept that researchers discussed regarding online learning; however, after 2000, researchers started to drop off this topic and recently, physical distance is not the topic anymore (Singh and Thurman, 2019).

Form the study of Singh and Thurman (2019) 's study on the term 'online education' as they analysed all literature which defined online education from 1988 to 2018, it can be concluded that online education is described as education given via the use of the internet for teaching and learning in an online setting. This includes students' online learning that is not contingent on their physical or virtual co-location. The teachers create instructional modules that improve learning and engagement in a synchronous or asynchronous setting, and the information is distributed online (Moore, Dickson-Deane and Galyen, 2011; Lee, 2017; Singh and Thurman, 2019).

2.1.2 MOOCs (Massive open online courses)

MOOCs are one of the modern types of online education that became popular in recent years. MOOC courses are available to everyone, anywhere in the world (Liyanagunawardena et al., 2013). In addition, MOOC courses provided for open enrollment, curriculum sharing, and flexible outcomes. MOOCs also provide public connecting, open virtual assets sponsored by top experts in the field. Furthermore, MOOCs are built on the engagement of students who participate based on their learning goals, prior knowledge and skills, and mutual benefits (Al-Rahmi et al., 2019). Through past years, MOOCs have emerged as a result of international collaborative collaborations such as Coursera (www.coursera.org), offering 7,303 courses across 53 countries with 241 partners led by several well-known universities in the world such as Yale University and London Business School (as of May 18, 2021) (Coursera, 2021), and edX (www.edx.org) which includes the Massachusetts Institute of Technology, Harvard University, and University of Cambridge (Edx,

2021). Recently, there are 77 million users in coursera.org (Coursera, 2021) and 24 million users for edx.org (Edx, 2021).

2.1.3 Other online learning platforms

Online education, of course, demands the use of media as a medium of instruction in both schools and colleges, as well as the use of a variety of applications to help with the distribution of learning materials. These programs include Zoom meetings, Google Classroom, Google Meet, and Microsoft Team, to name a few (Gunawan, Kristiawan, Risdianto & Monicha, 2021).

Zoom Meeting is a free HD software that lets you share your screen and video with up to 100 people while simultaneously acting as a video and audio learning tool. This application is now an option for both instructors and students because it can be used on a variety of mobile devices, laptops, and tablets. Teachers will be able to offer online and hybrid learning, better engage students with engaging virtual experiences, and enhance educational access through Zoom Meeting (Zoom, 2021). This will also improve learning experiences and promote student engagement by combining synchronous and asynchronous learning technology.

To create a blended approach, Google Classroom was used to create an online community for students to exchange and discuss topics covered in workshops, as well as access, use, and review materials. The purpose was to bring students from many faculties together and create a sense of community around the improvement of academic practice. Google Classroom makes it simple to establish and join virtual classroom areas, and anybody with a Google account may do so (Beaumont, 2018). Google Classroom (Google, 2021) is said to bring together all of Google's learning materials in one area, including Google Meet, Google Drive, and Google Sheets, and to administer several courses from a single site.

Microsoft Teams gives you all of the advantages of a traditional classroom without the need to go to school. Microsoft Team provides features like sharing assignments with instructors, projects with other students, talking with instructors and fellow students, and online meetings for when you want or need to interact face-to-face (Lindberg, 2021).

2.2 Technology Acceptance Model and UTAUT Model

In this section, the author has written about Technology Acceptance Model and UTAUT Model. Several frameworks have been introduced and used to understand the acceptance of technology. Technology acceptance model (TAM) (Davis, 1989) was argued to be one of the earliest models. TAM was introduced by Davis (1989) which developed from behavioral models including Theory of Reasoned Action (TRA) (Fishbein and Ajzan, 1975). TAM (Davis, 1989) argued that a user's attitude to a use of technology was influenced by user's perceived usefulness and perceived ease of use and in the end, it affected intention to use technology. It was also argued that there could be external variables which affected either or both of perceived usefulness and perceived ease of use. Since 1989, TAM has been redefined several times. In addition, several models and theories have been introduced. It can be concluded that TAM assumes that a user's perceived usefulness and perceived ease of use are two of the most important factors in technology adoption. Even though numerous studies (e.g., Venkatesh & Davis, 2000) have tested TAM with a wide range of new technologies and found that these two factors explain about 40% of the variance in intention to use a technology, it has been criticized for focusing primarily on personal factors (Lee, Kozar, and Lasen, 2003) and sometimes overlooking other constructs such as social influence, gender, tool experience, subjective norm (Mendoza, Jung & Kobayashi, 2017). As a result of this variety of models, and in order to harmonize the literature on new technology acceptance, the Unified Theory of Acceptance and Use of Technology (UTAUT) was developed by Venkatesh el al. (2003).

The UTAUT is a unified model that brings together alternative perspectives on consumer and innovation acceptance (Williams, Rana, & Dwivedi, 2015). UTAUT was created by reviewing and combining the constructs of eight different models, including the theory of reasoned action, the technology acceptance model, the motivational model, the theory of planned behavior, the combined theory of planned behavior/technology acceptance model, the model of personal computer use, the diffusion of innovations theory, and the social cognitive theory (Venkatesh el al. ,2003). According to Venkatesh et al. (2003), four key constructs, which are performance expectancy, effort expectancy, social influence and facilitating conditions, are direct determinants of behavioral intention to use and use behavior, and that these constructs are in turn controlled by gender, age, experience, and voluntariness of use. In the following section, the author will illustrate each key construct and link them with online learning usage.

Performance Expectancy

Performance expectancy (PE) is a degree to which a person believes that using this technology will accommodate him or her to achieve work performance enhancement (Venkatesh et al., 2003). According to past research (Lakhal, Khechine & Pascot, 2013; Mendoza, Jung & Kobayashi, 2017; Jongkolthanalarp, Chaiyasoonthorn & Chaveesuk, 2021), in online learning when students expect that using an online learning will help them understand the lesson better, and they believe that they will get an accurate knowledge from online learning. Moreover, online tutors can help them solve some problems that they do not understand. They expect that they will get a better academic performance from using online learning. As a result, when they get what they expected their satisfaction level will increase. There are several factors that can lead to a degree of performance expectancy (Davis, Bagozzi & Warshaw, 1992; Venkatesh et al., 2003). In this study, perceived usefulness, intrinsic motivation, and extrinsic motivation will be used as observation variable. In topic 2.3 and 2.4, there will be an illustration more about intrinsic motivation, and extrinsic motivation.

Effort Expectancy

The degree of ease associated with using the system is argued to be referred as effort expectancy (Venkatesh et al., 2003). In the other word, the degree of effort expectancy can be seen as the perceived ease of use for the users. Venkatesh et al. (2003) suggested that effort expectancy is one of the factors that has a direct effect on behavioral intention to use. When the system is very easy to use and students use less effort in order to understand and use the system, it will make students satisfied more when they use online learning (Lakhal, Khechine & Pascot, 2013; Jongkolthanalarp, Chaiyasoonthorn & Chaveesuk, 2021). In this study, perceived ease of use and course design will be used as observation variable. In topic 2.5, there will be an illustration more about intrinsic motivation, and extrinsic motivation.

Social Influence

Social influence (SI) is defined as the extent to which a person believes important, others think he or she should use the new system (Venkatesh et al., 2003). Im, Hong & Kang (2011) found that the effect of social influence is greater in countries with greater power distance and a less individualistic society. It is evident that users in more collectivistic and higher power distance cultures will be influenced by others when making technology adoption decisions. Subjective norm and social factors can be seen as observation variables. Subjective norm is defined as a combination

of perceived expectations from persons who are significant to the individual in general, as well as aspirations to adhere to these expectations (Davis, 1989; Lakhal, Khechine & Pascot, 2013). Social factors are defined as the individual's internalization of the subjective culture of the reference groups, as well as specific interpersonal agreements that the individual has formed with others in certain social contexts (Thompson, Higgins & Howell, 1991; Lakhal, Khechine & Pascot, 2013).

Facilitating Conditions

Facilitating conditions (FC) is defined as the degree to which a person believes that an organizational and technological infrastructure exists to facilitate system use (Venkatesh et al., 2003). In this study, the researcher will consider the availability and the readiness of technology for students as facilitating conditions. As slow internet connectivity, unstable connection, and lack of support for appropriate infrastructure made it difficult for students to use online learning (Mendoza, Jung & Kobayashi, 2017). In topic 2.6, there will be an illustration more about internet connectivity, and infrastructure.

Behavioral Intention to use

Behavioral Intention is argued to capture the motivational factors that affect a behavior. Intention is an indicator of how far people are willing to go in order to fulfill the behavior, and how much effort they want to put in (Venkatesh et al., 2003; Lakhal, Khechine & Pascot, 2013). It was believed be predicted by usage frequency prediction and usage planning.

Actual Use

Actual usage is the degree of frequency, nature, and length with which an individual makes use of an information system's capabilities (Kim et al., 2007; DeLone and McLean, 2016; Aldholay et al., 2018). Actual usage in online learning also indicates the frequency and duration of use (Kim et al., 2007). Several studies (Hou, 2012; Isaac et al., 2017; Aldholay et al., 2018) have shown that actual usage has a substantial impact on user satisfaction within the context of internet technology.

According to past literatures (e.g., Im, Hong & Kang, 2011; San Martín & Herrero, 2012; Lakhal, Khechine & Pascot, 2013; Jung & Lee, 2015; Kornpitack & Sawmong, 2020; Al-Rahmi, Shamsuddin & Alismaiel, 2020), these four determinants (performance expectancy, effort expectancy, social influence and facilitating conditions) have been validated in a number of studies conducted in different contexts. Based on these considerations, the UTAUT was deemed an appropriate model for objectively reviewing and categorizing the results of previous studies in the field of online education acceptance and student satisfaction.

2.3 Constructivist Learning Models

In this section, the author has written about constructivist learning models, which later illustrated the linkage to student satisfaction and main construct in UTUAT model. The concept of constructivist model of learning is that knowledge is constructed independently by individuals. In addition, students learn better when they discover knowledge by themselves with their own speed and time (Eom and Ashill, 2016). During their learning process, it is also important for students to become active learners rather than passive ones (Eom and Ashill, 2016; Zhou, Li, Wu, and Zhou, 2020). However, researchers (Smith, 2001) believed that students must have a self-motivation as well to enable student achievement. Moreover, role of instructors has been changed from being center stage to being creative with mediating and facilitating in the learning process for students. Furthermore, researcher added that knowledge can also be constructed by sharing. As a result, interactions between students and students or students and teachers are key ingredients for the success outcome in online education (Eom and Ashill, 2016). Another group of researchers which based their concept on cognitive information processing model also included that students have different learning style; thus, online courses need to be designed to serve with these varied learning style (Eom and Ashill, 2016).

With the discussion above, it can be derived that student motivation, interaction, and course design are three main factors that may have an influence in student satisfaction and learning outcome. However, when the constructivist learning models combine with the UTAUT model to test the determinant of student satisfaction as well as users' behavioral intention to use
, it can be implied that student motivation and course design can be plugin with performance expectancy and effort expectancy respectively, whereas interaction will be offered as another main determinant. Moreover, according to recent literatures (Roach & Lemasters, 2006; Kuo et al., 2013; Sun and Chen, 2016; Rasmitadila et al., 2020; Zhou et al., 2020), technology readiness was examined to be one of the main challenges that affect student satisfaction and as a result learning outcome. Thus, the technology readiness will be plugin as facilitating condition in the UTAUT model. Next, the mentioned factors will be added as an influential factor. These factors will be illustrated regarding past literatures.

2.4 Motivation Theory

In this section, the author has written about motivation theory. Motivation is a psychological force that reinforces individuals to do something toward their goal (Baber, 2020). Motivation is characterized as a term that influences the direction and severity of a behavior, as well as the efforts that occur as a result of the behavior (Keller, 1983).

2.4.1 Student Motivation

In educational settings, motivation has an important effect on learner attitudes and learning behaviors. It is assumed that if learner motivation is poor, learning will not occur at the optimal pace (Dick, Carey, & Carey, 2005). The importance of motivation in the learning process cannot be overstated. According to Selim (2007), student motivation is an important factor in accepting the online learning environment. Student motivation is also argued to be a vital element for the production of successful education (Keller, 1979; Williams and Williams, 2011). This is because regardless of how well-designed an instructional environment is, if students are not motivated, they will fail. Researchers and teachers believe that students with high levels of motivation to learn put in more effort and participation than students with low motivation (Keller, 1979). In term of online education, since the framework is largely automated, motivation is an important part of the learning process in online learning, just as it is in traditional education, and it is a prerequisite for effective online learning (Khan, 2009; Yilmaz, 2017). In addition, online learning is more individual and autonomous, motivation is essential for successful learning (Yilmaz, 2017). There are two types of motivation which are intrinsic motivation and extrinsic motivation.

Intrinsic Motivation and Extrinsic Motivation

Intrinsic motivation is the psychological force that makes a person do an activity for its own satisfaction for their feelings rather than for some other results (Eom and Ashill, 2016). Intrinsic motivational factors are reported to work with most students. These factors are involvement, curiosity, challenge, and social interaction. On the other hand, extrinsic motivation makes a person to do something toward its goal to attain a separable result such as reward or recognition (Eom and Ashill, 2016). Both intrinsic and extrinsic motivation was argued to affect students in their learning area (Williams and Williams, 2011). Students who have intrinsic motivation tended to have a high level of satisfaction and learning outcome solely without the use of extrinsic motivation such as rewards or reinforcement. On the other hand, students who have

extrinsic motivation rely mostly on rewards and desirable results for their motivation, such as test score and GPA. It was believed that extrinsic motivation makes students perform lower in term or academic performance than intrinsic motivation users (Williams and Williams, 2011).

In term of online education, researchers (Bolliger, Supanakorn, and Boggs, 2010) supported that motivation is a critical factor to maintain student satisfaction in an online lesson. Students who are highly motivated would do better in an online setting than students who are less motivated (Barbour & Reeves, 2009; Hsu, Wang, and Levesque-Bristol, 2019). Also, Patricia Aguilera-Hermida (2020) discovered that motivation affects the students' effort to learn. Students need interaction with professors to stay motivated, but this group of students described themselves as weak self-motivators.

To conclude, according to other research (Lakhal, Khechine, & Pascot, 2013; Mendoza, Jung, & Kobayashi, 2017; Jongkolthanalarp, Chaiyasoonthorn, & Chaveesuk, 2021), in online learning when students expect that using an online learning will help them understand the lesson better, and they believe that online learning will provide them with accurate knowledge. Furthermore, online instructors can assist students in solving difficulties that they do not understand. They anticipate that utilizing online learning will improve their academic achievement. As a consequence, when they receive what they expected, their level of satisfaction will rise. Regarding performance expectancy (PE) which is the degree to which an individual feels that employing online learning will enable him or her to enhance academic performance (Venkatesh et al., 2003), intrinsic motivation and extrinsic motivation can lead to a degree of performance expectancy.

2.5 Course Design

In this section, the author has written about course design, which later explain why it can lead to level of effort expectancy. First, Zhou el al. (2020) argued that the concept of traditional teaching has been changed during these past years. The concept of knowledge transferring has differed to students' active learning, and sometime teaching while learning. They suggested that students should be guided in the preview session. Then, they will learn actively, think actively, and explore new knowledge autonomously. Course design has played an important role in learning not only in traditional way but also an online education (Lee, 2014). Sun and Chen (2016) supported that perfect course design which motivated interaction between teachers and students leaded to an

effective use in online education along with well-prepared teachers. Zhou et al. (2020) also recommended that colourful teaching materials were another factor which can boost students' active learning. These materials were in the process that teachers need to prepare in advance, so they could gather students' attention and boost their learning experience. Faize and Nawaz (2020) suggested that to make online education interactive and motivating, instructors need to incorporate relevant short videos or short simulations to demonstrate the lesson as well. Alqurashi (2018) also supported that if students notice that the materials could help them to understand the lesson, the level of satisfaction will rise. This is kind of an advantage for online education as teachers can provide difference teaching materials for students to interact with content. In addition, Sun et al. (2020) found that high preparedness of the course materials from the teachers will lead to high satisfaction of students. However, students recommended that combining recorded video and live lesson with more online interaction might help to mitigate the problem of unstable network and increase the degree of student satisfaction.

In course design, teachers were the one who design the course; thus, they must have a proper support from their institutions in order to deliver a great design online course (Rasmitadila et al., 2020). They need to have proficiency and great effort to design the course that able to boost the attention span of the students and their learning skills (Muirhead, 2005; Sun et al., 2020). Teachers were suggested to spend a lot of time on making an effective online course design. The effective course needs to facilitate feedback from students and make them ask questions actively (Dhawan, 2020). In addition, teachers need to change students from passive learners to engaged learners via activities like open discussion, interactive question and answer sessions and sometime online presentation (Sun et al., 2020). Apart from teaching, teachers also had a duty to bring positive energy to the class to help students deal with the mental stress that might result from the isolation (Sun et al., 2020). Furthermore, teachers need to be trained in order to teach online as some teachers might not be familiar with teaching online. The training of instructors should not only be about how to use an online tool but have to be also about how to make an effective online lesson (Faize and Nawaz, 2020).

In term of interest and motivation, students seem to lose interest when they study for a long period. They believed that the used of varied instructional methods will encourage students to be more enthusiastic (Rasmitadila et al., 2020). Wang (2014) also suggested another view that trust is important for students when they use online education. Instructor reputation, course design quality and instructor communicative style were the three main factors that can make student trust to use

online education more. In addition, Liu, Chen, Sun, Wible, and Kuo (2010) found that online course design is the most significant predictor that affect user satisfaction. They added that when some interactive elements were added to an online course such as discussion room and chat room), students will be able to use these channels to engage in their class and create an interactive learning environment. Also, with the applications like Zoom, Skype, and Google Classroom, they make students able to interact with their peers and teachers easier than before.

To summarize, effort expectancy is the degree of how easy it is to use the system (Venkatesh et al., 2003). Students will be happier with online learning if the system is very simple to use and requires less work from them to comprehend and use it (Lakhal, Khechine & Pascot, 2013; Jongkolthanalarp, Chaiyasoonthorn & Chaveesuk, 2021). According to previous paragraphs, course design is the process and approach for designing and accommodating quality learning environments and experiences for students. Thus, it can lead to a degree of effort expectancy.

2.6 Learner Interaction

In this section, the author has written about learner interaction. Owing to the separation of teachers and learners, interaction has been considered one of the most critical components of distance education (Kuo et al., 2014). The lack of interaction between students and teachers was always the big issue when it came to online education due to the fact that students and teachers are isolated from each other (Kuo et al., 2013; Moore and Kearsley, 1996; Hebebci, Bertiz, and Alan, 2020; Baber, 2020; Dhawan, 2020). Patricia Aguilera-Hermida (2020) studied in 270 students in higher education and found that the lack of interaction between professors and students was a challenge. As a result, this lack of interaction diminished the level of motivation that raise student's effort in learning. Moreover, Aragon and Johnson (2008) also stated that lack of the level of interest or motivation is one of the main things which obstructs the growth of online education, and also increases the number of incomplete students from the online courses. Several studies (Sher, 2009; Endres et al., 2009; Ku et al., 2013, Kuo et al., 2013; Nonthamand, Suaklay, Pumila, Intha & Promwong, 2021) supported that interaction is an important factor for student learning and motivation when it comes to online education. Presently, with the advancement of technology-enabled learning environments, online learning platforms now provide ample opportunity for synchronous interactions between students as well as between students and the instructor. Threaded discussions, on the other hand, are frequently utilized in asynchronous mode to facilitate interactive

conversations and the exchange of ideas among students or between students and the instructor (Parahoo et al., 2015; Nonthamand et al., 2021). It has been argued that high-interactivity online courses result in higher levels of student motivation, improved learning, and satisfaction when compared to less interactive learning settings (Croxton, 2014).

Back in 1989, Moore (1989) proposed a model that separated interaction into three category which were learner-learner interaction, learner-instructor interaction, and learner-content interaction. Learner-learner interaction is mainly the communication between students who could exchange knowledge, information, or ideas in term of course content. Learner-instructor interaction is solely the communication between teachers and students. Learner-content interaction is a process when students elaborate, learn, and reflect on the content of the course (Moore and Kearsley, 1996). Kuo et al., (2013) later proved that learner-learner interaction and learner-instructor interaction were good predictors of student satisfaction on online education. However, they did not find that learner-content interaction would be a predictor. They suggested that it may be because of the fact that they did not assess the course design into their research question. Parahoo et al. (2015) supported that learner-learner interactions had a vital effect on student satisfaction. In addition, Bisht, Jasola, and Bisht (2020) proved that a lack of interaction with friends (learners-learners) and faculty members were reported as a challenge for online education which mean it could be a predictor to student satisfaction in online education. Alqurashi (2018) also recommended to develop an activity that can boost learner-learner interaction and find some activities for students to do with each other in order to engage with the class.

Kuo et al., (2014) and Alqurashi (2018) later proved that learner-content interaction was found to be the most critical factor that influence student satisfaction among the two types of interaction. Alqurashi (2018) stated that this is because when the environment become online, students usually spend a lot of time on processing information, digesting content, and learning from a computer screen. This process of self-learning from the content could make their interaction with content vital to their learning and satisfaction. However, learner-instructor interaction is still an essential predictor of student satisfaction (Alqurashi, 2018; Baber, 2020). Alqurashi (2018) suggested that there is still a high probability that if students have high quality interaction with their teachers, they will have high level of satisfaction. In online education, teachers' quick responses and feedbacks are very important for students as there is a lack of face-to-face interaction.

2.7 Technology as Facilitating Conditions

In this section, the author has written about technology as facilitating condition. Technology is one of the important factors that can enormously affect the use of online education due to that fact that at least 80 per cent of the course occur online. Online learning could consist of on various types of online activities apart from the actual online classroom (Roach and Lemasters, 2006; Kuo et al., 2013; Rasmitadila et al., 2020). Zhou et al. (2020) found that to deliver a complete and successful online learning, it needs to be guaranteed by a well- established internet infrastructure. Without strong infrastructure, the online activities will not be able to carry out. The unstable internet connectivity has a vast effect on students' use of online education. They had to accommodate an online education and confirm that this education was able to reach the location where the internet network is low. In China, Chinese government has digitalized their education system for more than 20 years. Therefore, they can deliver online education successfully when they needed during the pandemic period (Zhou et al., 2020). Sun and Chen (2016) also found that advanced technology was an important factor in the effective use of online education. Kuo et al. (2013) argued that technical problems while using internet may cause student frustration and dissatisfaction. It seems important for online learners to possess high internet connectivity to complete required tasks for an online course. Bisht et al. (2020) and Mendoza, Jung & Kobayashi (2017) also supported that internet connectivity was a challenge and very important factor for online education in term of both usage and satisfaction. Nonthamand et al. (2021) advised that students should prepare their readiness of the internet connectivity and their physical learning settings before they attend an online learning. In addition, Hebebci et al. (2020) and Nonthamand et al. (2021) reinforced that lack of technology readiness was among the remarkable negative issues with online education activities. In addition, they suggested that online education will be used more effectively in the future along with necessary improvement. In India, Nambiar (2020) found that more than half of the students from the sample indicated that technical issues (such as poor internet signal, poor quality of the video, and sometimes they had to find the way to log in back again between the classes) were the main issues during their online class. In addition, students wanted to have technical support from the instructors or staffs that can help. In the same way as teachers', students also needed to be trained to use an online application or medium that they would use in online lesson (Nambiar, 2020). Dhawan (2020) and Faize and Nawaz (2020) also acknowledged these technical issues as one of the main difficulties students face in online education. Faize and Nawaz

(2020) suggested that students need to have the availability of necessary material to attend online classes like free internet access or device.

2.8 Student Satisfaction

In this section, the author has written about student satisfaction. Student satisfaction is a key measure of how well students are learning. It can refer to student views of learning experiences and how they value a course while attending an educational institution (Elliott and Healy, 2001; Bolliger and Martindale, 2004; Kuo et al., 2013; Kuo et al., 2014; Al-Rahmi, Shamsuddin & Alismaiel, 2020). Student satisfaction was argued to be an interesting factor to be investigated. Student satisfaction could lead to several outcome such as student persistence, student retention and course quality (Bolliger and Martindale, 2004; Kuo et al., 2013; Kuo et al., 2014; Alqurashi, 2018). Researchers (Devinder and Datta, 2003) believed that satisfied customers are loyal; and in the same way, satisfied students were more likely to attend another class instructed by the same instructor. They are argued to be an asset for institutes. They are more likely to spread positive word-of-mouth, and sometimes they will come back to the institution as alumni (Parahoo, Santally, Rajabalee & Harvey, 2015). Bolliger and Martindale (2004) also suggested that surveys which can give valuable student satisfaction information could be used to boost the course or program quality.

There are several factors that affect student satisfaction in traditional and online education such as student characteristics, quality and usefulness of education, curriculum and instruction, student life, interaction in both online and face-to-face classes, technological features, students' learning styles, support services, and sometimes demographic characteristics (Yilmaz, 2017). However, online education shows a different set of issues as students may never visit a physical location and may hardly form a relationship with fellow students (Bolliger and Martindale, 2004; Yukselturk & Yildirim, 2008; Parahoo, Santally, Rajabalee & Harvey, 2015). Many studies have been working on this regard, and they found a variety of factors as an influential indicator for student satisfaction. Sher (2009), Kou et al. (2014) and Alqurashi (2018) found that all three types of interactions have an influence on student satisfaction in online learning. Endres, Chowdhury, Frye & Hurtubis (2009) added that learning practices and course materials could also affect student satisfaction. Thurmond, Wambach, Connors & Frey (2002) supported that course design could play a vital role in student satisfaction in online learning. Bolliger & Martindale (2004) found more that technology was also an important factor affected student satisfaction in online learning. Moreover,

according to previous literatures (e.g., Im, Hong & Kang, 2011; San Martín & Herrero, 2012; Lakhal, Khechine & Pascot, 2013; Jung & Lee, 2015; Kornpitack & Sawmong, 2020; Al-Rahmi, Shamsuddin & Alismaiel, 2020), several research in various situations have verified these four drivers (performance expectancy, effort expectancy, social influence, and facilitating condition). Thus, the author can conclude to the conceptual framework in figure 2.19.

2.9 Related Framework

The researcher has studied concepts, theories, research papers, dissertations, and reviews of relevant literature for use in analyzing research hypotheses. This section will illustrate the framework from related literature. Details are shown as follows.

The UTAUT is a unified model that combines different perspectives on consumer and innovation acceptance. Performance expectancy, effort expectancy, social influence, and facilitating conditions, according to Venkatesh et al. (2003), are direct predictors of behavioral intention to use and use behavior, and these variables are influenced by gender, age, experience, and voluntariness of use.

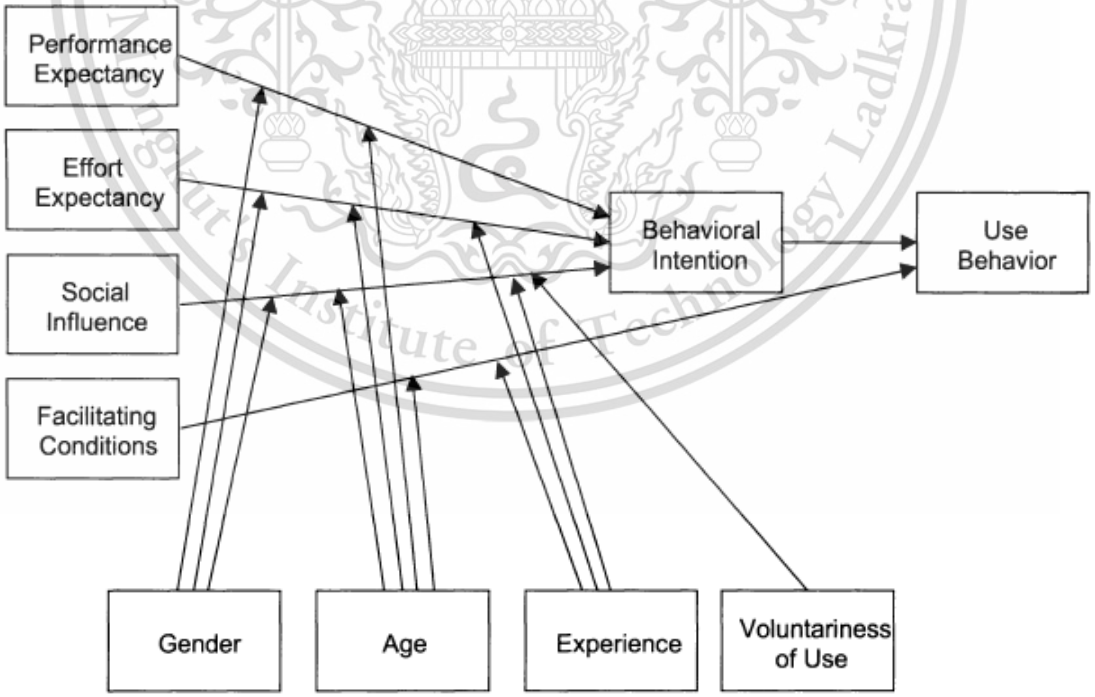

Figure 2.1 Venkatesh et al. (2003) research framework

Baber (2020) investigated the factors that influence students' perceived learning outcomes and their impact on student satisfaction. To conduct a cross-country study, data was obtained from undergraduate students in both South Korea and India. The study discovered that elements such as classroom interaction, student motivation, course structure, instructor knowledge, and facilitation have a favorable influence on students' perceived learning outcome and student satisfaction. There is no substantial difference between the two countries in terms of students' perceived learning outcomes and student satisfaction.

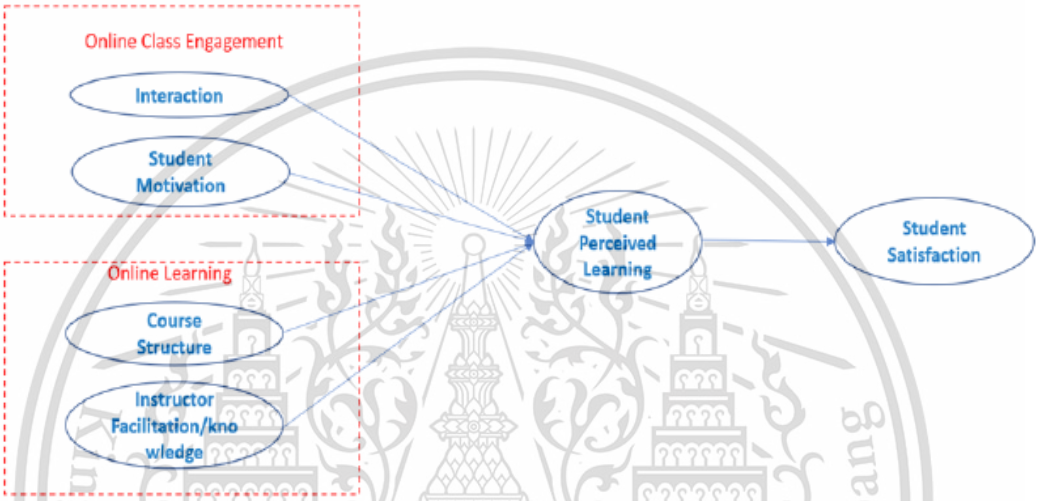

Figure 2.2 Baber (2020) research framework

Gray & DiLoreto (2016) claimed that although no research had tested the mediational relationship identified, studies have shown that course organization and structure, student engagement, learner interaction, and instructor presence had accounted for considerable variance in student satisfaction and perceived learning in online learning environments through a variety of pathways. Their research added to the body of knowledge regarding online learning and the factors that impact student satisfaction and perceptions of learning. Student satisfaction and perceived learning were explored in connection to course structure/organization, learner interaction, student engagement, and instructor presence. The findings of their study were meant to guide practice in online teaching and learning, with the goal of enhancing retention and improving quality.

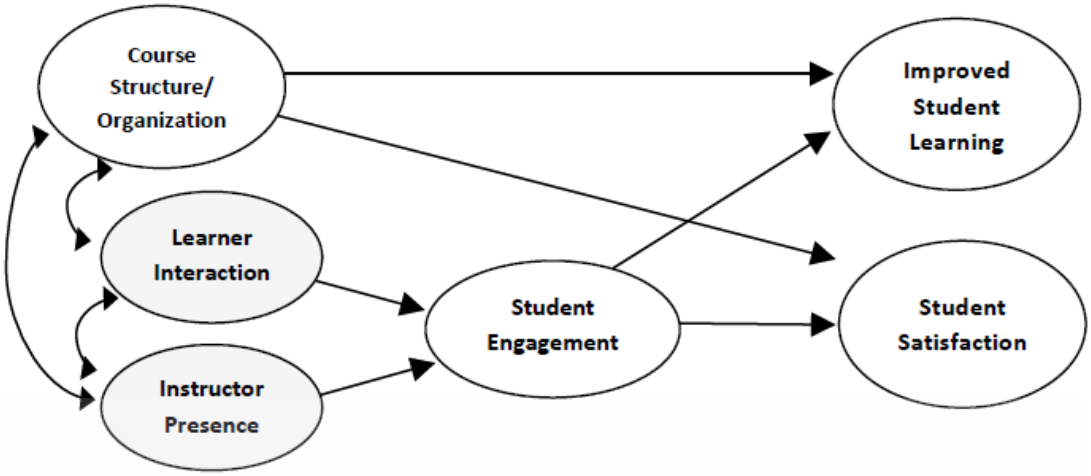

Figure 2.3 Gray & DiLoreto (2016) research framework

Eom & Ashill (2016) study expanded on previous research on critical success variables in university online education and is based on constructivist learning theories. In their study, the independent variables of intrinsic and extrinsic motivation, student self-regulation, instructor-student and student-student communication, instructor, and course design were studied as possible predictors of online learning outcomes. Instructor-student contact, student-student discourse, teacher, and course design all had a significant influence on student satisfaction and learning outcomes, according to the research. Extrinsic student motivation and self-control, on the other hand, show no apparent relationship with user satisfaction or learning outcomes. In addition, while intrinsic student motivation had an impact on learning outcomes, it had no bearing on user pleasure. Course design, teacher, and conversation were the biggest determinants of user satisfaction and learning outcomes, according to their research.

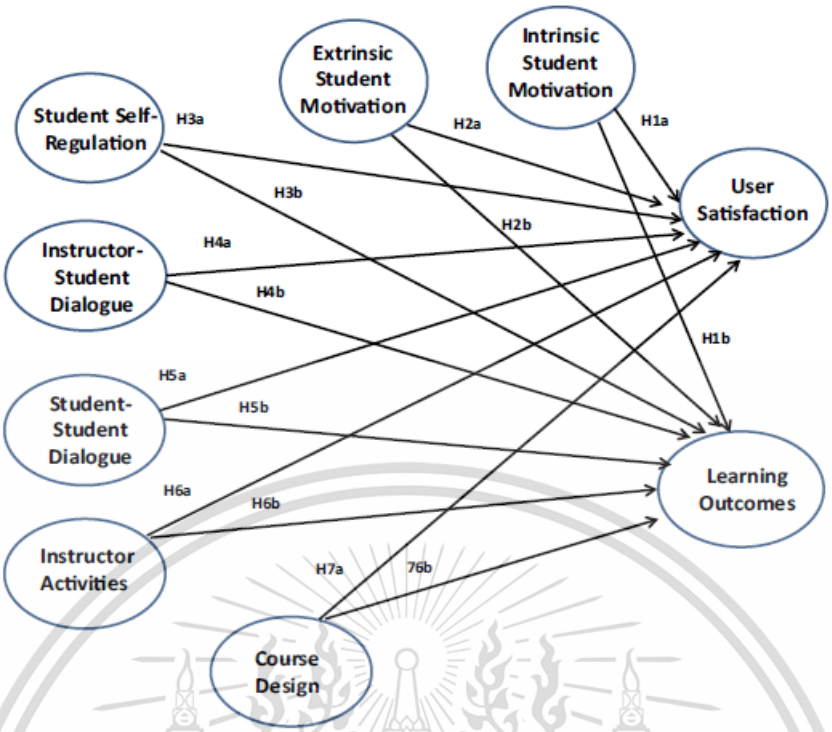

Figure 2.4 Eom & Ashill (2016) research framework

In Ikhsan, Saraswati, Muchardie & Susilo (2019) study, Structural Equation Modelling (SEM) was used to investigate the factors that influence students' perceptions of learning results and satisfaction in an online university course. As possible predictors of online learning, independent factors include teacher facilitation, technological assistance, course structure, instructor feedback, self-motivation, peer support, and interaction. A total of 400 students from BINUS Online Learning were polled. Instructor facilitation, technical assistance, instructor feedback, and self-motivation all affect learning outcomes, whereas instructor facilitation, technical support, self-motivation, and peer support all had a substantial impact on student satisfaction, according to the structural model results.

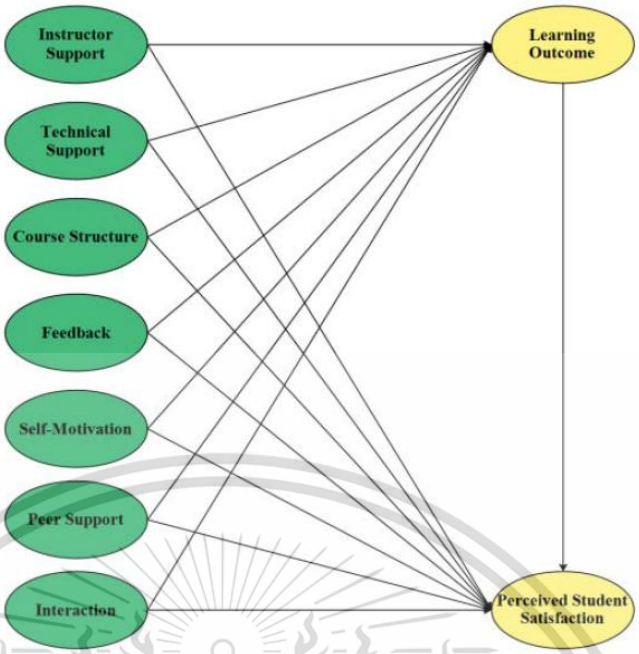

Figure 2.5 Ikhsan et al. (2019) research framework

Kornpitack & Sawmong (2020) examined at the model empirically to see what factors impact Thai high school students' use of the Virtual School Online Platform for English learning. The UTAUT model was used in conjunction with the prior education success construct to explore the behavioral intention and actual usage of an online learning platform from the perspective of high school students. Performance expectations, social influence, facilitating conditions, and past educational accomplishment all had a positive and substantial impact on behavioral intention, according to the findings. It was discovered that behavioral intention to use had a positive and considerable impact on actual usage. Performance expectancy, social influence, facilitating conditions, and past education performance were found to have a positive and significant impact on actual usage indirectly through behavioral intention. Effort expectancy was discovered to have a non-significant negative impact on behavioral intention and, in turn, on actual usage.

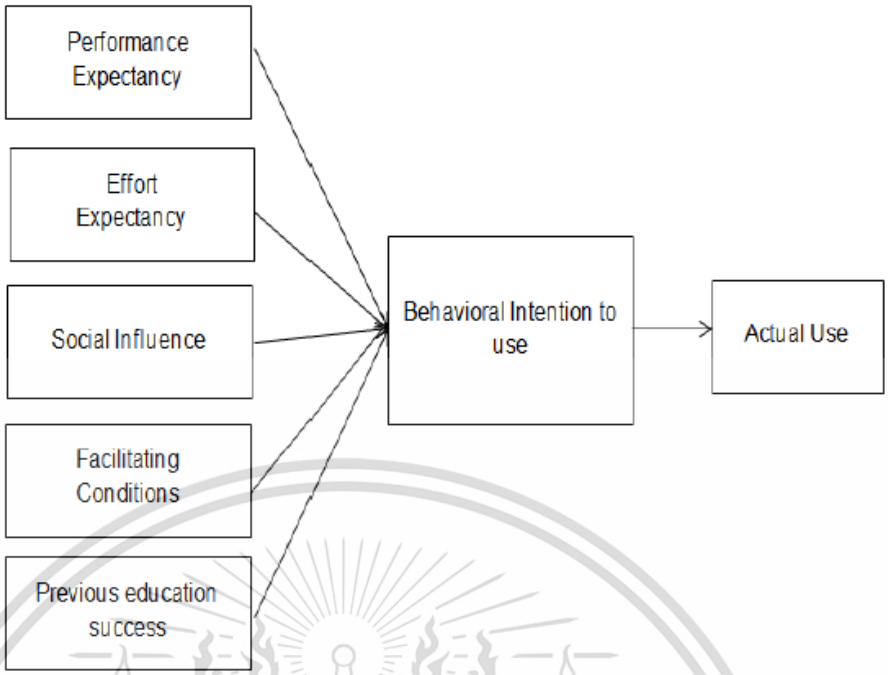

Figure 2.6 Kornpitack & Sawmong (2020) research framework

Al-Rahmi, Shamsuddin, and Alismaiel (2020) studied the influence of social media on student life in higher education. Social media has affected a variety of educational techniques and procedures, in addition to entertainment and academic reasons. The UTAUT paradigm was used to accredit the application to a new environment for academic performance in this study. The use of social media in higher education has been highlighted in this study, as well as the inclusion of aspects. Through the usage of social networks for learning objectives, the findings show that each independent variable has a direct influence on behavioral intention to use and actual social media use.

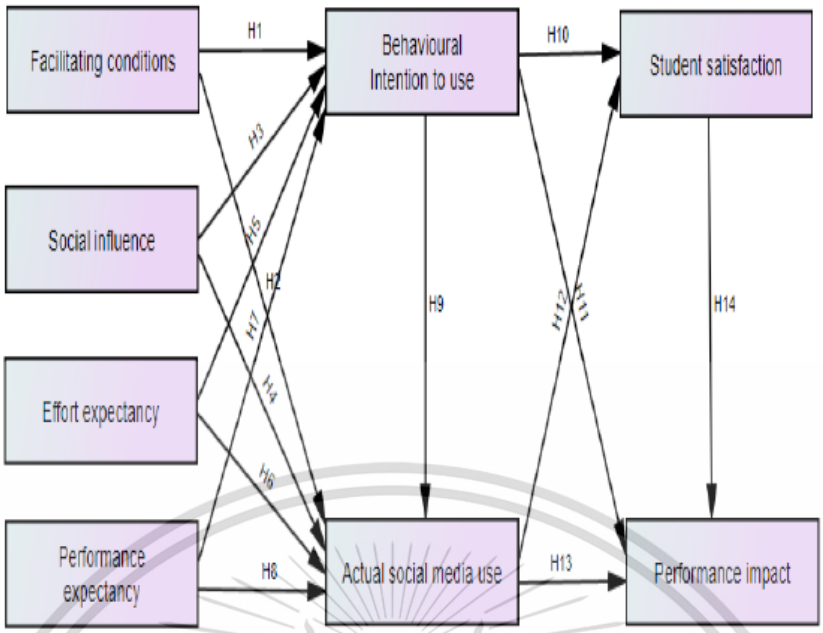

Figure 2.7 Al-Rahmi, Shamsuddin & Alismaiel (2020) research framework

Al-Rahmi et al. (2019) investigated the elements that influence students' intentions to use a massive open online course (MOOC) system. The current study presents an enhanced technology acceptance model by combining the technology acceptance model (TAM) with the innovation diffusion theory (IDT). The research goal was met after data was collected from 1148 students in Malaysia utilizing the (MOOCs) system. The outcomes of a quantitative research approach based on a Structure Equation Modeling analysis of the results (SEM). The findings show that six different perspectives on novelty elements influenced students' behavior in a (MOOCs) scheme. The relative benefits, intricacy, trialability, observability, compatibility, and felt satisfaction all had a substantial impact on perceived ease of use. The relative benefits, complexity, trialability, observability, compatibility, and perceived satisfaction all had a significant impact on the usefulness.

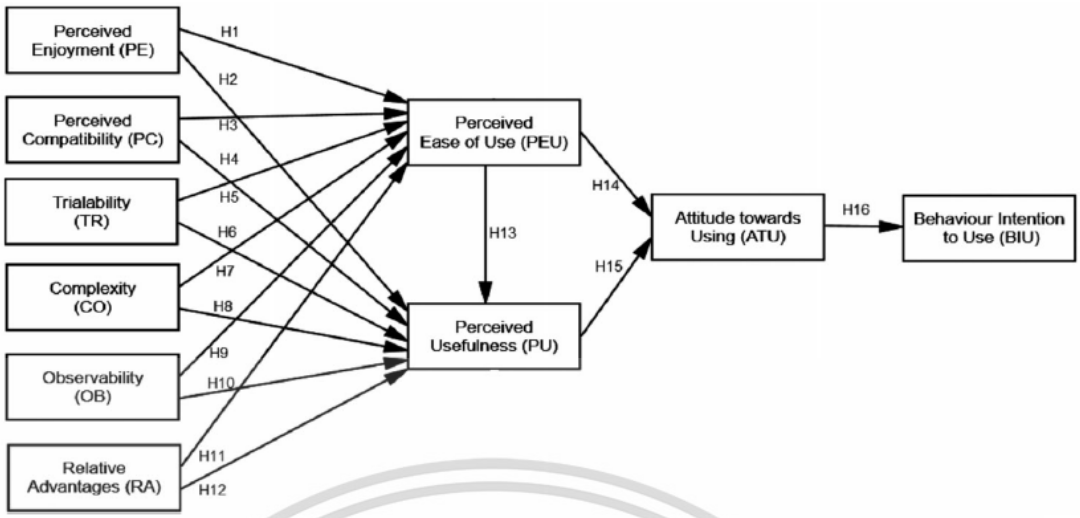

Figure 2.8 Al-Rahmi et al. (2019) research framework

El-Masri & Tarhini (2017) looked at the primary elements that may obstruct or facilitate university students' use of e-learning technologies in both emerging (Qatar) and developed (USA) nations. The major method of analysis in this work was structural equation modeling. In both populations, performance expectancy, hedonic motivation, habit, and trust were found to be significant predictors of behavioral intention (BI). However, the association between price value and BI was small, contrary to their expectations. Their findings also suggesedt that in underdeveloped nations, effort expectations and social influence led to an increase in students' use of e-learning systems, but not in developed countries. Furthermore, in rich nations, facilitating conditions boosted e-learning uptake, however in poor countries, this was not the case. Overall, the suggested model fit the data well and accounted for 68% of the variation in the Qatari sample and 63% of the variance in the USA sample.

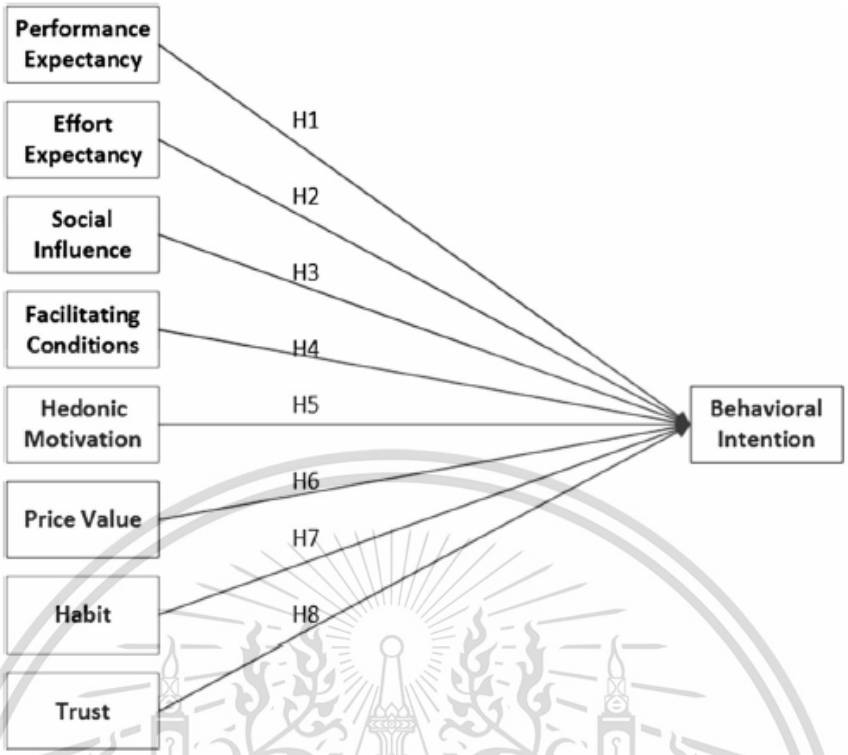

Figure 2.9 El-Masri & Tarhini (2017) research framework

Mendoza, Jung, and Kobayashi (2017) used the Unified Theory of Acceptance and Use of Technology to examine empirical research on MOOC adoption and explain aspects influencing MOOC adoption/non-adoption (UTAUT). The first step was to analyze 40 empirical research articles on MOOCs that were published in ten different publications between 2007 and 2016. Second, 12 publications that looked into characteristics that helped or hindered MOOC acceptance were evaluated critically. The study found that "Performance Expectancy" was the most important element in promoting MOOC uptake, while "Facilitating Condition" was the most significant obstacle. While the UTAUT was a valuable paradigm for analyzing MOOC uptake, it required to include "Learner Variables" and "Language Competencies" as two new elements. Finally, the study's shortcomings were reviewed, and recommendations for further research were given.

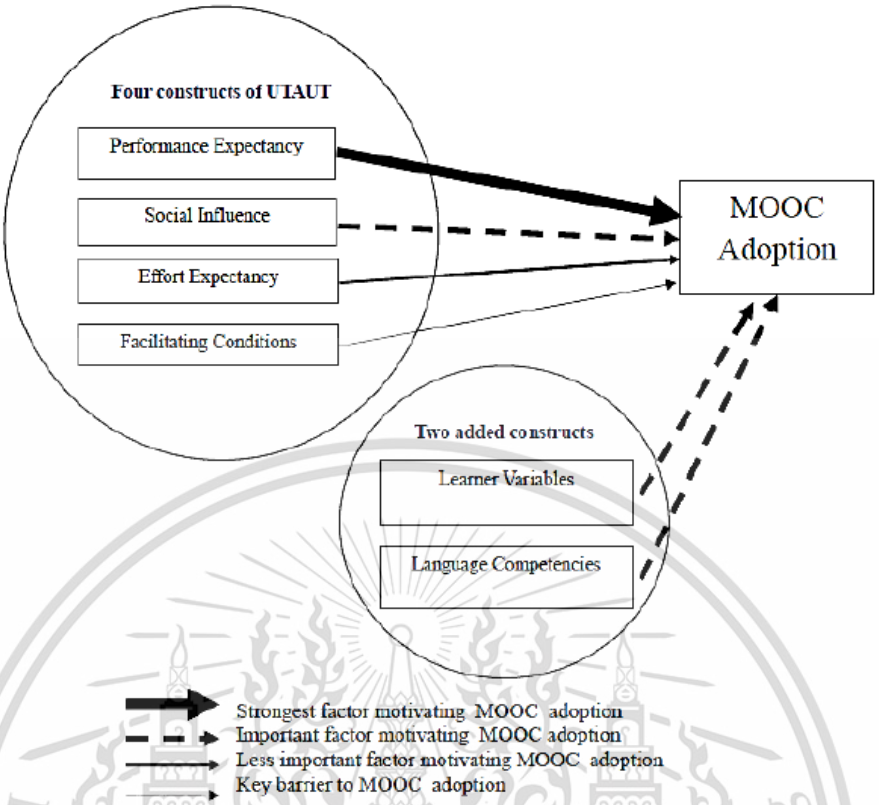

Figure 2.10 Mendoza, Jung & Kobayashi (2017) research framework

Alraimi, Zo, and Ciganek (2015) revealed elements that increased an individual's intention to continue utilizing MOOCs, which had previously received little attention. The data from a large-scale investigation was used to evaluate a research model based on the information systems continuity expectation-confirmation model. Perceived repute, perceived openness, perceived usefulness, perceived, and user satisfaction all affected the intention to continue using MOOCs, and the study model explained a considerable portion of the variation. The strongest indicators were perceived reputation and perceived openness, which had never been studied before in the context of MOOCs.

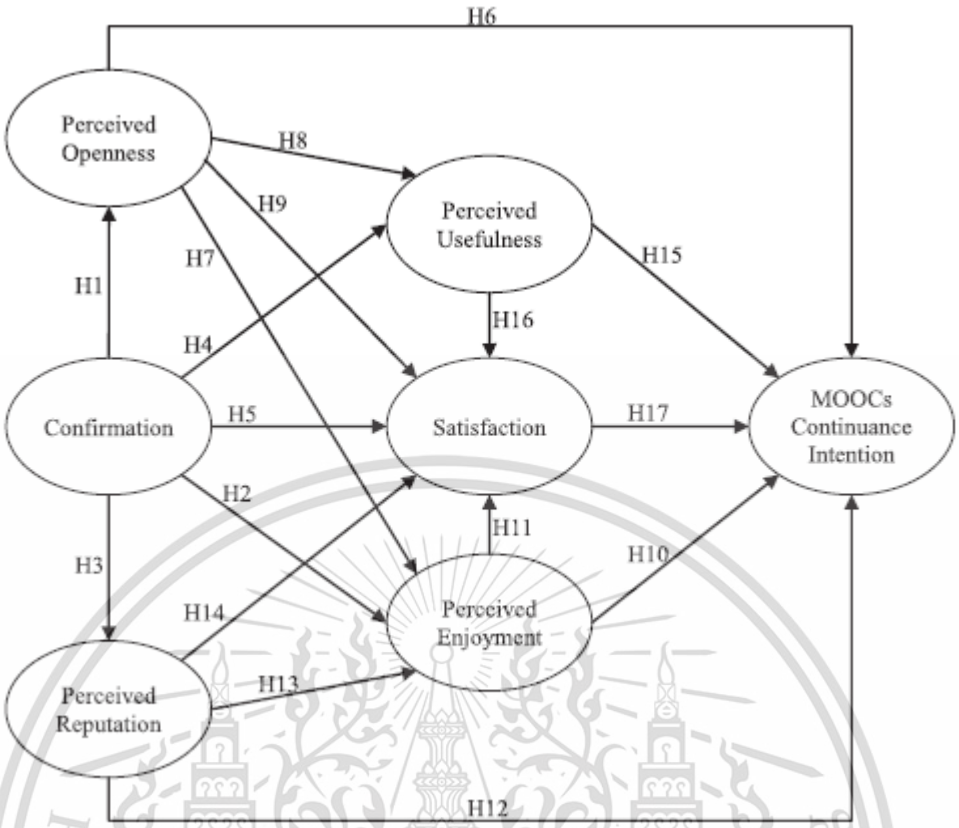

Figure 2.11 Alraimi, Zo & Ciganek (2015) research framework

Lakhal, Khechine & Pascot (2013) investigated psychological aspects that may impact undergraduate business students' adoption and usage of desktop video conferencing technology. This study tested a theoretical model encompassing seven variables based on the Unified Theory of Acceptance and Use of Technology: behavioral intentions to use desktop video conferencing, performance expectancy, effort expectancy, general social influence, peer social influence, facilitating conditions, and autonomy. An online questionnaire was used to collect data on a sample of 177 undergraduate business students enrolled in a mandatory information system distance course. The findings showed that performance expectancy, facilitating conditions, general social influence, and autonomy mediated by performance expectancy are the most important determinants of behavioral intentions to utilize desktop video conferencing.

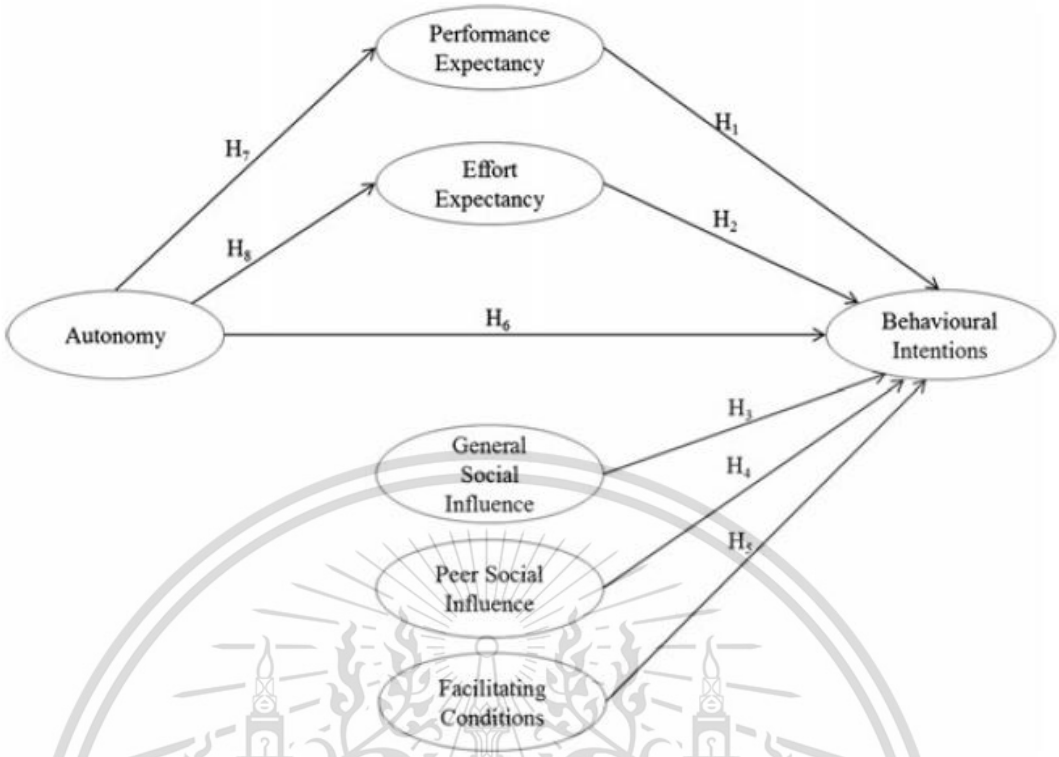

Figure 2.12 Lakhal, Khechine & Pascot (2013) research framework

Jung and Lee (2015) used the UTAUT model to predict and analyze factors influencing YouTube acceptance among university students and teachers in Japan and the United States. 569 students and 56 professors from Japanese and American institutions were questioned to see how UTAUT-related criteria influenced YouTube acceptability in these two countries. The findings demonstrated that the four UTAUT predictors may explain YouTube acceptance to a large extent; however, the effect of each predictor on YouTube acceptance varies significantly depending on the cultural setting and the role of instructors and learners.

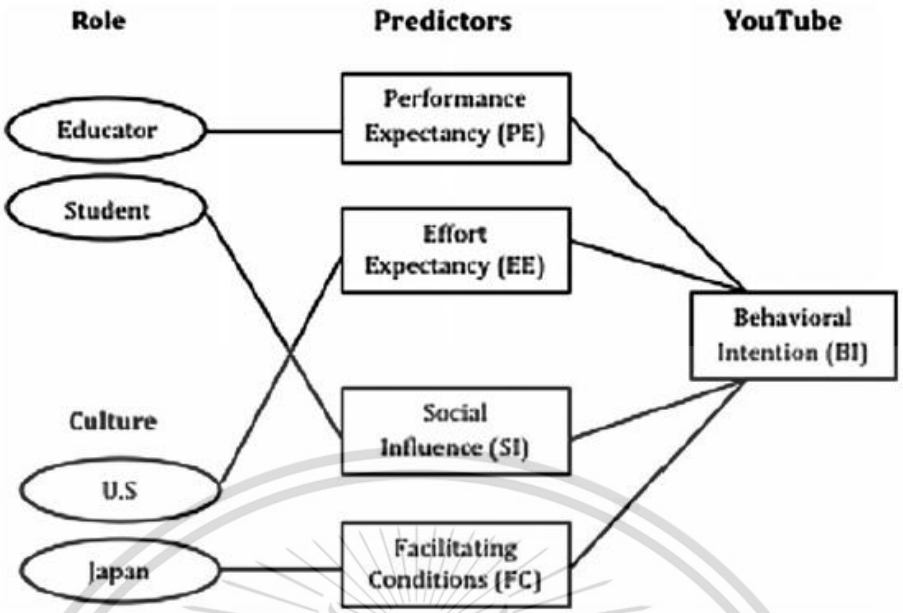

Figure 2.13 Jung & Lee (2015) research framework

To identify the influences that arose in online higher education contexts, Parahoo et al. (2015) constructed a model of student happiness. The study used a mixed method approach to discover issues that students thought were impacting their satisfaction, starting with focus groups and then moving on to exploratory and confirmatory factor analysis to build the study model. Data was acquired from a campus-wide sample of 834 students enrolled in a generic online course at the University of Mauritius using an online questionnaire. The study revealed four major drivers of student satisfaction using structural equation modeling, in order of decreasing importance: the marketing construct of university reputation; physical facilities; faculty empathy; and student–student interactions.

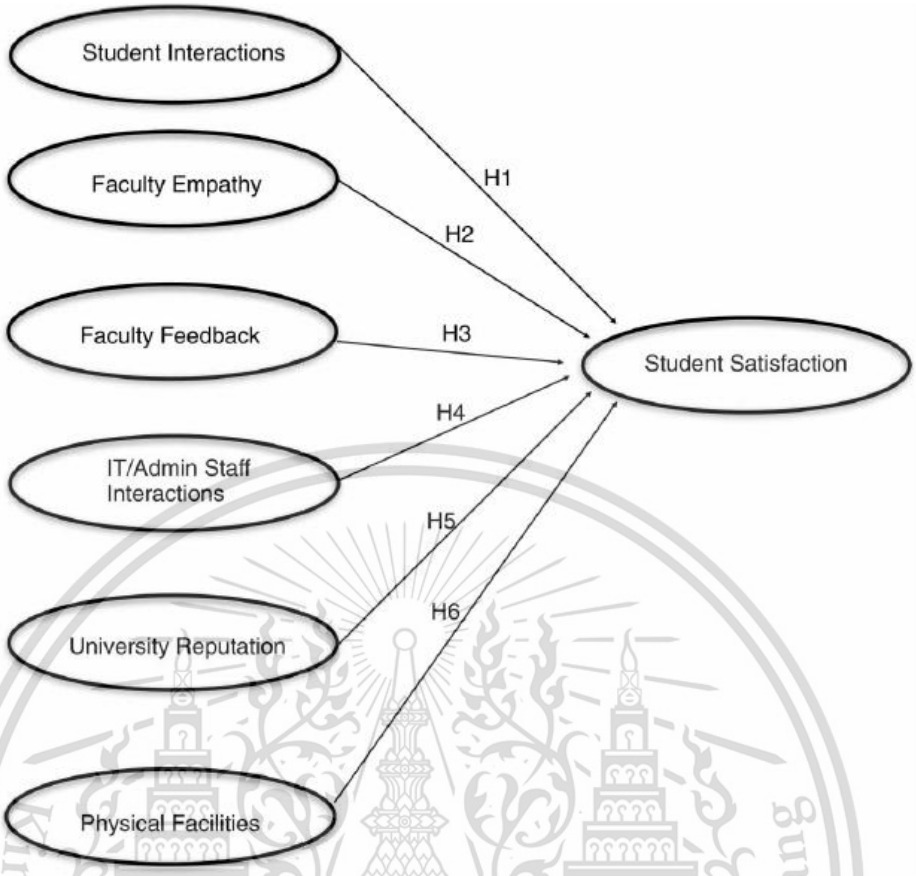

Figure 2.14 Parahoo et al. (2015) research framework

Jongkolthanalarp, Chaiyasoonthorn, and Chaveesuk (2021) intended to gather data from 400 questionnaires used by secondary school students to research variables impacting satisfaction with the online tutorial company in the central area. (Students in grades 7–12) In addition, statistical data analysis techniques such as frequency, percentage, mean, standard deviation, and multiple linear regression were used in the study. The hypothesis assumption results showed that Perceived Ease of Use and Confirmation could predict the influence on satisfaction in using the online tutorial business of secondary school students in the central region at statistical significance level 0.01 and Perceived Usefulness could predict the influence on satisfaction in using the online tutorial business of secondary school students in the central region at statistical significance level 0.05.

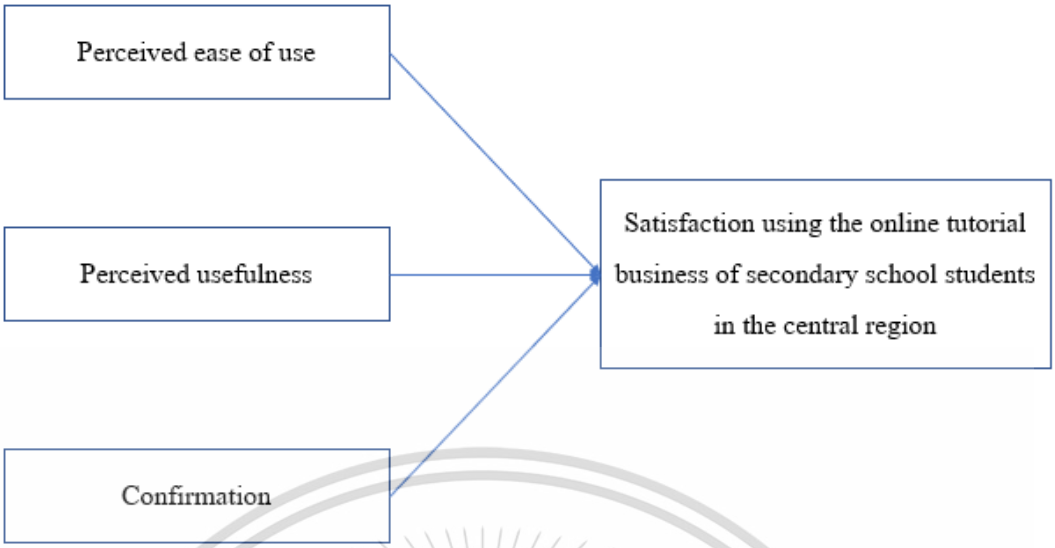

Figure 2.15 Jongkolthanalarp, Chaiyasoonthorn & Chaveesuk (2021) research framework

Isaac, Abdullah, Ramayah, and Mutahar (2017) attempted to explain the performance impact of Yemeni government personnel by combining the DeLone and McLean IS success model with task-technology fit (TTF). The questionnaire survey approach was utilized to obtain primary data from 530 internet users from Yemen's 30 government ministries and entities. The data analysis began with exploratory factor analysis, followed by confirmatory factor analysis, and finally structural equation modeling with AMOS. The findings demonstrated that the suggested integrated model fits the data quite well. The results of the multivariate analysis revealed four major findings. For beginning, actual usage had a significant beneficial influence on user satisfaction, TTF, and performance impact. Second, user satisfaction has a significant impact on performance impact. Third, TTF has a significant favorable influence on user satisfaction and performance. Fourth, the link between actual usage and performance effect was mediated by both user satisfaction and TTF.

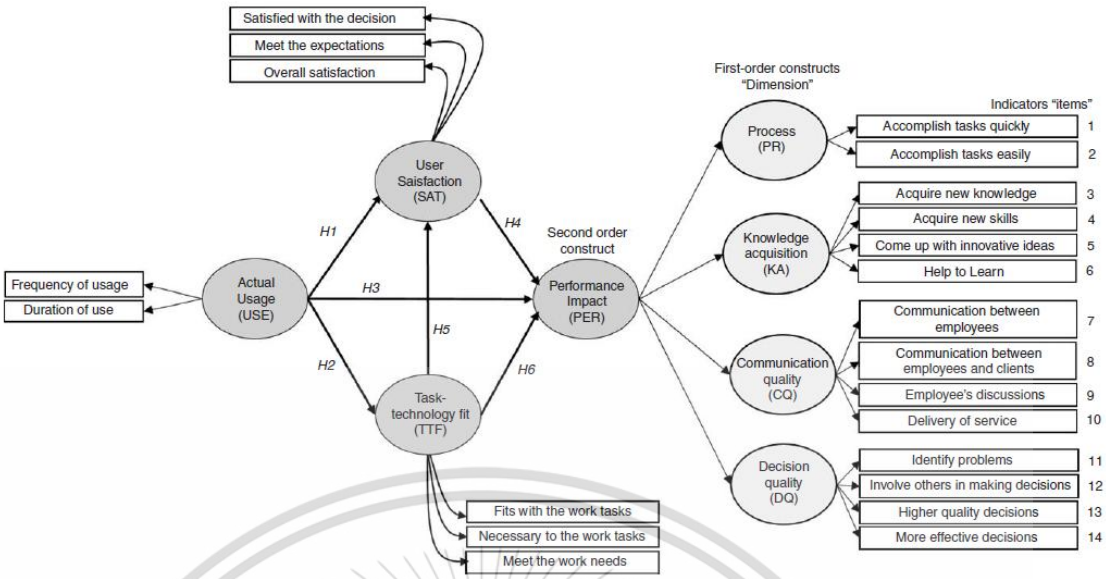

Figure 2.16 Isaac, Abdullah, Ramayah, and Mutahar (2017) research framework

Hou (2012) intended to experimentally validate a paradigm for discovering the links between end-user computing satisfaction (EUCS), system utilization, and individual performance. Using the structural equation modeling technique, data from 330 end users of BI systems in the Taiwanese electronics sector were utilized to test the linkages provided in the framework. The findings lend considerable credence to our concept. Our findings suggest that greater levels of EUCS can lead to increased BI system utilization and better individual performance, and that higher levels of BI system usage will lead to better individual performance. Furthermore, the findings of this study, which are congruent with DeLone and McLean's IS success model, indicated the existence of a strong positive association between EUCS and system utilization.

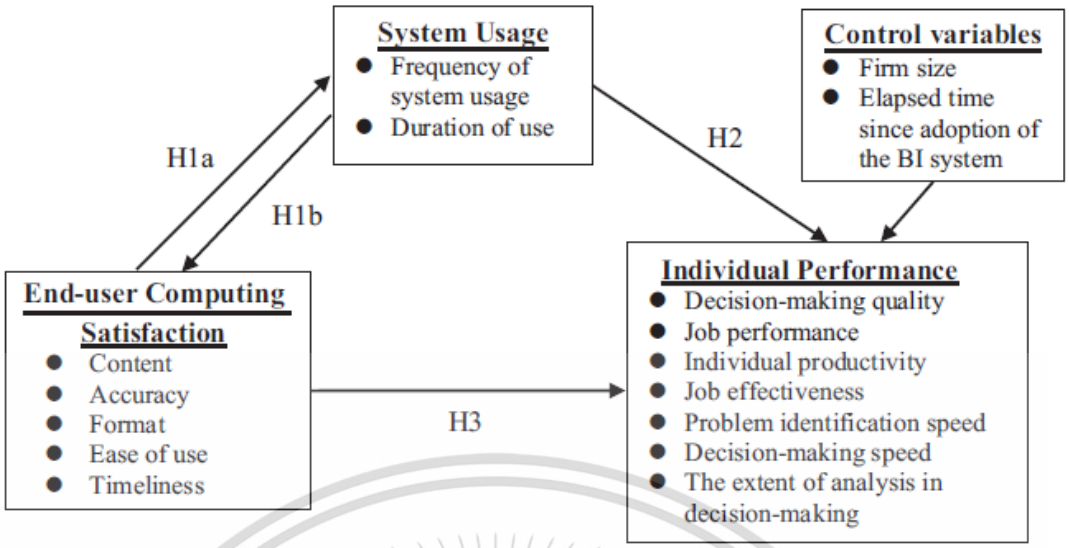

Figure 2.17 Hou (2012) research framework

Aldholay et al. (2018) enhanced the Delone and McLean information system success model by include a self-efficacy component as a predictor of user pleasure and actual usage to predict student achievement. The questionnaire survey approach was utilized to obtain primary data from 448 students across nine Yemeni public universities. The proposed model's six components were assessed using current scales. AMOS was used to analyze the data, which included confirmatory factor analysis and structural equation modeling. Overall quality (system, information, and service quality) and self-efficacy have a favorable influence on user satisfaction and actual usage; actual usage strongly predicts user satisfaction; and both user satisfaction and actual usage have a positive impact on student performance.

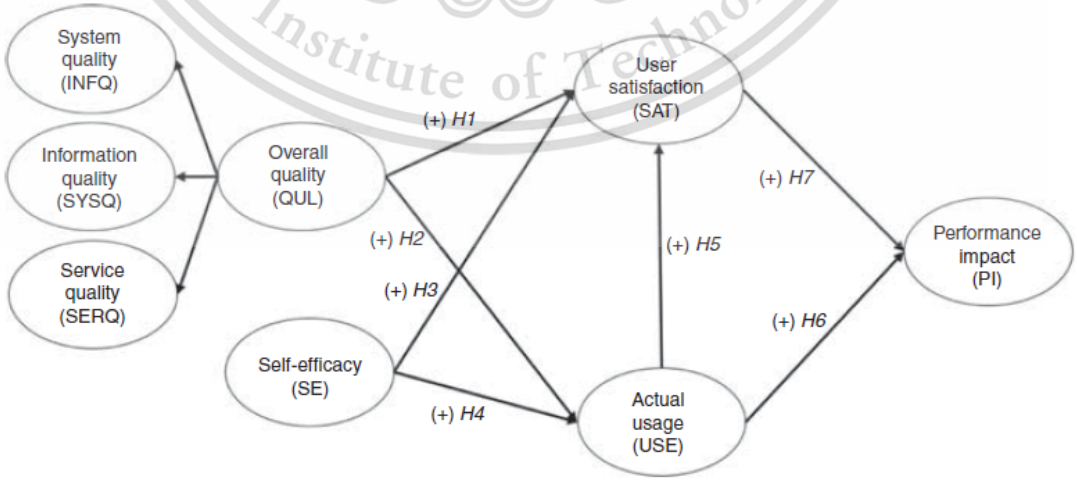

Figure 2.18 Aldholay et al. (2018) research framework

2.10 Research Conceptual Model

From the literature reviewed above, this research has drawn out the research conceptual framework as figure 2.19

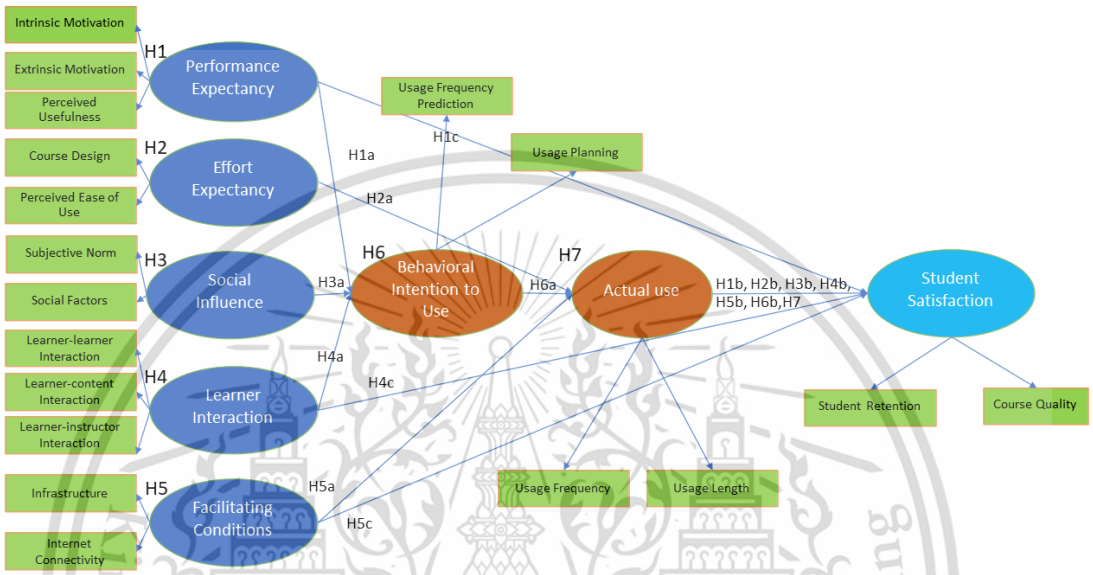

Figure 2.19 Proposed Research Conceptual Model

2.11 Summary

From the literature review, it is found that there are several factors that can lead to the level of student satisfaction in online education. Those factors are student motivation, which can divide into intrinsic and extrinsic motivation, course design, interaction (learner-learner, learner-content, and learner-instructor interaction), and technology readiness. When it comes to the intention to use online technology, the UTUAT model is the most appropriate model. Moreover, according to previous literatures (e.g., Im, Hong & Kang, 2011; San Martín & Herrero, 2012; Lakhal, Khechine & Pascot, 2013; Jung & Lee, 2015; Kornpitack & Sawmong, 2020; Al-Rahmi, Shamsuddin & Alismaiel, 2020), several research in various situations have verified these four factors (performance expectancy, effort expectancy, social influence, and facilitating condition) could be used in online learning sector. When the observed determinant from the literature review combines with the main determinants in the UTAUT model. It can conclude as figure 2.19. Learner interaction

will become a new factor from the original model. For student motivation, course design, and technology readiness can be merged with performance expectancy, effort expectancy, and facilitating condition respectively as explained in the previous sections. Consequently, the research hypotheses can then be created and supported by all articles as shown at table 2.1, which will lead to the research methodology in the next chapter.

Table 2.1 The Summery of theory/content/variable and Author/year/article titles supported the model or hypotheses in this study

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Performance Expectancy	Venkatesh, Morris, Davis & Davis/2003/ User Acceptance of Information Technology: Toward a Unified View	The UTAUT is a unified model that brings together alternative perspectives on consumer and innovation acceptance. Venkatesh et al. (2003) indicated that four key constructs, which are performance expectancy, effort expectancy, social influence and facilitating conditions, are direct determinants of behavioral intention to use and use behavior, and that these constructs are in turn controled by gender, age, experience, and voluntariness of use.	H1a,H1b,H1c
	Im, Hong & Kang /2011/ An international comparison of technology adoption	Im, Hong, and Kang (2011) investigated how culture influences the relationships between the dimensions in the UTAUT model. They used data from Korea and the United States. The results suggest that the UTAUT model works effectively with both data. When Korea and the United States are compared, the effects of effort expectancy on behavioral intention and the influence of behavioral intention on use behavior are stronger in the United States.	

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Performance Expectancy	San Martín & Herrero/2012/ Influence of the user's psychological factors on the online purchase intention in rural tourism: Integrating innovativeness to the UTAUT framework	The purpose of this study was to investigate the process of new information technology adoption by users of rural tourism services. This study constructed a theoretical model based on the UTAUT model that contained five factors of online purchasing intention, including performance expectancy, effort expectancy, social influence, facilitating conditions, and innovativeness. The findings revealed that the levels of performance and effort required in relation to the transaction, as well as the level of innovativeness of users, have a favorable influence on online purchase intention. In addition, the association between performance expectancy and online purchase intention was moderated by innovativeness.	H1a,H1b,H1c

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Performance Expectancy	Jung & Lee/2015/ YouTube acceptance by university educators and students: a cross-cultural perspective	Using the UTAUT model, this study aimed to predict and assess factors impacting YouTube acceptability among university students and instructors in two very different cultures, Japan and the US. To investigate the impact of UTAUT-related factors on YouTube acceptance in these two nations, 569 students and 56 educators from Japanese and American colleges were surveyed. The results revealed that the UTAUT's four predictors can explain YouTube acceptance to a high degree; however, the influence of each predictor on YouTube acceptance differs significantly depending on the cultural setting and the role of the teachers and learners.	H1a,H1b,H1c

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Performance Expectancy	Kornpitack & Sawmong /2020/ Empirical Investigation of Students' Actual Use Towards Learning English Online with Thailand's Virtual School Online Platform: Extended UTAUT Framework	This study empirically examined the model to determine the characteristics that influence Thai high school students' utilization of the Virtual School Online Platform for English learning. The study investigated the behavioral intention and actual usage of an online learning platform from the perspective of high school students, using the UTAUT model in addition to the previous education success construct. The findings demonstrated that performance expectancy, social influence, facilitating conditions, and previous education success all had a positive and significant influence on behavioral intention. The behavioral intention to use was found to have a favorable and significant influence on actual use. Actual use was discovered to be positively and considerably influenced indirectly through behavioral intention by performance expectancy, social influence, facilitating conditions, and previous education performance. Effort expectancy was found to have a non-significant detrimental affect on behavioral intention and indirectly on actual use.	H1a,H1b,H1c

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Performance Expectancy	Al-Rahmi, Shamsuddin & Alismaiel /2020/ Unified theory of acceptance and use of technology (UTAUT) Theory: The Factors Affecting Students' Academic Performance in Higher Education	The purpose of this article was to examine the use of social media in higher education and its impact on student lives. Aside from entertainment and academic reasons, social media has influenced numerous educational methods and processes. In this research, the UTAUT model was employed to authenticate the application to a new context for academic performance. This study has emphasized the usage of social media in higher education, as well as highlighting the addition of elements. The findings indicate that each independent variable has a direct effect on behavioral intention to use and actual social media use through the use of social networks for learning purposes.	H1a,H1b,H1c

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Effort Expectancy	Venkatesh, Morris, Davis & Davis /2003/ User Acceptance of Information Technology: Toward a Unified View	The UTAUT is a unified model that brings together alternative perspectives on consumer and innovation acceptance. Venkatesh et al. (2003) indicated that four key constructs, which are performance expectancy, effort expectancy, social influence and facilitating conditions, are direct determinants of behavioral intention to use and use behavior, and that these constructs are in turn controled by gender, age, experience, and voluntariness of use.	H2a,H2b
	Im, Hong & Kang /2011/ An international comparison of technology adoption	Im, Hong, and Kang (2011) investigated how culture influences the relationships between the dimensions in the UTAUT model. They used data from Korea and the United States. The results suggest that the UTAUT model works effectively with both data. When Korea and the United States are compared, the effects of effort expectancy on behavioral intention and the influence of behavioral intention on use behavior are stronger in the United States.	

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Effort Expectancy	San Martín & Herrero/2012/ Influence of the user's psychological factors on the online purchase intention in rural tourism: Integrating innovativeness to the UTAUT framework	The purpose of this study was to investigate the process of new information technology adoption by users of rural tourism services. This study constructed a theoretical model based on the UTAUT model that contained five factors of online purchasing intention, including performance expectancy, effort expectancy, social influence, facilitating conditions, and innovativeness. The findings revealed that the levels of performance and effort required in relation to the transaction, as well as the level of innovativeness of users, have a favorable influence on online purchase intention. In addition, the association between performance expectancy and online purchase intention was moderated by innovativeness.	H2a,H2b

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Effort Expectancy	Jung & Lee/2015/ YouTube acceptance by university educators and students: a cross-cultural perspective	Using the UTAUT model, this study aimed to predict and assess factors impacting YouTube acceptability among university students and instructors in two very different cultures, Japan and the US. To investigate the impact of UTAUT-related factors on YouTube acceptance in these two nations, 569 students and 56 educators from Japanese and American colleges were surveyed. The results revealed that the UTAUT's four predictors can explain YouTube acceptance to a high degree; however, the influence of each predictor on YouTube acceptance differs significantly depending on the cultural setting and the role of the teachers and learners.	H2a,H2b

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Effort Expectancy	Kornpitack & Sawmong /2020/ Empirical Investigation of Students' Actual Use Towards Learning English Online with Thailand's Virtual School Online Platform: Extended UTAUT Framework	This study empirically examined the model to determine the characteristics that influence Thai high school students' utilization of the Virtual School Online Platform for English learning. The study investigated the behavioral intention and actual usage of an online learning platform from the perspective of high school students, using the UTAUT model in addition to the previous education success construct. The findings demonstrated that performance expectancy, social influence, facilitating conditions, and previous education success all had a positive and significant influence on behavioral intention. The behavioral intention to use was found to have a favorable and significant influence on actual use. Actual use was discovered to be positively and considerably influenced indirectly through behavioral intention by performance expectancy, social influence, facilitating conditions, and previous education performance. Effort expectancy was found to have a non-significant detrimental effect on behavioral intention and indirectly on actual use.	H2a,H2b

Table 2.1 (Continue)

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Table 2.1 (Continue)

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Social Influence	Venkatesh, Morris, Davis & Davis /2003/ User Acceptance of Information Technology: Toward a Unified View	The UTAUT is a unified model that brings together alternative perspectives on consumer and innovation acceptance. Venkatesh et al. (2003) indicated that four key constructs, which are performance expectancy, effort expectancy, social influence and facilitating conditions, are direct determinants of behavioral intention to use and use behavior, and that these constructs are in turn controled by gender, age, experience, and voluntariness of use.	H3a,H3b
	Im, Hong & Kang /2011/ An international comparison of technology adoption	Im, Hong, and Kang (2011) investigated how culture influences the relationships between the dimensions in the UTAUT model. They used data from Korea and the United States. The results suggest that the UTAUT model works effectively with both data. When Korea and the United States are compared, the effects of effort expectancy on behavioral intention and the influence of behavioral intention on use behavior are stronger in the United States.	

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Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Learner Interaction	Kuo et al./2013/ A predictive study of student satisfaction in online education programs	The goal of this study was to see how much interaction and other factors affect student satisfaction in online learning environments. The contribution of predictor variables to student satisfaction was determined using regression analysis. The impact of background variables on predictors was investigated. The findings revealed that learner-instructor interaction, learner-content interaction, and Internet self-efficacy were all good predictors of student satisfaction, whereas learner-learner interactions and self-regulated learning did not.	H4a,H4b,H4c

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Learner Interaction	Hebebci, Bertiz, and Alan/2020/ Investigation of Views of Students and Teachers on Distance Education Practices during the Coronavirus (COVID-19) Pandemic	The purpose of this research is to find out what teachers and students think of the usage of online education applications during the COVID-19 pandemic. The study's population consists of 16 teachers and 20 students. It was determined that students and teachers have both positive and negative attitudes about online education activities. Positive thoughts typically convey the fact that education may be carried out in a planned and organized manner even under extreme circumstances. Issues such as limited engagement, infrastructure issues, and a lack of equipment are among the most notable unfavorable perceptions of online education activities.	H4a,H4b,H4c

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Learner Interaction	Baber/2020/ Determinants of Students' Perceived Learning Outcome and Satisfaction in Online Learning during the Pandemic of COVID19	The purpose of this study is to investigate the factors that influence students' perceived learning outcomes and their impact on student satisfaction. To conduct a cross-country study, data was obtained from undergraduate students in both South Korea and India. The study discovered that elements such as classroom interaction, student motivation, course structure, instructor knowledge, and facilitation have a favorable influence on students' perceived learning outcome and student satisfaction. There is no substantial difference between the two countries in terms of students' perceived learning outcomes and student satisfaction.	H4a,H4b,H4c

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Learner Interaction	Moore/1989/ Three types of interaction	This study proposed a model that separated interaction into three category which were learner-learner interaction, learner-instructor interaction, and learner-content interaction. Learner-learner interaction is mainly the communication between students who could exchange knowledge, information or ideas in term of course content. Learner-instructor interaction is solely the communication between teachers and students. Learner-content interaction is a process when students elaborate, learn and reflect on the content of the course.	H4a,H4b,H4c

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Learner Interaction	Bisht, Jasola, and Bisht/2020/ Acceptability and challenges of online higher education in the era of COVID-19: a study of students' perspective	The goal of this study was to firstly determine the acceptability of online examination and learning among students by analyzing various factors such as difficulty, mental pressure, study pattern, and then to determine the role of gender in adopting online education. The two main findings were that online examinations were accepted with ease and low pressure in comparison to regular examinations, and that gender played a significant role in adopting online education, with female students being more adoptable with online education in terms of assignments, study patterns, and comfort. This study also focused on the difficulties of online education, such as Internet connectivity, class interactions.	H4a,H4b,H4c

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Learner Interaction	Alqurashi/2018/ Predicting student satisfaction and perceived learning within online learning environments	The purpose of this study was to investigate how learner–content interaction, learner–instructor interaction, and learner–learner interaction can predict student satisfaction and perceived learning. The overall model with all four predictor variables was significantly predictive of satisfaction and perceived learning, according to the regression results.	H4a,H4b,H4c
Facilitating Condition	Venkatesh, Morris, Davis & Davis/2003/ User Acceptance of Information Technology: Toward a Unified View	The UTAUT is a unified model that brings together alternative perspectives on consumer and innovation acceptance. Venkatesh et al. (2003) indicated that four key constructs, which are performance expectancy, effort expectancy, social influence and facilitating conditions, are direct determinants of behavioral intention to use and use behavior, and that these constructs are in turn controled by gender, age, experience, and voluntariness of use.	H5a,H5b,H5c

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
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Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Facilitating Condition	Sun and Chen/2016/ Online Education and Its Effective Practice: A Research Review	The goal of this study was to provide practical recommendations for people seeking to design online courses so that they may make informed decisions during the implementation process. Based on their findings, the authors concluded that effective online instruction is dependent on well-designed course content, motivated interaction between the instructor and learners, well-prepared and fully-supported instructors, a sense of online learning community, and rapid technological advancement.	H5a,H5b,H5c

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Facilitating Condition	Zhou, Li, Wu & Zhou/2020/ "School's Out, But Class's On", The Largest Online Education in the World Today: Taking China's Practical Exploration During The COVID-19 Epidemic Prevention and Control as an Example	This study examined the history of large-scale online education, clarified the foundation of large-scale online education, and revealed the influence of large-scale online education activities on society and education.	H5a,H5b,H5c
	Nambiar/2020/ The impact of online learning during COVID-19: students' and teachers' perspective	The goal of this study was to conduct an online survey of teachers' and students' perceptions and experiences with online classrooms. The findings indicate that the following factors are important for teacher and student satisfaction with online classes: quality and timely interaction between student and professor, availability of technical support, structured online class modules, and modifications to accommodate the conduct of practical classes.	

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Facilitating Condition	Hebebci, Bertiz, and Alan/2020/ Investigation of Views of Students and Teachers on Distance Education Practices during the Coronavirus (COVID-19) Pandemic	The purpose of this research is to find out what teachers and students think of the usage of online education applications during the COVID-19 pandemic. The study's population consists of 16 teachers and 20 students. It was determined that students and teachers have both positive and negative attitudes about online education activities. Positive thoughts typically convey the fact that education may be carried out in a planned and organized manner even under extreme circumstances. Issues such as limited engagement, infrastructure issues, and a lack of equipment are among the most notable unfavorable perceptions of online education activities.	H5a,H5b,H5c

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Facilitating Condition	Faize and Nawaz/2020/ Evaluation and Improvement of students' satisfaction in Online learning during COVID-19	The goal of this study was to use a collaborative method to help university students in Islamabad (Pakistan) learn online. During COVID-19, the institution began offering online courses for the first time, having no prior experience with this type of learning. The first part involved identifying the issues that students had with online learning and soliciting their suggestions for solutions. The next stage was to engage with a group of instructors to change existing instructional methods during online education based on the students' feedback. They evaluated students' acceptance of online learning by measuring their satisfaction levels before and after the modification. Students were more satisfied with online learning after the modifications, according to the post-modification data.	H5a,H5b,H5c

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Behavioral Intention to Use	Venkatesh, Morris, Davis & Davis/2003/ User Acceptance of Information Technology: Toward a Unified View	The UTAUT is a unified model that brings together alternative perspectives on consumer and innovation acceptance. Venkatesh et al. (2003) indicated that four key constructs, which are performance expectancy, effort expectancy, social influence and facilitating conditions, are direct determinants of behavioral intention to use and use behavior, and that these constructs are in turn controled by gender, age, experience, and voluntariness of use.	H6a,H6b
	Im, Hong & Kang/2011/ An international comparison of technology adoption	Im, Hong, and Kang (2011) investigated how culture influences the relationships between the dimensions in the UTAUT model. They used data from Korea and the United States. The results suggest that the UTAUT model works effectively with both data. When Korea and the United States are compared, the effects of effort expectancy on behavioral intention and the influence of behavioral intention on use behavior are stronger in the United States.	

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Behavioral Intention to Use	San Martín & Herrero/2012/ Influence of the user's psychological factors on the online purchase intention in rural tourism: Integrating innovativeness to the UTAUT framework	The purpose of this study was to investigate the process of new information technology adoption by users of rural tourism services. This study constructed a theoretical model based on the UTAUT model that contained five factors of online purchasing intention, including performance expectancy, effort expectancy, social influence, facilitating conditions, and innovativeness. The findings revealed that the levels of performance and effort required in relation to the transaction, as well as the level of innovativeness of users, have a favorable influence on online purchase intention. In addition, the association between performance expectancy and online purchase intention was moderated by innovativeness.	H6a,H6b

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Behavioral Intention to Use	Jung & Lee/2015/ YouTube acceptance by university educators and students: a cross-cultural perspective	Using the UTAUT model, this study aimed to predict and assess factors impacting YouTube acceptability among university students and instructors in two very different cultures, Japan and the US. To investigate the impact of UTAUT-related factors on YouTube acceptance in these two nations, 569 students and 56 educators from Japanese and American colleges were surveyed. The results revealed that the UTAUT's four predictors can explain YouTube acceptance to a high degree; however, the influence of each predictor on YouTube acceptance differs significantly depending on the cultural setting and the role of the teachers and learners.	H6a,H6b

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Behavioral Intention to Use	Kornpitack & Sawmong /2020/ Empirical Investigation of Students' Actual Use Towards Learning English Online with Thailand's Virtual School Online Platform: Extended UTAUT Framework	This study empirically examined the model to determine the characteristics that influence Thai high school students' utilization of the Virtual School Online Platform for English learning. The study investigated the behavioral intention and actual usage of an online learning platform from the perspective of high school students, using the UTAUT model in addition to the previous education success construct. The findings demonstrated that performance expectancy, social influence, facilitating conditions, and previous education success all had a positive and significant influence on behavioral intention. The behavioral intention to use was found to have a favorable and significant influence on actual use. Actual use was discovered to be positively and considerably influenced indirectly through behavioral intention by performance expectancy, social influence, facilitating conditions, and previous education performance. Effort expectancy was found to have a non-significant detrimental effect on behavioral intention and indirectly on actual use.	H6a,H6b

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Behavioral Intention to Use	Al-Rahmi, Shamsuddin & Alismaiel /2020/ Unified theory of acceptance and use of technology (UTAUT) Theory: The Factors Affecting Students' Academic Performance in Higher Education	The purpose of this article was to examine the use of social media in higher education and its impact on student lives. Aside from entertainment and academic reasons, social media has influenced numerous educational methods and processes. In this research, the UTAUT model was employed to authenticate the application to a new context for academic performance. This study has emphasized the usage of social media in higher education, as well as highlighting the addition of elements. The findings indicate that each independent variable has a direct effect on behavioral intention to use and actual social media use through the use of social networks for learning purposes.	H6a,H6b

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Actual Usage	Aldholay, Isaac & Abdullah/2018/ An extension of Delone and McLean IS success modelwith self-efficacy Online learning usage in Yemen	The purpose of this research is to expand the Delone and McLean information system success model by include a self-efficacy construct as a predictor of user satisfaction and actual usage to predict student performance. The study discovered three major findings: overall quality (system, information, and service quality) and self-efficacy have a positive impact on user satisfaction and actual usage; actual usage significantly predicts user satisfaction; and user satisfaction and actual usage both have a positive impact on student performance.	H7

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Actual Usage	Hou /2012/ Examining the effect of user satisfaction on system usage and individual performance with business intelligence systems: An empirical study of Taiwan's electronics industry	The purpose of this research is to empirically evaluate a paradigm for detecting links between end-user computing satisfaction, system utilization, and individual performance. Using the structural equation modeling technique, data from 330 end users of BI systems in the Taiwanese electronics sector were utilized to test the linkages provided in the framework. The findings lend considerable credence to our concept. Our findings suggest that greater levels of EUCS can lead to increased BI system utilization and better individual performance, and that higher levels of BI system usage will lead to better individual performance. Furthermore, the findings of this study, which are congruent with DeLone and McLean's IS success model, demonstrate that there is a substantial positive association between EUCS and system utilization.	H7

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Actual Usage	Isaac, Abdullah, Ramayah, & Mutahar /2017/ Internet usage, user satisfaction, task-technology fit, and performance impact among public sector employees in Yemen	The purpose of this study is to combine the DeLone and McLean IS success model with task-technology fit (TTF) to understand the influence of Yemeni government employees' performance. The findings demonstrated that the suggested integrated model well matches the data. The multivariate analysis results show four major findings. For starters, real usage has a significant beneficial influence on user satisfaction, TTF, and performance impact. Second, user satisfaction has a significant impact on performance impact. Third, TTF has a significant influence on customer satisfaction and performance. Fourth, both user satisfaction and TTF operate as a bridge between real usage and performance impact.	H7

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Student Satisfaction	Alqurashi/2018/ Predicting student satisfaction and perceived learning within online learning environments	The purpose of this study was to investigate how learner–content interaction, learner–instructor interaction, and learner–learner interaction can predict student satisfaction and perceived learning. The overall model with all four predictor variables was significantly predictive of satisfaction and perceived learning, according to the regression results.	H1a,H1b,H1c, H2a,H2b, H3a,H3b, H4a,H4b,H4c
	Bolliger and Martindale/2004/ Key Factors for Determining Student Satisfaction in Online Courses	The goal of this research was to find out what characteristics affect student satisfaction with online courses. According to the findings, student satisfaction with online courses is determined by three constructs: instructor variables, technological difficulties, and interactivity.	H5a,H5b,H5c

Table 2.1 (Continue)

Theory/Content/ Variable	Author/year/article titles	Summary	Hypotheses
Student Satisfaction	Yilmaz/2017/ Exploring the role of e-learning readiness on student satisfaction and motivation in flipped classroom	The goal of this study was to see how students' e-learning preparation affected their happiness and motivation in a flip classroom model of learning. Students' preparation for e-learning was found to be a major predictor of satisfaction and motivation in the flip classroom type of instruction.	H1a,H1b,H1c, H2a,H2b, H3a,H3b, H4a,H4b,H4c H5a,H5b,H5c

CHAPTER 3

RESEARCH METHODOLOGY

This research title "developing an online education model for the next new normal: an empirical study of the learning satisfaction of Thai high school students" the researcher designed the research methodology that comprises of details as follows.

3.1 Research Design

The objective of this research is to study performance expectancy, effort expectancy, social influence, learner interaction, facilitating conditions, behavioral intention to use, actual use, and student satisfaction; then, to analyse the components of performance expectancy, effort expectancy, social influence, learner interaction, facilitating conditions, behavioral intention to use, actual use, and student satisfaction, and to analyse direct effects and indirect effects of the variables. By the end, this research developed an online education model for the next new normal in Thailand and find the way to improve online education to fulfil student satisfaction. To achieve these objectives, mixed method is needed. Qualitative method was conducted first, and then followed by quantitative methods. In addition, rich and in-depth answers from qualitative methods need to be conducted first in order to get an insight information from users in order to confirm all expected factors and the conceptual framework which derived by the results from a study in the past in higher education. With its naturalistic character, it mostly studies people and things based on their natural circumstance. This kind of research also seeks to gather inside data from the respondents. Furthermore, most of the analysis will be done with words. It will give a comprehensive perspective of the context that the research wants to achieve (Punch, 2014). Moreover, it is because sometimes

there might an interest aspect or unexpected answer which can help developing this research to be studied thoroughly. In addition, semi-structured interview and document analysis was used to gain in-depth and overall information as often as possible for answering the research questions and to review each influential factor first before doing quantitative research.

After gathering information from qualitative methods, a survey was constructed based on the interview result and from past research papers. A quantitative method was used to generalize the information and confirm the findings from past research in various levels of education (mostly higher education) in Thailand and other countries. In addition, the survey was used to measure factors predicting student satisfaction on online education among Thai students. The quality of the questionnaire used validity and reliability. Reliability was adopted the Cronbach's Alpha Coefficient (Cronbach, 1951) and the validity was adopted IOC technique. The statistic to analyze descriptive data used descriptive statistic such as mean average, standard deviation, percentage, skewness, and kurtosis. The Structural Equation Modeling (SEM) was used to analyze data from collected questionnaires.

3.2 Research Variables

The researcher gathered data, checked from past literatures, principles, theories, academic journal articles, and related research papers, and then summarized variables for this analysis in the following manner.

3.2.1. Exogenous latent variables: 5 variables

3.2.1.1 Performance Expectancy consists of 3 observed variables which are

3.2.1.1.1 Intrinsic Motivation

3.2.1.1.2 Extrinsic Motivation

3.2.1.1.3 Perceived Usefulness

3.2.1.2 Effort Expectancy consists of 2 observed variables which are

3.2.1.2.1 Course Design

3.2.1.2.2 Perceived Ease of Use

3.2.1.3 Social Influence consists of 2 observed variables which are

3.2.1.3.1 Subjective Norm

3.2.1.3.2 Social Factors

3.2.1.4 Learner Interaction consists of 3 observed variables which are

3.2.1.4.1 Learner-learner Interaction

3.2.1.4.2 Learner-content Interaction

3.2.1.4.3 Learner-instructor Interaction

3.2.1.5 Facilitating Conditions consists of 2 observed variables which are

3.2.1.5.1 Infrastructure

3.2.1.5.2 Internet Connectivity

3.2.2. Mediator/Intervening construct variable: 2 variables

3.2.2.1 Behavioral Intention to Use consists of 2 observed variables which are

3.2.2.1.1 Usage Frequency Prediction

3.2.2.1.2 Usage Planning

3.2.2.2 Actual Use consists of 2 observed variables which are

3.2.2.2.1 Usage Frequency

3.2.2.2.2 Usage Length

3.2.3. Endogenous Latent Variable: 1 variable

3.2.3.1 Student Satisfaction consists of 2 observed variables which are

3.2.3.1.1 Student Retention

3.2.3.1.2 Student Persistence

3.3 Population and Samples

3.3.1 Population and Samples

The population and sample in this study will use students in public high schools in Thailand**.** Cambridge dictionary defines a high school as a school for children aged 15 to 18, usually separated into classes nine through twelve or ten through twelve **(**Cambridge Dictionary, 2021**).** In Thai Education System **(**Ministry of Education, 2021**)**, the Basic Education Core Curriculum covers three educational levels which are primary education level, lower secondary education level, and upper secondary education level**.** Upper secondary education level **(**high school**)** consists of 3 levels

including Mattayom 4 to 6 (Grade 10 to 12). This level focuses on increasing specific knowledge and skills in accordance with individual learners' capacities, aptitudes, and interests in academic and technological application, skills for high-level thinking processes, ability to apply knowledge for further education and livelihood, and self-development and national progress in accordance with students' respective roles, as well as the ability to apply knowledge for further education and livelihood (Ministry of Education, 2021).

There are 1,878,153 students in high schools (as on May 20, 2021) (National Statistical Office, 2021) which can divide to 1,509,524 students in public schools and 368,629 students in private schools. For public schools which are the population in this study, Office of the Basic Education Commission categorised high schools into 62 areas of secondary educational service area office (Ministry of Education, 2021). Each area consists of schools from 1 to 2 provinces (the full list can be found in appendix I).

-Samples

The sample in this study will be used students from public high schools in Thailand. The sample size will be about 270 students by using the calculating sample size from SEM criteria determined from using 15 times of 18 observation variables
(Schumacker & Lomax, 2016; Hair, Black, Babin & Anderson, 2010).

3.3.2 Sampling technique and sample size in quantitative research

Sampling is argued to be the important key to statistics and the generalizability of the findings (Lee & Lings, 2008). The sampling technique that will be used is a combination of multistage sampling and simple random sampling technique. This research will firstly divide the population into five actual regions in Thailand. Then in each region, we will focus on the actual area which Office of the Basic Education Commission categorises high schools. Then, we will use a sample to focus on high schools which already existed in each area. The sampling technique will be as following.

1. Use multistage sampling technique to divide area into 5 regions to cover all part of the country.
2. Use simple random sampling technique to pick 1 to 3 areas out of 5 regions. For the region of Northeastern and Central Thailand which has more areas included than

others, there were 3 areas selected to represent the whole region. As there are approximately 7 areas in Northern, Eastern, and Southern region, whereas there are around 21 areas in Northeastern and Central Thailand. Thus, 1 selected area represents 7 areas.

3. Use simple random sampling technique to pick a large school from each area already picked in the second stage to reduce the limitation from unequal or inconsistent standard in online learning system between large schools and small schools**.** The criteria of a large school is that they have to have more than 2,500 students in theirs school. Thus, each selected school is representable to each other.
4. Use systematic random sampling technique to pick 30 students from each selected school**.** Each school has around 1,400 to 1,500 students. Thus, I reordered student list in numerical order regarding their student ID, the first students selected was 30th, for every 30 students, 1 student was selected, so the last selected students was 900th to get 30 students to represent the whole school, as each school is in the same criteria which is a large school.

The appropriate sample size for this study should be 270 samples determined from using 15 times of 18 observation variables (Schumacker & Lomax. 2016; Hair, Black, Babin & Anderson, 2010).

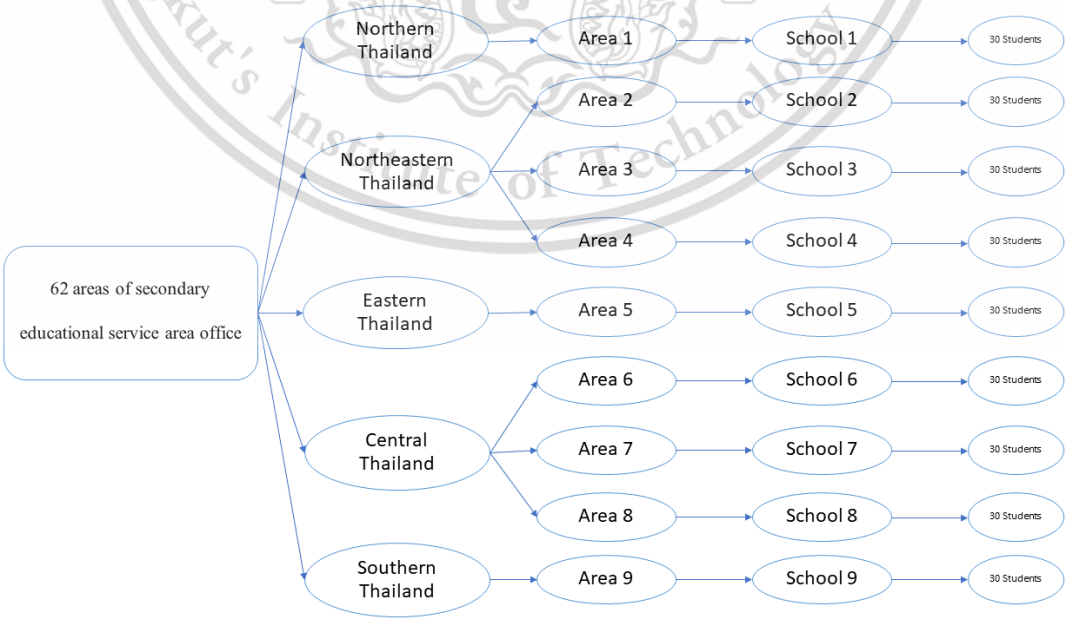


Figure 3.1 Sampling Design Technique

3.4 Research Instrument

The researcher will use both interview and online questionnaire as a tool to collect data on the determinants of behavioral intention to use and actual use that subsequently impact student satisfaction according to the hypothesis set to be proven by statistical methods to find the significance of the relationship between variables.

3.4.1 Developing Measurement tools

1. Collect data from concepts, theories, documentation, and guidelines as well as research related to the conceptual framework.

2. Study relationships of endogenous variables, exogenous variables, and observed variables and then prepare a test questionnaire and interview questions

3. The test questionnaire and interview questions was examined by five Thai education industry experts to determine the Index of Item- Objective Congruence (IOC) between test questionnaire questions and research goals and research problems. Each question receives three scores: +1; certain that the research objectives are congruent to the question, 0; uncertain, 0; and -1; certain that the research objectives are incongruent. The IOC is the average score, which must be between 0.5 and 1.0. If the IOC score is less than 0.5, the test questions must be updated to ensure that each question addresses the testing objectives.

4. Review the test questionnaire in connection with the experts' recommendations.

5. Test the questionnaire that has been revised in relation to the expert's advice with samples before the actual use to check each question whether it is clear, cover the same issue, and ask respondents in the same direction or not.

6. Test the questionnaire results by calculating the coefficient of Cronbach's alpha or the coefficient of reliability. The Cronbach's alpha must be greater than or equal to accepted criterion of 0.70 (Cronbach, 1951).

7. Improve the test questionnaire in order to obtain the original questionnaire that will be used for data collection in the next step.

3.4.2 Questionnaire structure

Structure of questionnaires in this study will be consisted of items 69 which will be divided in to 10 parts as following

Table 3.1 The structure of questionnaires

Part	Variable	Number of items	Item	Scale
1	Personal Information	**(15)**	**1-15**	**Nominal**
2	Performance Expectancy (PE)	**(9)**	**16-24**	**Interval**
	2.1 Intrinsic Motivation (IM)	**3**	**16-18**	
	2.2 Extrinsic Motivation (EM)	**3**	**19-21**	
	2.3 Perceived Usefulness (PU)	**3**	**22-24**	
3	Effort Expectancy (EX)	**(7)**	**25-31**	**Interval**
	3.1 Perceived Ease of Use (PEU)	**3**	**25-27**	
	3.2 Course Design (CD)	**4**	**28-31**	
4	Social Influence (SI)	**(6)**	**32-37**	**Interval**
	4.1 Subjective Norm (SN)	**3**	**32-34**	
	4.2 Social Factors (SF)	**3**	**35-37**	
5	Learner Interaction (LI)	**(9)**	**38-46**	**Interval**
	5.1 Learner-learner Interaction (LLI)	**3**	**38-40**	
	5.2 Learner-content Interaction (LCI)	**3**	**41-43**	
	5.3 Learner-instructor Interaction (LII)	**3**	**44-46**	
6	Facilitating Conditions (FC)	**(6)**	**47-52**	**Interval**
	6.1 Infrastructure (Inf)	**3**	**47-49**	
	6.2 Internet Connectivity (IC)	**3**	**50-52**	

Table 3.1 (Continue)

Part	Variable	Number of items	Item	Scale
7	Behavioral Intention to Use (BIU)	**(5)**	**53-57**	**Interval**
	7.1 Usage Frequency Prediction (UFP)	**2**	**53-54**	
	7.2 Usage Planning (UP)	**3**	**55-57**	
8	Actual use (AU)	**(6)**	**58-63**	**Interval**
	8.1 Usage Frequency (UF)	**2**	**58-59**	
	8.2 Usage Length (UL)	**4**	**60-63**	
9	Student Satisfaction (SS)	**(5)**	**64-68**	**Interval**
	9.1 Student Retention (SR)	**2**	**64-65**	
	9.2 Student Persistence (SP)	**3**	**66-68**	
10	Open-ended Question 10.1 Further Recommendation on the current online learning system	**1**	**69**	**Open-ended**
	Total 10 parts consisted of 69 items	**69**		

The questionnaire was constructed through a combination of an analysis of various literature related to each latent variable and each observation variable (e.g., Jongkolthanalarp et al., 2021; Krouska et al., 2021; Lakhal et al., 2013; Mendoza et al., 2017; Teo et al., 2019; Venkatesh et al., 2003; Williams and Williams, 2011; Alqurashi, 2018; Asmuni et al., 2012; Baber, 2020; Bisht et al., 2020; Kuo et al., 2013; Bisht et al., 2020; Chardnarumarn et al., 2021; Darawong and Widayati, 2021; Dhawan, 2020; Faize and Nawaz, 2020; Hebebci et al., 2020; Kuo et al., 2013; Nambiar, 2020; Nonthamand et al., 2021; Oranop, 2016; Rasmitadila et al., 2020; Aldholay et al., 2018; Hou, 2012; Isaac et al., 2017; Kim et al., 2007; Parahoo et al., 2015; Yilmaz, 2017; Yukselturk and Yildirim, 2008), as well as the author's creation in collaboration with the help of the IOC experts mentioned in the following section in reviewing and evaluating each item.

3.4.3 Quality of research instruments

The quality of questionnaires will be examined by bringing a sample questionnaire to five experts in Thai education industry experts to examine the questions in the questionnaire for completing and covering content, as well as sufficient comprehension on the subject being measured, including language that respondents can read and understand. The questionnaires were then put to the test for 1) material validity and 2) reliability. The five experts will be as follows.

1. Assoc.Prof. Dr. Supamas Angsuchoti (Lecturer of Sukhothai Thamathirat University)
2. Pol.Col. Dr. Khwanchat Wongkajonpaiboon
   (Police Colonel of Technology Crime Suppression Division)
3. Asst.Prof. Dr. Singha Chaveesuk (Lecturer of KMITL Business School)
4. Asst.Prof. Dr. Nuttawut Rojniruttikul (Lecturer of KMITL Business School)
5. Dr. Nisakorn Chadchavalpanich (Director of Kornpitacksuksa School)

1) Content validity

Each question in the questionnaire was rated by five experts. For each query, the score value is then averaged to calculate the Index of Item-Objective Congruence (IOC). It is preferable if each query has an IOC of 0.6 or higher.

Score+1 = if the expert is certain that the item accurately calculates the attribute

Score 0 = if the expert is not certain that the item accurately calculates the attribute

Score -1 = if the expert is certain that the object does not calculate the attribute

Content validity formula

$$IOC = \frac{\sum R}{N}$$

R	=	Congruent score
N	=	numbers of experts
1	=	Congruent
0	=	Questionable
-1	=	Incongruent

The range between the IOC score is -1 and +1 and the closer the 1, the better.

How to determine content validity.

The item with IOC score between 0.6-1.00 The item calculates the attribute

The item with IOC score	between 0.5-0.6	The item must be reviewed.
The item with IOC score	below 0.50	The item must be eliminated.

2) Measurement Reliability

Coefficient of reliability measures the accuracy of an instrument's entire set of objects. Cronbach's Alpha Coefficient is used to calculate internal consistency (Cronbach, 1951). The scale's individual items or observe variables should all measure the same construct and therefore be strongly correlated. Cronbach's Alpha (Cronbach, 1951), a measure of internal accuracy, can be used with a rating scale and is measured as follows.

$$\alpha = \frac{K}{K-1}\left[1 - \frac{\sum S_i^2}{S_t^2}\right]$$

α = Coefficient of reliability

k = the numbers of items or indicators in the instrument

S_i^2 = the variance of each item

S_t^2 = the variance of total score

Interpretation: High reliability is described as reliability coefficients or Cronbach's Alpha Coefficients of 0.70 or higher calculated from at least 30 sets of a standard version of the experiment questionnaire (Cronbach, 1951; Hair et al., 2010). The validity and reliability of this research will be illustrated more in chapter 4, section 4.2.3.

3.5 Data Collection

3.5.1 Qualitative Data

The collection of qualitative data is explained in the following.

The data was collected from the resources such as article, journal, book, report, office of national statistics, all database and etc, and overall knowledge as much as possible for addressing the thesis questions and contributing to conceptual research framework in order to work on quantitative method, this dissertation used semi-structured interviews and paper analysis. Some approaches may have drawbacks that prevent them from addressing a specific feature of the study. Interviews, on the other hand, are the primary approach used in this study. Punch (2014) suggests

that using different data collection techniques, which can refer to triangulation, can help to improve the relevance and minimize bias of this dissertation.

Sample Size of qualitative Data

Purposive sampling was used as the foundation for the sampling plan in this dissertation. The aim is to choose an interviewee who is knowledgeable about the study issues (Lee and Lings, 2008). The interviewees was experts from Thai education industry. The experts will be as following positions.

Expert 1: Advisor to the Deputy Minister of Education

Expert 2: Former Secretary General of Office of the Basic Education Commission

Expert 3: Director of an extra-large public school in Bangkok

Expert 4: Director of an extra-large public school in Pathumthani

Expert 5: Manager of a private school in Bangkok

Interviews are a good way to learn about people's perspectives on a given situation (Punch, 2014). As I previously said, semi-structured interviews became the primary method of data collection in qualitative part. The interview questions would mostly be open-ended, allowing interviewees to take the lead by sharing their opinions in their own unique way. Furthermore, according to Punch (2014), this method of interview can detect the respondents' positive or negative interactions during the interview.

Table 3.2 The semi-structured interview

Part	Answer
Part 1 Personal information of key informant such as gender age ant etc.	Answer
Part 2 Interview question about how to make a high school student satisfy with online education in Thailand	Answer
Part 3 How important of this factor on online education in Thailand in your opinion - Performance Expectancy (PE) -Social Influence (SI) -Learner Interaction (LI) -Facilitating Conditions (FC) -Behavioral Intention (BI) -Actual use (AU) -Student Satisfaction. (SS)	Answer

3.5.2 Quantitative Data

This study was collected the primary data as a quantitative data. The primary data will be collected by the five-point Likert scale questionnaire from the high school student who have experience on online learning during the first academic year of 2021 via google form. The google form link was sent to the representative teacher at each selected school. After that, they sent the link to students that had been selected in the sampling process according to 3.3.2.

3.5.3 Backward Translation for Qualitative Data and Quantitative Data

This research is conducted only in Thailand; thus, the Thai language will be used mainly in both qualitative and quantitative data collecting process. However, the data must be backward translated to English by native speaker to proof-reading in order to interpret and organise the data into international research. Lee and Lings (2008) recommended that using common attitudinal or behavioral factors in instrument will be better than using the unique concept that exist only in a particular culture. The research questionnaire was translated from Thai to English Language and

approved by the expert who was expertise in applied language area, being a lecturer in the university (see the expert's profile and certificate of translation in appendix G).

3.6 Statistical Data Analysis and Interpretation

This study used descriptive statistic and quantitative statistic to test the hypothesis as follow.

3.6.1 Basic descriptive statistical analysis

In this study descriptive statistics such as mean, frequency percentage, standard deviation including skewness, and kurtosis will be used to describe respondent information. All details are following.

-Mean

The statistical mean is the mean or average used to calculate the central tendency of the data in question. It is calculated by summing all of the data points in a population and dividing the total by the number of points. The resulting number is referred to as the mean or average.

Mean interpretation

Table 3.3 Interpretation of Mean Table from Likert-scale (Sözen & Güven, 2019)

Range of mean value	Interpretation
4.21 – 5.00	Strongly Agreed
3.41 – 4.20	Agreed
2.61 – 3.40	Moderately Agreed
1.81 – 2.60	Not Agreed
1.00 – 1.80	Strongly Disagreed

- Standard deviation interpretation

Interpretation of standard deviation in the case of 5-point rating scale (Panthai, 2002, pp. 174-175).

Table 3.4 Interpretation of Standard Deviation Table

Range of standard deviation	Interpretation
Value higher than 1.75	high variance
Value between 1.25-1.75	fairly high variance
Value less than 1.25	low variance

Skewness interpretation

Skewness is a measure of the asymmetry of a real-valued random variable's probability distribution about its mean in probability theory and statistics. The value of skewness might be positive, zero, negative, or undefined.

Table 3.5 Interpretation of Skewness Table

Skewness	Distribution shape of data	Interpretation
< 0	Left or negative distribution	The tail of the left side of the distribution is longer or fatter than the tail on the right side. The mean and median will be less than the mode.
0	Normal distribution	Data are symmetrically distributed.
>0	Right or positive distribution	The tail on the right side of the distribution is longer or fatter. The mean and median will be greater than the mode.

- **Kurtosis**

Kurtosis (from Greek: kyrtos or kurtos, meaning "curved, arching") is a measure of the "tailedness" of a real-valued random variable's probability distribution in probability theory and statistics.

Kurtosis interpretation

Table 3.6 Interpretation of Kurtosis Table

Skewness	Distribution shape of data	Interpretation
< 3 (or Kurtosis – 3 < 0)	Platykurtic	Data disperse out of the mean and distribution has thinner tails.
3 (or Kurtosis – 3 = 0)	Mesokurtic	Data exhibit a normal distribution.
> 3 (or Kurtosis-3 >0)	Leptokurtic	Data center around the mean and distribution has fatter tails.

3.6.2 Quantitative statistic to test the model or hypothesis

The purpose of this research is to create a model of high school student satisfaction with online education in Thailand. The quantitative statistic used to assess the model or hypothesis, such as Structural Equation Modeling (SEM), as well as the statistics relevant, will be presented below.

Chi-square

A chi- square ($\chi 2$) statistic is a measure of the difference between the observed and predicted frequencies of a set of events or variables. $\chi 2$ is determined by the amount of the discrepancy between the observed and real values, the degrees of freedom, and the sample size. $\chi 2$ can be used to determine whether two variables are connected or independent of one another, as well as to assess the goodness-of-fit between an actual and theoretical distribution of frequencies.

Correlation

Correlation is a statistical approach for determining and explaining the relationship between two variables. (This means that each individual must have at least two scores, one for each of the two factors.) A correlation informs us three things about the relationship between X and Y.

Correlation interpretation

PPMCC values of observed variables range from -1 to 1. The positive sign means that 2 observed variables have relationship in the same direction and vice versa.

Criteria for interpretation of correlation coefficient I (Hinkle, Wiersma & Jurs, 2003)

Table 3.7 Interpretation of Correlation Coefficient Table (Hinkle, Wiersma & Jurs, 2003)

Correlation Coefficient, r	Interpretation
$r \geq 0.9$	extremely high correlation
$0.7 \leq r < 0.9$	moderate high correlation
$0.5 \leq r < 0.7$	moderate correlation
$0.3 \leq r < 0.3$	moderate low correlation
$r < 0.3$	extremely low correlation

Structural Equation Modeling (SEM)

The researcher employs Structural Equation Modeling (SEM) in this study, which is a model that incorporates Path Analysis and Factor Analysis, two concepts of linear analysis statistics. SEM is a multivariate analysis approach that incorporates Factor Analysis and Multiple Regression. The advantages of this SEM methodology are that it can be used to analyze the relationships between different variables in the conceptual research framework model, both directly and indirectly, in a single time frame. AMOS, LISREL and MPLUS, among other statistical programs, are widely used in SEM examinations (Hair et al., 2010).

The researcher used LISREL 9.1 to conduct the subsequent goodness-of-fit (GOF) assessment and the confirmatory factor analysis (CFA). The 69-item questionnaire, which contained eight latent variables, 18 observed variables, and ten hypotheses, was analyzed using a structural equation model (SEM). The output of the SEM and ten hypotheses were analyzed using descriptive statistics.

Factor Analysis

Factor Analysis is a method used in research studies to investigate the relationship structure of observed variables. Instead of asking a single question that may not be straightforward or informative, the questionnaire should include several items that inquire about student satisfaction, resulting in the possibility of several observed variables. Many measurable variables are also present in practice, and these variables can be linked to one another.

Factor analysis techniques examine the structure of the association of measurable variables, group the associated observed variables into groups called factors, and treat the produced

factors as new variables. As a result, factor analysis is a grouping of multiple measurable variables, also known as a technique for reducing the number of variables.

Path Analysis

Path analysis is used in statistics to describe the directed dependencies between a group of variables. Models analogous to any kind of multiple regression analysis, factor analysis, canonical correlation analysis, discriminant analysis, and more general families of models in multivariate analysis of variance and covariance studies are included (MANOVA, ANOVA, ANCOVA). Path analysis, in addition to being conceived of as a type of multiple regression concentrating on causality, can be considered as a subset of structural equation modeling (SEM) - one in which only single indicators are used for each variable in the causal model. Path analysis, in other words, is SEM with a structural model but no measurement model. Path analysis is also known as causal modeling, study of covariance structures, and latent variable models.

Structural Equation Model Analysis

The steps of SEM analysis are as following.

1) Examine the multicollinearity: to pass this criterion, all observed variables must be independent and correlation between all pairs of observed variables must be less than 0.90 (Hair et al., 2010)

2) Assess measurement model validity: measurement model validity depends on 1) pass acceptable criteria of goodness of fit, 2) pass construct validity, and 3) pass reliability

The measurement of the goodness of model fit for SEM is determined by 1) Absolute Fit Indices that indicate how well the research model fits the empirical data e.g. p-value of Chi-squares ($\chi 2$), Relative Chi-square ($\chi 2/df$), Goodness of Fit Index (GFI), Standardized Root Mean Square Residual (SRMR), and Root Mean Square Error of Approximation (RMSEA), 2) Incremental Fit Indices that indicate how well the estimated research model fits relative to a baseline model that assumes all observed variables are uncorrelated e.g. Incremental Fit Index (IFI), Comparative Fit Index (CFI) and Normed Fit Index (NFI), and 3) Parsimony Fit Indices that indicate which model among competing models (relative to their complexity because more complex models are expected to fit the data better) exhibits the best fit e.g. Adjusted Goodness of Fit Index (AGFI). The details are explained in Table 3.8.

Construct validity refers to the accuracy of conclusions drawn from test scores and other metrics. It is concerned with whether a test measures the expected concept. In addition,

construct validity determines the extent to which a set of observed variables represents the latent variables that were constructed in relation to theories. It comprises of convergent validity and discriminant validity. The standardized factor loading (with t-value greater than |1.96| or p-value is greater 0.05) of each observed variable must be higher than 0.35 (Hair et al., 2010, p. 117) and this indicates the degree of strength of that observed variable in the measurement model.

Convergent validity measure how close of a set of observed variables altogether to determine their latent variables. The Average Variance Extracted (AVE) of each latent variable must be equal to or greater than 0.5 (Hair et al., 2010).

Discriminant validity tests whether two dissimilar constructs measure the same thing or not and the relationship between measures from different constructs should be very low. Pearson's correlation coefficients between pairs of latent variables must be less than the square root of the extracted average variance (AVE) (Hair et al., 2010).

$$\text{AVE} = \frac{\sum \text{Standardized factor loading}^2}{[\sum \text{Standardized factor loading}^2 + \sum \text{Variance(error)}]}$$

$$\text{Communality or Common Variance} = \sum \text{Standardized factor loading}^2$$

Reliability is measure by Composite Reliability (C.R. > 0.7, Hair et al., 2010) that indicates the shared variance among the set of observed variables of a latent variable (internal consistency reliability).

$$\text{C.R.} = \frac{(\sum \text{Standardized factor loading})^2}{[(\sum \text{Standardized loading})^2 + \sum \text{Variance(error)}]}$$

Variance(error) = variance of the error term for the ith indicator

3.6.2.3 Structural Equation Model Assessment

SEM presents relationship between all pairs of latent variables in the form of a linear regression. Therefore, there are three issues to be assesses.

1) The direction of each regression coefficient must conform to theories

2) Each regression coefficient must be statistically significant

3) Coefficient of Determination (R^2) must be higher than 0.50 (Hair et al., 2010).

Table 3.8 SEM Statistical Criteria for Research Model

Statistics	Symbol	Objectives	Accepted level
Chi-square	χ^2	Test null hypothesis that the conceptual research framework model is overall fit empirical data	Ns. ($p > 0.05$)
Relative Chi-square	χ^2/df or CMIN/df	Test the consistency between the conceptual research framework model and empirical data	< 2.00
Goodness of Fit Index	GFI	To measure the goodness of fit of SEM as a whole	> 0.90
Standardized Root Mean Square Residual	Standardized RMR (SRMS)	To evaluate the covariance that are not explained by the model (residuals) by calculating the square root of the discrepancy between the elements of sample covariance matrix and the covariance matrix predicted by the model. SRMR values range between 0-1.	< 0.05

Table 3.8 (Continue)

Statistics	Symbol	Objectives	Accepted level
Root Mean Square Error of Approximation	RMSEA	To evaluate how well the model would fit the population covariance matrix if it were available. RMSEA values range between 0-1.	< 0.05
Incremental Fit Index	IFI	Test how well the estimated model fits the baseline (null model) that assumes all observed variables uncorrelated regardless of sample size.	> 0.90
Comparative Fit Index	CFI	To analyze the model fit by examining the discrepancy between the empirical data and the hypothesized model. Values range between 0-1.00.	> 0.90
Normed Fit Index	NFI	To analyze the discrepancy between the chi- squared value of hypothesized model and the chi- squared value of the null mode.	≥ 0.90
Adjusted Goodness of Fit Index	AGFI	To evaluate the overall goodness of fit of SEM by considering differing degrees of model complexity by penalizing more complex models and favoring those with a minimum number of free paths. AGFI values range between 0-1.	≥ 0.90

Source: Hair et al. (2010), Schumacker & Lomax (2016), Wanichbancha (2013), Ullman (2006)

3.7 Summary

The researcher used both qualitative and quantitative approach to cover the research question as often as possible by using interview to confirm the conceptual framework with the school director and then employing the questionnaire to collect data from a sample of students from high schools in Thailand. The structural equation model was used to analyse the results. In addition, a documentary review approach by documentary review was conducted to confirm problems and obstacles.

CHAPTER 4

ANALYSIS AND FINDINGS

At this stage of the research study of developing an online education model for the next new normal: an empirical study of the learning satisfaction of Thai high school students, the objectives of this research are 1) to study performance expectancy, effort expectancy, social influence, learner interaction, facilitating conditions, behavioral intention to use, actual use, and student satisfaction 2) to analyse the components of performance expectancy, effort expectancy, social influence, learner interaction, facilitating conditions, behavioral intention to use, actual use, and student satisfaction 3) to analyse direct effects of the variables mentioned prior 4) to develop an online education model for the next new normal

The analysis and findings are divided into two part and orderly presented in the following topics.

Part 1 Research finding of the Qualitative research

4.1 Qualitative Data Analysis

Part 2 Research finding of the Quantitative research

4.2 The research finding of the performance expectancy, effort expectancy, social influence, learner interaction, facilitating conditions, behavioral intention to use, actual use, and student satisfaction

4.3 The result of the analysis of the components of performance expectancy, effort expectancy, social influence, learner interaction, facilitating conditions, behavioral intention to use, actual use, and student satisfaction

4.4 The research findings of the direct, indirect, and total effect analyses

4.5 The research findings of the study hypotheses testing

4.6 The research finding of an online education model for the next new normal

Part 1 Research finding of the Qualitative research

4.1 Qualitative Data Analysis

As mentioned in chapter 3, the sample plan in this dissertation was built on the foundation of purposive. The goal is to select an interviewee who is well-versed in the study's topics (Lee and Lings, 2008). Experts from Thailand's education business were interviewed including 2 executives from the Ministry of Education of Thailand, 2 school directors from extra-large public schools, and a manager from a private school in Bangkok. The experts are as follows.

Expert 1: Advisor to the Deputy Minister of Education

Expert 2: Former Secretary General of Office of the Basic Education Commission

Expert 3: Director of an extra-large public school in Bangkok

Expert 4: Director of an extra-large public school in Pathumthani

Expert 5: Manager of a private school in Bangkok

The majority of the interview questions were open-ended, enabling respondents to take the lead by expressing themselves in their own unique way. Furthermore, according to Punch (2014), this interview approach can detect positive or negative interactions amongst respondents throughout the interview. The first question started with personal information followed by questions about how to make a high school student satisfy with online education in Thailand and finished with how important of concerned factors on online education in Thailand in their opinion.

Firstly, all experts agreed that the expected factors can influence student satisfaction; however, there were differences of the degree of importance lie between each factor. This will be illustrated in the next section an analysis from the interview.

Performance Expectancy (PE)

All of the experts mentioned that students usually study for their grade of GPA, and sometimes for their future goal like an admission to a good university. However, there are some interesting aspects from experts like Expert 3. He mentioned about the input factors from different students from different schools.

“The input factors of the students from each school are not the same. Thus, it affects the level of the expectation of the performance from students and their parents. Students and parents from schools which have high academic reputation will definitely expect their school to offer them academic performance. Also, they will expect that if they studied in those schools, they would be able to study in the university that they want. However, students should also have their need that which university they want to study for the bachelor’s degree. It will drive them to be interested in studying hard. This will affect other processes as well, as their intention commitment is clear.”

He was very certain about this because he said he has managed 7 to 8 schools, and he saw the readiness of students differently. In addition, he argued that parent education level can be an important factor as well, as he said.

“Parents' education also has an effect. For example, if a parent has an education that is at a not very high level, such as elementary school, when their child comes to high school. Parents will not be able to advise their children. As a result, this expectation was not planned from the beginning.”

Expert 2 agreed on this point as different students will have different motivators; students’ life expectancy is different from each other. In addition, he added that most students will be motivated more by their university admission goal; whereas GPA was like a compulsory for them in schools to study and not to fail the exam. However, in some cases, GPA was more like a pathway to enter the university admission process as most universities set students’ GPA as a minimum requirement for the admission. Expert 5 also agreed with the point that students need to have motivation and inspiration in order to make them study effectively in online learning. In addition, he supported that students who had parents’ expectations will have more motivation to study effectively online than students who did not.

Another interesting aspect was from Expert 1. He mentioned about perceived usefulness that some of the benefits that will be taken from online learning are immediate benefits such as doing homework or doing research. Moreover, he explained how intrinsic motivation was important, but in terms of online education, it was not as important as extrinsic motivation and perceived usefulness. As he said.

"Self-improvement is the inherent factor. Everyone wishes to be well-informed. It does not have to be solely about online learning. We also aim to establish ourselves as significant. However, I don't believe it is primarily about online learning. It is more concerned with broad or everyday learning."

He stated that intrinsic motivation is more relevant when discussing general learning, but it was not limited to only online education.

Effort Expectancy (EE)

There were two separated perspectives about effort expectancy. Firstly, the experts talked about users' (students') ability to use the technology. They claimed that current students are from Generation Z, which, according to Francis and Hoefel (2018), is defined as everyone born between 1995 and 2010. They are considered true digital natives since they grew up with the internet, social media, and mobile gadgets at their fingertips. As a result, there will be less issues when it comes to using online learning.

However, Expert 5 pointed out that parents often claimed that their children loved computers; however, it did not mean they will be into online learning as well. When it comes to learning, the course design will be a focus. According to another expert, the actual issue with online learning is the way it is constructed, including the online learning platform, course design, and teaching method. Expert 3 demonstrated that there was a significant generation gap between most teachers and students. If teachers continued to use traditional teaching methods or one-way communication, they would never be able to work effectively with students in online learning. As a result, teachers must adapt their teaching method to meet the needs of their students. Expert 1 also supported that teachers had to change their way of teaching as he recommended.

“Teaching and learning must also be designed to be straightforward, less time-consuming, fascinating, and attractive to follow.”

Expert 1 went on to say that instructors should adjust their teaching schedules from for example 12 periods each semester to dedicating 2 to 3 periods to students for presentations or doing seminars to exchange perspectives with students. Expert 2 also agreed that teachers needed to adjust, advising them to recognize that they are always communicating with students rather than just talking to themselves. As he stated.

“When teaching, teachers may mistakenly believe that they are speaking alone. Teachers must highlight that they are conversing with students at all times. They must be interactive in nature. There has to be a place to respond.”

Expert 1 also stated more about training teachers that teachers should be adequately prepared to use Zoom Meeting and create media from PowerPoint. Furthermore, he demonstrated that, as of now, with the existing scenario with Covid-19, students are unable to properly deal with the same quantity of knowledge that was required for them to learn in terms of the curriculum. As a result, the content must be trimmed to approximately 50 to 60% of the full text including all key concepts. Also, study hours must be more flexible because students cannot stay on screen and study online for 7 to 8 hours like they did in school. Expert 3 agreed that the curriculum should change the rigidity of study hours to be more flexible regarding online learning.

Homework was another factor that contributed to student dissatisfaction with online learning during the COVID-19 pandemic. Throughout the pandemic, it was asserted in the media that students were given too much homework. During the online learning session, Expert 3 confessed that students had a number of homework assignments. He argued that

“It is impossible when we continue to employ the same curriculum and anticipate no homework or workload at all.”

He illustrated more that teachers still need to present homework data or test points used to measure and evaluate students. He pointed out that the core curriculum of Thai education must be

altered to accommodate online learning during the pandemic. Regarding homework, Expert 2 agreed that there could not be any homework at all. He stated

“This is to ensure that the student is attending the online lesson. We don't know how much responsibility students will bear for their online education.”

He did, however, show out a method to have homework without making students dissatisfied with online learning. He illustrated

“Students will not perceive at the same level in an online classroom as they would in a traditional classroom. As a result, the assigned homework, it must be simple for students to do in order for them to desire to do it. Alternatively, divide the homework into two pieces. Part 1 is a general introduction. Check to see if they attended the online lesson. The other option is to practice or challenge. Also, offer them bonus points.”

Overall, from the interview, the experts' opinions showed that effort expectancy can be a factor in students' satisfaction or dissatisfaction with online learning during the epidemic. However, it demonstrated that the main source of concern was the traditional teaching style and the traditional core curriculum.

Social Influence (SI)

According to the experts, there was an obvious impact from friends, teachers, and family when it comes to online learning. However, there was a significant difference in their levels of importance. The majority of the experts (4 out of 5) agreed that friends can be the most effective influencer. As Expert 2 said “If there is a trend or a discussion, friends come to number one.”

Expert 1 also explained that students were already interested in online things, which was a trend. Or the teacher made it a priority to push them to learn online. However, the issue was that others around them were still unable to give high-quality services. The teacher lacked the necessary expertise to satisfy students. As a consequence, we can observe that the teacher was once again concerned with making pupils satisfied with online learning. Social influence was only one of the factors that piqued their interest in online learning.

Expert 4 pointed out an interesting aspect that “Students make friends from different schools. They have made a comparison of each school's learning system. But, in the end, they decided what would be most beneficial to them. This impact did exist. These youngsters, on the other hand, can figure it out for themselves. He selected what was most important to him.”

This viewpoint indicated that the influence was limited to students' motivation in adopting online learning; however, other criteria that demonstrate benefits have a greater impact on satisfaction.

If we talked about family, according to Expert 3, parents and friends were the important people that affect student motivation, as he explained.

“Parental expectations affect student inputs. When students are in a highly competitive society, for example, it is difficult to enter Samsen School. The competitive rate for the admission exams is 10 to 1. Students must have high marks to get admitted. You can see the social effect that parents, teachers, and families anticipate children who come in to be brilliant because they have already been chosen. So, if children live in a competitive world, they must be active in order to interact with their classmates. They will be pressured if they don't bother or don't care.”

Expert 2 also emphasised the importance of family support that “Family members should offer support, privacy, and understanding, and they should continue to inquire if they can assist in any way. It is necessary to train parents at home to be teachers.”

As a result, we may conclude that, in terms of social influence, family may have a greater influence on satisfaction level than the other two subfactors. Friends appeared to be more associated with usage than satisfaction.

Learner Interaction (LI)

All experts agreed that this was like a weakness of online learning. Expert 1 began by pointing out the problem of only one sort of contact between students and teachers. Learners and learners are at the bottom of the list. He explained the situation that “Zoom Meeting is now utilized in 90% of online learning. They had an interaction like this, which is typical of a regular class. That is, those that are adept at answering inquiries will do so. The regular students will be studying as

normal. Those that are highly skilled cannot wait and begin to vanish. Those with a poorly educated suffered the most. However, teachers and students continue to communicate with one another. We do not standardize how students engage with one another."

Expert 3 agreed that the interaction between teachers and students in online learning were able to be as regular as it is in regular class. In addition, he stated that a caring teacher had a huge impact on students. However, we put some concerns on the ability of teachers as he said

"If the teacher is incompetent, the topic is lifeless, the teaching technique is outdated, and the pupils will be uninterested…. Today's teacher must adapt. Teachers are unable to educate in the same manner. Teachers must pay greater attention to their students and prepare for their lessons. They can't merely look for information and impart it. The teaching method must be more current and up to date.".

We can perceive that the person who was concerned was a teacher once more. Nevertheless, Expert 2 advised about how to get more interaction between learners in online learning that

"We may have to push pupils to exchange their points of view with friends, or match and rate them with a score. It will lay the groundwork for learning from the start. Students must reflect on their thoughts while learning in the classroom. Perhaps reflect at regular periods. When the key concerns have been resolved, they express their feelings. Everyone must offer their ideas at the end of the study period. Is it worthwhile to study? Will it be put to use? Make them pleased by exchanging points of view. Most likely, they will begin by coercing their pals to swap their points of view."

Expert 1 agreed and illustrated more that "Which must be included in the assignment, certain things must be researched, then presented or asked a question, and then debated. They will engage with one another via the teacher as a connection. This is similar to a council meeting that must be passed by the chairman. Interactions between learners should be established. Perhaps it's sort of like having question and answer tournaments with friends.".

Expert 3 also explained the importance of interaction between students as he said.

“They haven't attended to school since the first day of semester one, which has had a significant impact. They haven't had the opportunity to meet friends or teachers. They did, however, communicate through the system. Why do I believe it is significant? Because children at this age put more trust in their peers than in teachers and parents, and if they have a lot, they will support each other, push and have a major influence on learning.”

For the interaction between contents and students, Expert 1 illustrated that

“Teachers are the ones who find and prepare instructional content. But, instead of the instructor, we might allow the students discover and develop content for instruction. Part of it will support the teacher's viewpoint. Part of it will address the issue that the teacher's content is incomplete or does not reach all students. All three interactions must be completed. It used to be those interactions between learners and learners and learners and teachers were the only ones that were obvious.”

He admitted that this form of interaction was not readily apparent in Thai education at the time, but that it was crucial. Another issue, according to Expert 2, was that during the epidemic, not all students can afford to have a study material with them while studying online at home, limiting their ability to interact with the content. As he argued

“There should be, but how can there be if the facts aren't present? What source did you use to obtain the funds? It is a requirement that all study documents be supported by the school. The documents must be sent to the students' addresses or picked up by the parents. Make every effort to reach out to students. To be able to write and take notes, you'll need documents.”

Expert 3 also added that some schools were not ready to find a good content for students as they need funds to do so. As he argued

“Because there are so many options for finding educational information, the era has changed. If the teacher does not aim to do a good job of finding material. Students will have more interesting material. It is important to emphasize that each school's preparation must be considered. Because it takes money to run a business here. However, some schools do not have a capital.”

In conclusion, learners-learners and learners-instructors interactions were suggested to have a vital role in satisfying students in online learning during the Thai epidemic of COVID-19. However, we cannot conclude that learner-content interaction did not count because experts agreed that it was vital; the problem was that this contact was not particularly evident, and it may require funding to manage the system for this interaction to occur properly.

Facilitating Condition (FC)

When the experts discussed the relevance of other elements, they frequently cited the facilitating condition. Expert 2 stated that it was like a fundamental equipment for online learning, as he said

"It's a fundamental tool. It is required. If not, it's game over. Like cooking, it's over if there's no pan. Individuals must be considered by the state."

Expert 1 agreed that it was a very important thing to be concerned about. He explained

"It has a significant influence at the primary level. When the equipment and the internet are not ready, online learning will be a failure. When we look at the picture, we see that there are teachers, students, textbooks, and teachers. We speak about how learning works in general, but this is especially crucial while studying online. If you don't have a gadget or access to the internet, you won't be able to learn online."

Expert 5 also emphasised "Students will be less motivated and discouraged if their study equipment is ineffective or their internet connection is inconsistent."

The facilitating condition for online learning differed depending on location or school. According to Expert 4, Expert 3, and Expert 5, this did not appear to be a problem in their schools because all students can afford the equipment. There may be only 5% of students in their schools who cannot afford the equipment, but with such a small number of students, their school can provide assistance. Another reason their school may not experience this issue is that it is located in the heart of a large province, like Bangkok and Pathumthani. Nevertheless, Expert 3 explained that as a whole picture this was a problem and the government should support all students. He advised

“But, in reality, I believe that the state should support more about study gadgets; for example, if we are students, we should be able to purchase it at a lesser cost. However, it is presently only available at the university level. They should also allow government entities, such as public schools, to adjust their procurement budgets. I can't do that now because schools can't afford to buy the equipment for the teachers themselves. Because government regulations cannot establish standards for school-purchased items.We must provide convenience for both students and teachers. It was necessary to alter the procurement method; otherwise, it would be impossible to complete. Recently, we are not able to pay in cash for students to purchase SIM cards on their own. The rule states that the school must be the one to find items for students and cannot provide cash. We believe that if the government allows us to organize it ourselves. It ought to be more convenient.”

He also stated about the problem in rural area that it was less likely for schools in rural area to offer internet access to all students or to establish an online learning session. He said

“It does not have the same level of preparedness. It lacks the same conveniences. We pay thirty-four thousand baht each month for internet access at school. If you're wondering if a small school in another province will be able to afford internet access like us, the answer is no. If they can't provide appropriate internet connectivity in classrooms, how will pupils get proper internet signal at home? Some students are unable to study online on a regular basis since they utilize a daily internet sim.”

Expert 1 pointed out the key to this issue that we must find the way to get people to access both devices and networks without expensive costs. He suggested that there were three key points that must be done. Firstly, budgeting for study equipment is a must for everyone. Secondly, the government should provide total internet signal coverage throughout the country. Thirdly, the government needs to change the teacher's practice of not writing textbooks and instead creating study media to post to the cloud for students to utilize.

To summarize, we can see that this element was a fundamental issue that needed to be addressed in order to complete a successful online learning. However, all of these concerns appear to be ones that the government or the ministry of education must address in order for the country to be able to study online fully and efficiently.

Table 4.1 Summary of the interview result

Experts	Expected Factors					Most Important Factors
	PE	EE	SI	LI	FC	
Expert 1	Agreed	Agreed	Agreed	Agreed	Agreed	EE
Expert 2	Agreed	Agreed	Agreed	Agreed	Agreed	PE, FC
Expert 3	Agreed	Agreed	Agreed	Agreed	Agreed	PE, FC
Expert 4	Agreed	Agreed	Agreed	Agreed	Agreed	EE
Expert 5	Agreed	Agreed	Agreed	Agreed	Agreed	FC

Summary and suggestions from the interview

In summary, we can see from table 4.1 that all experts agreed that there was an influence from each factor on student satisfaction with online education during the covid-19 pandemic. However, when asked which factor was the most important, most experts mentioned up to two factors at the same time. To begin, two of five experts felt that performance expectancy was the most important aspect in satisfying student online learning activity. They contended that this factor would have an effect on student attention and learning. The other two experts (2 of 5) indicated that effort expectancy may be the first thing that springs to mind. Finally, other experts (3 of 5) felt that one of the most essential components was technology as a means to facilitate conditions. However, they all went through almost all of the factors that were important to them again. Nonetheless, I can see a common point that when they explain the factors, at the end they will mention whether or not teachers are suitable for online learning, as if everything was fixed, all infrastructure and internet connectivity were ready for all students, and teachers still did not develop the way they teach. Students will continue to be dissatisfied with online learning. Expert 3 stated

“It will be traced back to if the instructor is not active and does not improve himself, he will be eliminated from the student's consciousness since he cannot educate the student effectively. This will be a difficult point to resolve. Teachers who were needed to teach in front of a class must adapt and be able to educate using the necessary technology, as well as identify techniques of teaching that are most appealing to students. It is preferable to answer rather than talk unilaterally; there

must be interaction between teachers and pupils." However, he pointed out that the COVID-19 scenario might be a chance for instructors to improve their teaching skills as well, because they must mostly teach online.

Expert 1 also added "Today's issue is that teachers educate online in the same way they do in regular classroom. Students are bored to death if they have to confront a traditional style of teaching 16 times each semester in online learning."

However, there is one aspect that experts did not bring up as frequently as others. It was owing to social influence. I assumed that this element was the one that encouraged students to begin studying online, but that other variables may make them satisfied with online learning during Thailand's epidemic as the experts confirmed. Nonetheless, there were some interesting advice from the experts for developing an effective online learning model that I would like to illustrate. First of all, Expert 1 advised and showed the example of South Korea that when developing an online teaching system in South Korea, they employed the approach of bringing 100 educators to a hotel with various animation artists. They had to undertake study materials and media for three months before it was finished. Thailand has a large number of qualified teachers and tutors. It will be excellent if we do it like they do. Expert 2 also stated a very interesting piece of advice that

"Teachers perform differently in large and small schools. Teachers at small schools are uninspired. Teaching isn't fun until the teachers are passionate about the subject, but for the instructors at large schools, the setting served as a motivator. We have long desired to consolidate local schools into a large school as a solution. Physically, it isn't possible. But we can now do so digitally. Let's work together with 4 to 5 schools to make teaching more enjoyable. They might assist educate a subject or make it more enjoyable. Now, in the education service sector, small schools often do not have all instructors who graduated with all major subjects, but they may be fulfilled if a total of 2-3 schools are involved."

According to Expert 1 and Expert 2, this is the best approach to use the online system to our advantage and enhance the student's online learning experience. If we are unable to provide students with a variety of professional and trained teachers physically, we may provide them with them digitally.

After getting all information from the interview, it was evident that all expected factors were supported by the experts. Thus, these factors were qualified to use in the quantitative analysis process. Next sections, the quantitative analysis will be illustrated.

Part 2 Research finding of the Quantitative research

4.2 The research finding of the performance expectancy, effort expectancy, social influence, learner interaction, facilitating conditions, behavioral intention to use, actual use, and student satisfaction

4.2.1 Symbols and meanings used for statistical values, latent variables and observable variables

This research identified the following symbol meaning used in place of statistical values and variables as following:

$\overline{X}$	Mean
SD	Standard Deviation
n	Number of respondents used for analysis
SE	Standard Error
SK	Skewness
KU	Kurtosis
P-Value	Statistical Probability
χ^2	Chi-Square
R^2	Coefficient of determination
GFI	Goodness of Fit Index
AGFI	Adjusted Goodness of Fit Index

RMR	Root Mean Squared Residual
RMSEA	Root Mean Square Error of Approximation
TE	Total Effect
IE	Indirect Effect
DE	Direct Effect

The symbols for five exogenous latent variables are as follows:

PE	Performance Expectancy
EE	Effort Expectancy
SI	Social Influence
LI	Learner Interaction
FC	Facilitating Condition

The symbols for three endogenous latent variables are as follows:

BI	Behavioral Intention to Use
AU	Actual Usage
SS	Student Satisfaction

There are 3 observable variables in performance expectancy with the following symbols:

X1	Intrinsic Motivation
X2	Extrinsic Motivation
X3	Perceived Usefulness

Three items about intrinsic motivation are symbolized as follows:

X11	Online learning will allow me to develop myself independently.

X12 Online learning will give me more opportunities to learn on my own.

X13 Online learning will make me feel fun and happy.

Three items about extrinsic motivation are symbolized as follows:

X21 I will concentrate on studying online in order to get good grades.

X22 I studied online in order to be able to take the entrance exam to the university I wanted.

X23 If I get good grades from online learning, it will be appreciated by my family and society.

Three items about perceived usefulness are symbolized as follows:

X31 Online learning will improve my learning outcomes.

X32 Online learning will enhance my other learning activities.

X33 Online learning will provide me with the knowledge I need to complete the homework assignments that my teachers have assigned to me.

There are 2 observable variables in effort expectancy with the following symbols:

X4 Perceived Ease of Use

X5 Course Design

Three items about perceived ease of use are symbolized as follows:

X41 I found online learning to be easy to use.

X42 Online learning is a simple learning process.

X43 I will be able to use the online learning system fluently.

Four items about course design are symbolized as follows:

X51 The materials used for online learning are difficult enough to make learning challenging.

X52 The scoring model in online learning is appropriate.

X53 The school's online learning style keeps me constantly learning.

X54 The difficulty of online exams varies according to the student's ability to study, making it challenging.

There are 2 observable variables in social influence with the following symbols:

X6 Subjective Norm

X7 Social Factor

Three items about subjective norm are symbolized as follows:

X61 I studied online because my friend suggested it.

X62 I studied online because my teacher recommended it.

X63 I studied online because my family recommended it.

Three items about social factor are symbolized as follows:

X71 I think online learning nowadays is something everyone learns.

X72 My teachers provide full support for online learning.

X73 My school fully supports online learning.

There are 3 observable variables in learner interaction with the following symbols:

X8 Learner-learner Interaction

X9 Learner-instructor Interaction

X10 Learner-content Interaction

Three items about learner-learner interaction are symbolized as follows:

X81 I have more discussions about studying with other students through online learning.

X82 More discussions about learning between students in the classroom emerges as a result of this online learning.

X83 I have developed my knowledge from talking with fellow students in online learning more than in traditional learning.

Three items about learner-instructor interaction are symbolized as follows:

X91 I have had more conversations with my teachers through online learning.

X92 Instructors respond to questions from online learning with students rather quickly.

X93 The instructor's way of communicating in online learning has given me a better understanding of the lesson.

Three items about learner-content interaction are symbolized as follows:

X101 Online learning materials are interesting and stimulating to learn.

X102 Online learning materials are easily accessible.

X103 Online learning materials have helped me understand the lessons better.

There are 2 observable variables in facilitating condition with the following symbols:

X11 Infrastructure

X12 Internet Connectivity

Three items about infrastructure are symbolized as follows:

X111 I have all the equipment I need for online learning.

X112 I have all the necessary programs ready to study online.

X113 The use of online learning requires more equipment than normal learning.

Three items about internet connectivity are symbolized as follows:

X121 Internet speed for online learning is quite high.

X122 I have a relatively stable internet connection while studying online.

X123 Where I live there is a wide variety of internet networks to choose from.

There are 2 observable variables in behavioral intention to use with the following symbols:

Y1 usage frequency prediction

Y2 usage plan

Two items about usage frequency prediction are symbolized as follows:

Y11 I will study online whenever I can.

Y12 I will study online regularly every day throughout the semester.

Three items about usage plan are symbolized as follows:

Y21 I intend to study online every time according to my schedule.

Y22 I intend to study online in order to review the course material later.

Y23 I intend to study online in order to study the material in advance.

There are 2 observable variables in actual usage with the following symbols:

Y3 usage frequency

Y4 usage length

Two items about usage frequency are symbolized as follows:

Y31 I study online every day.

Y32 I study online whenever I can.

Four items about usage length are symbolized as follows:

Y41 Studying online that takes less than 1 hour per session allows me to concentrate on my studies.

Y42 Setting up an online teaching time that isn't too long. Help students not get bored.

Y43 Providing a shorter number of hours to study online makes it more effective for studying that takes longer.

Y44 In one day, I was able to study online for a total of 5 hours, which is more efficient than 8 hours of studying all day.

There are 2 observable variables in student satisfaction with the following symbols:

Y5 student retention

Y6 course quality

Two items about student retention are symbolized as follows:

Y51 I want to continue using the online learning system next semester.

Y52 I would like to use the online learning system in my university studies.

Three items about usage length are symbolized as follows:

Y61 I am satisfied with the knowledge gained from online learning.

Y62 I can apply the knowledge I have gained in the exam.

Y63 I got better grades by studying online.

4.2.2 Descriptive data Analysis

- Personal Information of the respondents

Researcher collected data of 270 Thai high school students across nine Thai provinces in August 2021. Using a network of Thai teachers, students were assisted with their questionnaire input using Google Form. The personal information of respondents was presented in Table 4.2

Table 4.2 Personal Information (gender and geographic data)

Region	Schools (Province)	Gender				Total
		Male		Female		
		Count	%	Count	%	Count
Northern	NareeratPhrae (Phrae)	7	2.59	23	8.52	30
Central	Ayutthaya Wittayalai (Ayutthaya)	16	5.93	14	5.19	30
	PrommanusornPhetchaburi (Phetchaburi)	15	5.56	15	5.56	30
	Thammasat Khlongluang Wittayakom (Pathum Thani)	11	4.07	19	7.04	30
Eastern	Sakaew (Sakaew)	11	4.07	19	7.04	30
Northeastern	Narinukun (Ubon Ratchathani)	7	2.59	23	8.52	30
	Lam Plai Mat (Buriram)	16	5.93	14	5.19	30
	Kalasin Phitthayasan (Kalasin)	8	2.96	22	8.15	30
Southern	Wichienmatu (Trang)	11	4.07	19	7.04	30
Totals		102	37.78	168	62.22	270

From table 4.2, the majority of those who responded were female with the number of 168 respondents accounted for 62.22 per cent. The less was male with the number of 102 respondents accounted for 37.78 per cent.

Table 4.3 Personal Information (Age)

Age	Count	Percentage
14 years	2	0.74
15 years	49	18.15
16 years	87	32.22
17 years	94	34.81
18 years or older	38	14.07
Totals	270	100

Table 4.3 shows that 17-year-old pupils made up the bulk of the responses, accounting for 34.81 percent of the total. 16-year-old pupils received the second-highest number of responses, with 87 (32.22%), followed by 15-year-old students, who received 49 (18.15%). With 38 pupils, the fourth group was 18-year-old-or-older students (14.07 %). The answer with the fewest responses was 14 years old, which accounted for 0.74 percent of the total (2 respondents).

Table 4.4 Personal Information (Study level)

Grade (Mattayom)	Count	Percentage
Grade 10 (Mattayom 4)	85	31.48
Grade 11 (Mattayom 5)	95	35.19
Grade 12 (Mattayom 6)	90	33.33
Totals	270	100

Table 4.4 reveals that students in grades 11 (mattayom 5) made up the bulk of responders, accounting for 35.19 percent of the total. Grade 12 (mattayom 6) had the second most responses, accounting for 33.33 percent of the total. Grade 10 (mattayom 4) had the third most responses, accounting for 31.48 percent of the total.

Table 4.5 The online learning system used at respondents' schools

The online learning system used at respondents' schools	Count	Percentage
Zoom Meeting	85	31.48
Google Classroom	202	74.81
Google Meet	227	84.07
Line Meeting	61	22.59
Facebook Live	31	11.48
Microsoft Team	33	12.22
Virtual School Online	29	10.74
Others	20	7.41

According to the survey results, the majority of respondents indicated that their school employed more than one online learning system, as shown in table 4.5. Google Meet was the most popular online learning system, with 227 respondents (84.07 percent). Google Classroom was the second most popular system, with 202 respondents (74.81 percent). Zoom Meeting was the third most popular system, with 85 respondents (31.48 percent), followed by Line Meeting (61 respondents, 22.59 percent), Microsoft Team (33 respondents, 12.22 percent), Facebook Live (31 respondents, 11.48 percent), and Virtual School Online (29 respondents, 11.48 percent) (10.74 percent). Other systems received the fewest responses, with only 20 people responding (7.41 percent).

Table 4.6 Answers to if the school's online learning system was able to study asynchronously

Is the school's online learning system able to study asynchronously?	Count	Percentage
Yes	136	50.37
No	134	49.63
Totals	270	100

Table 4.6 shows that 136 individuals (50.37%) said their school's online learning system allowed them to study asynchronously. The remaining 134 respondents (49.63 percent) stated their school's online learning system did not allow them to study asynchronously.

Table 4.7 Answers to if respondents had extra online tuition with other places, in addition to studying online with the school

In addition to studying online with the school, do you have extra online tuition with other places?	Count	Percentage
Yes	104	38.52
No	166	61.48
Totals	270	100

In table 4.7, 104 students (38.52%) reported that they received additional online tuition from sources other than their school. The remaining 166 pupils (61.48 percent) said they only studied online with their school.

Table 4.8 Average online study hours per day

Average online study hours per day	Count	Percentage
Less than 1 hour	2	0.74
1 - 3 hours	19	7.04
4 - 6 hours	90	33.33
7 - 8 hours	123	45.56
8 hours or more	36	13.33
Totals	270	100

Table 4.8 reveals that the range of 7 to 8 hours per day received the most responses, accounting for 45.56 percent of the total. With 90 students responding, the second most popular response was 4 to 6 hours per day (33.33 percent). The next most popular response was 8 hours or more each day, which received 36 responses and accounted for 13.33 percent of the total, followed by 1 to 3 hours, which received 19 responses (7.04 percent), and finally, less than 1 hour, which received just 2 responses (0.74 percent).

Table 4.9 Family's average monthly income

Family's average monthly income	Count	Percentage
Less than 10,000 baht	73	27.04
10,001 baht to 25,000 baht	94	34.81
25,001 baht to 40,000 baht	55	20.37
40,001 baht to 55,000 baht	21	7.78
55,001 baht to 70,000 baht	12	4.44
More than 70,000 baht	15	5.56
Totals	270	100

According to table 4.9, the majority of respondents (94 respondents (34.81%) said their family's average monthly income ranged 10,001 and 25,000 baht. With 73 responders, the second most popular range was less than 10,000 baht (27.04 percent). The third most popular range was 25,001 baht to 40,000 baht, which received 55 responses (20.37 percent), followed by 40,001 baht to 55,000 baht, which received 21 responses (7.78 percent), more than 70,000 baht, which received 15 responses (5.56 percent), and finally 55,001 baht to 70,000 baht, which received 12 responses (12.56 percent) (4.44 percent).

Table 4.10 Answers to who respondents lived with

Respondents live with their …	Count	Percentage
Parents	185	68.52
Father or Mother (either one)	44	16.30
Relatives or others	39	14.44
Alone	2	0.74
Totals	270	100

According to table 4.10, students lived with their parents the most, with 185 respondents accounting for 68.52 percent. The second most popular response was father or mother (either one) with 44 respondents (16.30 percent), followed by relatives or others with 39 respondents (14.44 percent), and finally lived alone with just 2 respondents (0.74 percent).

Table 4.11 Primary usage devices for online learning

Primary usage devices for online learning	Count	Percentage
PC Desktop	35	12.96
Tablet	22	8.15
Smartphone	165	61.11
Laptop	48	17.78
Smart TV	0	0.00
Totals	270	100

In relation to table 4.11, smartphones were the most commonly utilized as a primary device for online learning, with 165 students (61.11 percent) responding that they used a smartphone the most. The laptop was the second most popular device, with 48 respondents (17.78 percent), followed by a PC desktop with 35 respondents (12.96 percent), and finally a tablet with 22 respondents (8.15 percent). There was no response for a smart TV in table 4.11.

Table 4.12 The device in table 4.11 already exists or needs to be purchased new.

The device in table 4.11 already exists or needs to be purchased new.	Count	Percentage
Already owned	242	89.63
Buy new one	28	10.37
Totals	270	100.00

In table 4.12, the primary device used for online learning in table 4.11 was mostly already owned, with 242 respondents responding (89.63 percent). The less (28 respondents (10.37 percent) were required to purchase a new one for online study.

Table 4.13 The primary source of internet connectivity

The primary source of internet connectivity	Count	Percentage
Wi-Fi signal	186	68.89
Signal from phone sim	84	31.11
Totals	270	100

Table 4.13 reveals that wi-fi signal was the most answered primary source of internet access, with 186 replies (68.89 percent). With 84 replies, the signal from the phone sim was the least (31.11 percent).

Table 4.14 Students' average additional cost occurred with online learning

Additional cost occurred with online learning	Count	Percentage
0 - 5,000 baht	199	73.70
5,001 - 10,000 baht	50	18.52
10,001 - 15,000 baht	9	3.33
15,001 - 20,000 baht	3	1.11
More than 20,000 baht	9	3.33
Totals	270	100

According to Table 4.14, the majority of respondents (199 respondents, or 73.70 percent) reported that their additional cost from online learning was between 0 and 5,000 baht. The second most popular range was 5,001 to 10,000 baht, which received 50 responses (18.52 percent). The third most popular ranges were 10,001 to 15,000 baht and more than 20,000 baht, each receiving 9 replies (3.33 percent), and 15,001 to 20,000 baht received just 3 responses (1.11 percent).

Table 4.15 Students' average additional monthly expenses

Additional monthly expenses	Count	Percentage
0 - 100 baht	37	13.70
101 - 500 baht	99	36.67
501 - 1,000 baht	76	28.15
More than 1,000 baht	58	21.48
Totals	270	100

Table 4.15 shows that the majority of students (99 respondents, or 36.67 percent) said they had an extra monthly expense in order to study online more effectively of 101 to 500 baht. 501 to 1,000 baht was the second most popular response, with 76 people responding (28.15 percent). More than 1,000 baht had the third highest replies (21.48 percent), followed by 0 to 100 baht, which received 37 responses (13.70 percent).

Moreover, at the end of the questionnaire, the researcher provided an optional open-ended question asking for an additional suggestion for improving online learning systems in Thailand. There were 60 students that submitted a suggestion, accounting for 22.22 percent of the total, with some addressing issues with online course design and others addressing political issues. These suggestions will be included in chapter 5.

4.2.3 Confidence Intervals and Coefficient of determination

In this study, the researcher examined the questionnaires' quality by evaluating their structural validity in relation to the research objectives. Using the Index of Item-Objective Congruence, 5 experts tested the content validity of each item to guarantee subject coverage, research aims, and accuracy in language expressions (IOC). The experts agreed on 68 of the questionnaire's quantitative items, showing that the questionnaire exhibited structural validity. In addition, as indicated by experts, the researcher improved ambiguous, unintelligible, and language clarity messages. To make the questionnaire more understandable by using easier-to-understand language (Appendix D).

The researcher performed a confidence check (reliability) with a sample of 30 Thai high school students to see if the questions were clear and consistent with the objectives, and Cronbach's Alpha results ranged from 0.79 to 0.89 (Table 4.16) indicating that the questionnaire used in this research was highly reliable and very consistent with the objectives of this research.

Next, the researcher examined the questionnaire's reliability as a measure of each variable. The coefficient of determination and Cronbach's Alpha value are presented in the table below to indicate the data's reliability before entering the structural equation.

Table 4.16 The external latent variable's reliability and the Coefficient of determination of exogenous latent variables

Constructs	α	AVE	CR	Observed variables	loading	R^2
Performance Expectancy (PE)	0.85	0.63	0.84	intrinsic motivation (x1)	0.80	0.63
				extrinsic motivation (x2)	0.69	0.47
				perceived usefulness (x3)	0.89	0.79
Effort Expectancy (EE)	0.84	0.71	0.55	perceived ease of use (x4)	0.80	0.64
				course design (x5)	0.93	0.87
Social Influence (SI)	0.79	0.43	0.60	subjective norms (x6)	0.64	0.41
				social factors (x7)	0.67	0.45
Learner Interaction (LI)	0.89	0.60	0.82	learner and learner interaction (x8)	0.68	0.47
				learners and teachers' interaction (x9)	0.78	0.60
				learners and learning content interaction (x10)	0.86	0.73
Facilitating Conditions (FC)	0.79	0.53	0.69	ICT infrastructure (x11)	0.79	0.62
				Internet availability (x12)	0.66	0.44

The results of the data analysis in Table 4.16 revealed that the coefficient of determination for each item of Performance Expectancy variables ranged from 0.47 to 0.79, and Cronbach's alpha for Performance Expectancy variables comprised of sub-variables including such intrinsic motivation, extrinsic motivation, and perceived usefulness had a total value of 0.85. Data gathered from the analysis question item, which served as the study's metric, revealed that the variables' coefficient of determination and reliability are both high.

Table 4.16 shows that the coefficient of determination for each item of Effort Expectancy variables ranged from 0.67 to 0.87, and Cronbach's alpha for Effort Expectancy variables consisted of sub-variables including such perceived ease of use and course design had a total value of 0.84. Data gathered from the analysis question item, which served as the study's metric, revealed that the variables' coefficient of determination and reliability are both high.

According to the data analysis results in Table 4.16, the coefficient of determination for each item of Social Influence variables ranged from 0.64 to 0.67, and Cronbach's alpha for Social Influence variables comprised of sub-variables including such subjective norms and social factors had a total value of 0.79. The coefficient of determination and variable reliability are modest, according to data derived from the analysis question item, which was the study's measure.

The data analysis results in Table 4.16 revealed that the coefficient of determination for each item of Learner Interaction variables ranged from 0.68 to 0.86, and Cronbach's alpha for Learner Interaction variables comprised of sub-variables including such learner and learner interaction, learners and teachers' interaction, and learners and learning content interaction had a total value of 0.89. Data gathered from the analysis question item, which served as the study's metric, revealed that the variables' coefficient of determination and reliability are both high.

From table 4.16, the coefficient of determination for each item of Facilitating Conditions variables varied from 0.66 to 0.79, while Cronbach's alpha for Facilitating Conditions variables consisted of sub-variables including ICT infrastructure and Internet availability had a total value of 0.79. The coefficient of determination and variable reliability are modest, according to data derived from the analysis question item, which was the study's measure.

Table 4.17 The internal latent variable's reliability and the Coefficient of determination of endogenous latent variables

Constructs	α	AVE	CR	Observed variables	loading	R^2
Behavioral Intention (BI)	0.84	0.68	0.81	frequency use prediction (y1)	0.79	0.63
				plan to use (y2)	0.86	0.74
Actual Use (AU)	0.82	0.69	0.82	frequency of use (y3)	0.81	0.66
				usage time (y4)	0.85	0.72
Student Satisfaction (SS)	0.85	0.76	0.86	student retention (y5)	0.78	0.61
				course quality (y6)	0.95	0.91

Table 4.17 shows that the coefficient of determination for each item of Behavioral Intention variables ranged from 0.63 to 0.74, and Cronbach's alpha for Behavioral Intention variables comprised of sub-variables including frequency use prediction, and plan to use had a total value of 0.84. Data gathered from the analysis question item, which served as the study's metric, revealed that the variables' coefficient of determination and reliability are both high.

Table 4.17 reveals that the coefficient of determination for each item of Actual Use variables varied from 0.66 to 0.72, with a total value of 0.82 for Cronbach's alpha for Actual Use variables consisted of sub-variables like frequency of use and usage time. Data gathered from the analysis question item, which served as the study's metric, revealed that the variables' coefficient of determination and reliability are both high.

Finally, regarding table 4.17, the coefficient of determination for each item of Student Satisfaction variables ranged from 0.61 to 0.91, with a total value of 0.85 for Cronbach's alpha for Student Satisfaction variables, which included sub-variables like student retention and course quality. Data gathered from the analysis question item, which served as the study's metric, revealed that the variables' coefficient of determination and reliability are both high.

4.3 The result of the analysis of the components of performance expectancy, effort expectancy, social influence, learner interaction, facilitating conditions, behavioral intention to use, actual use, and student satisfaction

4.3.1 The analysis of construct correlation coefficients and basic statistical values

- Construct Correlation Coefficients

We observed high correlations in Table 4.18 based on generally accepted interpretations, implying that when Pearson's r values are 0.50 – 1, the correlation is strong. When standardized factor loading values are more than or equal to 0.60, validity is further confirmed (0.64 - 0.95).

Table 4.18 Testing results for construct correlation coefficients.

Constructs	BI	AU	SS	PE	EE	SI	LI	FC
BI	1							
AU	0.712**	1						
SS	0.598**	0.649**	1					
PE	0.671**	0.610**	0.713**	1				
EE	0.735**	0.686**	0.695**	0.882**	1			
SI	0.720**	0.679**	0.621**	0.724**	0.901**	1		
LI	0.762**	0.672**	0.686**	0.835**	0.885**	0.819**	1	
FC	0.556**	0.596**	0.501**	0.534**	0.628**	0.745**	0.652**	1
CR	0.803	0.817	0.858	0.853	0.716	0.614	0.818	0.665
AVE	0.673	0.691	0.752	0.661	0.559	0.443	0.602	0.500
√AVE	0.820	0.831	0.867	0.813	0.748	0.665	0.775	0.707

Note: **Sig. < 0.01

- Descriptive statistics Analysis

The fundamental statistical values of variables, including such mean, standard deviation, skewness, kurtosis, and variable interpretation, were investigated in this study.

Three observable variables, intrinsic motivation (X1), extrinsic motivation (X2), and perceived usefulness (X3), comprised the performance expectancy (PE) variables.

Table 4.19 Descriptive statistics of performance expectancy variables

Latent Variable	Observable Variable	Items	$\overline{X}$	SD	Sk	Ku
PE	PE		3.22	1.00	0.07	-0.45
	X1		3.11	1.01	0.05	-0.31
		X11	3.11	0.96	0.11	0.08
		X12	3.40	0.89	0.08	-0.41
		X13	2.80	1.08	0.27	-0.46
	X2		3.51	0.99	-0.10	-0.58
		X21	3.63	0.95	-0.30	-0.27
		X22	3.58	1.01	-0.07	-0.9
		X23	3.31	0.99	0.06	-0.35
	X3		3.06	0.95	0.27	-0.28
		X31	3.04	0.95	0.30	-0.37
		X32	3.07	0.97	0.29	-0.34
		X33	3.07	0.93	0.22	-0.08

According to Table 4.19, the mean of the latent variables in performance expectancy (PE) was 3.22, which was moderate. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed to the right. (Skewness is positive). The value of kurtosis is platykurtic. When the kurtosis value is less than 3, the data disperses out of the mean and the distribution's tails are thinner.

For Effort Expectancy variable, there were two observable variables including perceived ease of use (X4), and course design (X5).

Table 4.20 Descriptive statistics of effort expectancy variables

Latent Variable	Observable Variable	Item	$\overline{X}$	SD	Sk	Ku
EE	EE		3.31	0.92	0.04	-0.13
	X4		3.38	0.96	0.01	-0.39
		X41	3.29	0.95	0.15	-0.39
		X42	3.32	0.97	0.07	-0.31
		X43	3.53	0.96	-0.19	-0.27
	X5		3.25	0.88	0.04	0.10
		X51	3.42	0.83	0.04	0.25
		X52	3.34	0.89	0.07	-0.03
		X53	3.00	0.88	0.08	0.17
		X54	3.25	0.87	0.21	0.17

According to Table 4.20, the mean of the latent variables in effort expectancy (EE) was 3.31, which was moderate. A standard deviation of less than 1.25 suggested low variation. When it came to data distribution, it was revealed that the data was slightly skewed to the right. (Skewness is positive). The value of kurtosis is platykurtic. When the kurtosis value is less than 3, the data disperses away from the mean and the tails of the distribution become thinner.

For Social Influence variable, there were two observable variables including subjective norm (X6), and social factors (X7).

Table 4.21 Descriptive statistics of social influence variables

Latent Variable	Observable Variable	Item	$\overline{X}$	SD	Sk	Ku
SI	SI		3.34	1.07	-0.16	-0.43
	X6		3.00	1.09	0.02	-0.46
		X61	2.66	1.06	0.21	-0.33
		X62	3.32	1.05	-0.09	-0.32
		X63	3.53	1.09	-0.05	-0.45
	X7		3.69	0.93	-0.13	0.54
		X71	3.72	0.90	0.08	-0.87
		X72	3.70	0.92	-0.08	-0.76
		X73	3.64	0.99	-0.29	-0.25

According to Table 4.21, the mean of the latent variables in social influence (SI) was 3.34, which was moderate. A standard deviation of less than 1.25 suggested low variation. When it came to data distribution, it was revealed that the data was slightly skewed to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3, the data disperses away from the mean and the tails of the distribution become thinner.

For Learner Interaction variable, there were three observable variables including learner-learner interaction (X8), learner-instructor interaction (X9) and learner-content interaction (X10).

Table 4.22 Descriptive statistics of learner interaction variables

Latent Variable	Observable Variable	Item	$\overline{X}$	SD	Sk	Ku
LI	LI		3.16	0.95	0.05	-0.14
	X8		3.07	1.01	0.03	-0.34
		X81	3.25	0.95	-0.15	-0.15
		X82	3.04	0.98	0.27	-0.22
		X83	2.90	1.08	0.09	-0.49
	X9		3.16	0.93	0.07	-0.14
		X91	2.97	1.02	0.17	-0.29
		X92	3.34	0.88	0.05	-0.17
		X93	3.18	0.84	0.18	-0.05
	X10		3.24	0.90	0.13	0.05
		X101	3.19	0.83	0.30	0.55
		X102	3.47	0.91	0.29	-0.16
		X103	3.07	0.91	0.22	0.06

According to Table 4.22, the mean of the latent variables in learner interaction (LI) was 3.16, which was moderate. A standard deviation of less than 1.25 suggested low variation. When it came to data distribution, it was revealed that the data was slightly skewed to the right. (Skewness is positive). The value of kurtosis is platykurtic. When the kurtosis value is less than 3, the data disperses away from the mean and the tails of the distribution become thinner.

For Facilitating Condition variable, there were three observable variables including infrastructure (X11), and internet connectivity (X12).

Table 4.23 Descriptive statistics of facilitating condition variables

Latent Variable	Observable Variable	Item	$\overline{X}$	SD	Sk	Ku
FC	FC		3.49	1.01	-0.17	-0.46
	X11		3.53	1.02	-0.19	-0.53
		X111	3.43	0.99	-0.12	-0.51
		X112	3.32	1.04	-0.24	-0.36
		X113	3.53	1.00	-0.23	-0.77
	X12		3.43	1.01	-0.15	-0.38
		X121	3.47	1.04	-0.15	-0.41
		X122	3.45	0.94	-0.05	-0.43
		X123	3.36	1.06	-0.19	-0.39

According to Table 4.23, the mean of the latent variables in facilitating condition (FC) was 3.49, which was moderate. A standard deviation of less than 1.25 suggested low variation. When it came to data distribution, it was revealed that the data was slightly skewed to the left. (Skewness is a slight negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3, the data disperses away from the mean and the tails of the distribution become thinner.

For Behavioral Intention to Use (BI) variable, there were two observable variables including usage frequency prediction (Y1), and usage plan (Y2).

Table 4.24 Descriptive statistics of behavioral intention to use variables

Latent Variable	Observable Variable	Item	$\overline{X}$	SD	Sk	Ku
BI	BI		3.58	1.00	-0.16	-0.55
	Y1		3.70	1.06	-0.43	-0.47
		Y11	3.83	1.10	-0.45	-0.52
		Y12	3.57	0.98	-0.38	-0.50
	Y2		3.50	0.94	0.03	-0.51
		Y21	3.75	0.98	-0.22	-0.69
		Y22	3.43	0.90	-0.04	-0.12
		Y23	3.34	0.89	0.26	-0.35

According to Table 4.24, the mean of the latent variables in behavioral intention to use (BI) was 3.58, which was moderate. A standard deviation of less than 1.25 suggested low variation. When it came to data distribution, it was revealed that the data was slightly skewed to the left. (Skewness is a slight negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3, the data disperses away from the mean and the tails of the distribution become thinner.

For Actual Usage (AU) variable, there were two observable variables including usage frequency (Y3), and usage length (Y4).

Table 4.25 Descriptive statistics of actual usage variables

Latent Variable	Observable Variable	Item	$\overline{X}$	SD	Sk	Ku
AU	AU		3.84	1.00	-0.36	-0.67
	Y3		3.97	1.00	-0.50	-0.69
		Y31	3.96	1.03	-0.40	-0.92
		Y32	3.98	0.96	-0.20	-0.35
	Y4		3.78	1.00	-0.30	-0.62
		Y41	3.56	1.01	-0.20	-0.35
		Y42	3.88	1.01	-0.47	-0.45
		Y43	3.86	0.97	-0.32	-0.67
		Y44	3.81	0.98	-0.22	-0.99

According to Table 4.25, the mean of the latent variables in actual usage (AU) was 3.84, which was moderate. A standard deviation of less than 1.25 suggested low variation. When it came to data distribution, it was revealed that the data was slightly skewed to the left. (Skewness is a slight negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3, the data disperses away from the mean and the tails of the distribution become thinner.

For Student Satisfaction (SS) variable, there were two observable variables including student retention (Y5), and course quality (Y6).

Table 4.26 Descriptive statistics of student satisfaction variables

Latent Variable	Observable Variable	Item	$\overline{X}$	SD	Sk	Ku
SS	SS		2.91	1.09	0.01	-0.47
	Y5		2.62	1.20	0.34	-0.73
		Y51	2.62	1.24	0.39	-0.83
		Y52	2.62	1.16	0.28	-0.63
	Y6		3.10	0.95	-0.05	0.00
		Y61	2.99	0.98	0.07	-0.06
		Y62	3.11	0.95	-0.12	0.03
		Y63	3.20	0.92	-0.07	0.13

According to Table 4.26, the mean of the latent variables in student satisfaction (SS) was 2.91, which can be indicated as dissatisfaction. A standard deviation of less than 1.25 suggested low variation. When it came to data distribution, it was revealed that the data was slightly skewed to the right. (Skewness is a slight positive). The value of kurtosis is platykurtic. When the kurtosis value is less than 3, the data disperses away from the mean and the tails of the distribution become thinner.

- Descriptive statistics Analysis (categorized by regions in Thailand)

This section shows the fundamental statistical values of variables, including such mean, standard deviation, skewness, kurtosis, and variable interpretation. These statistical values were categorized in each region from the samples regarding table 4.2 and show just 8 latent variables.

Table 4.27 Descriptive statistics of 8 latent variables from northern region sample

Region	Latent Variables	$\overline{X}$	SD	Sk	Ku
Northern	PE	2.99	0.96	0.19	-0.40
	EE	3.27	0.91	0.02	-0.60
	SI	3.19	1.05	0.01	-0.50
	LI	3.01	0.86	0.30	-0.10
	FC	3.69	0.88	-0.19	-0.67
	BI	3.53	0.90	-0.32	-0.20
	AU	3.77	1.01	-0.29	-0.75
	SS	2.90	0.92	-0.12	-0.05

According to Table 4.27, the mean of performance expectancy (PE) in the northern region was 2.99, which was moderate. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed to the right. (Skewness is positive). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of effort expectancy (EE) in the northern region was 3.27, which was moderate. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the right. (Skewness is positive). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of social influence (SI) in the northern region was 3.19, which was moderate. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the right. (Skewness is positive). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of learner interaction (LI) in the northern region was 3.01, which was moderate. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the right. (Skewness is positive). The value of

kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of facilitating condition (FC) in the northern region was 3.69, which was agreed. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of behavioral intention to use (BI) in the northern region was 3.53, which was agreed. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of actual usage (AU) in the northern region was 3.77, which was agreed. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of student satisfaction (SS) in the northern region was 2.90, which was moderate. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

Table 4.28 Descriptive statistics of 8 latent variables from central region sample

Region	Latent Variables	$\overline{X}$	SD	Sk	Ku
Central	PE	3.23	0.96	-0.02	-0.28
	EE	3.24	0.90	-0.06	0.21
	SI	3.32	1.04	-0.17	-0.24
	LI	3.12	0.92	-0.02	0.04
	FC	3.52	0.95	-0.17	-0.43
	BI	3.64	0.99	-0.20	-0.50
	AU	3.98	0.94	-0.32	-1.02
	SS	2.79	1.11	0.08	-0.56

According to Table 4.28, the mean of performance expectancy (PE) in the central region was 3.23, which was moderate. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of effort expectancy (EE) in the central region was 3.24, which was moderate. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is leptokurtic. When the kurtosis value is more than 3 (or kurtosis -3 more than 0), the data center around the mean and distribution has fatter tails.

The mean of social influence (SI) in the central region was 3.32, which was moderate. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of learner interaction (LI) in the central region was 3.12, which was moderate. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis

is leptokurtic. When the kurtosis value is more than 3 (or kurtosis -3 more than 0), the data center around the mean and distribution has fatter tails.

The mean of facilitating condition (FC) in the central region was 3.52, which was agreed. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of behavioral intention to use (BI) in the central region was 3.64, which was agreed. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of actual usage (AU) in the central region was 3.98, which was agreed. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of student satisfaction (SS) in the central region was 2.79, which was moderate. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

Table 4.29 Descriptive statistics of 8 latent variables from eastern region sample

Region	Latent Variables	$\overline{X}$	SD	Sk	Ku
Eastern	PE	2.91	1.04	0.31	-0.25
	EE	3.17	0.95	0.28	-0.04
	SI	3.38	1.09	-0.30	-0.29
	LI	2.96	0.90	0.17	0.25
	FC	3.36	1.12	-0.01	-0.72
	BI	3.43	0.99	0.14	-0.48
	AU	3.68	1.16	-0.52	-0.47
	SS	2.39	1.09	0.36	-0.44

According to Table 4.29, the mean of performance expectancy (PE) in the eastern region was 2.91, which was moderate. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed to the right. (Skewness is positive). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of effort expectancy (EE) in the eastern region was 3.17, which was moderate. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the right. (Skewness is positive). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of social influence (SI) in the eastern region was 3.38, which was moderate. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of learner interaction (LI) in the eastern region was 2.96, which was moderate. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the right. (Skewness is positive). The value of

kurtosis is leptokurtic. When the kurtosis value is more than 3 (or kurtosis -3 more than 0), the data center around the mean and distribution has fatter tails.

The mean of facilitating condition (FC) in the eastern region was 3.36, which was moderate. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of behavioral intention to use (BI) in the eastern region was 3.43, which was agreed. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the right. (Skewness is positive). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of actual usage (AU) in the eastern region was 3.68, which was agreed. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of student satisfaction (SS) in the eastern region was 2.39, which was not agreed. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the right. (Skewness is positive). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

Table 4.30 Descriptive statistics of 8 latent variables from northeastern region sample

Region	Latent Variables	$\overline{X}$	SD	Sk	Ku
Northeastern	PE	3.41	1.05	-0.01	-0.65
	EE	3.46	0.94	0.05	-0.38
	SI	3.41	1.08	-0.15	-0.57
	LI	3.33	1.00	-0.05	-0.32
	FC	3.48	1.02	-0.12	-0.43
	BI	3.56	1.04	-0.15	-0.69
	AU	3.77	0.99	-0.22	-0.82
	SS	3.23	1.08	-0.11	-0.37

According to Table 4.30, the mean of performance expectancy (PE) in the northeastern region was 3.41, which was agreed. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of effort expectancy (EE) in the northeastern region was 3.46, which was agreed. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the right. (Skewness is positive). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of social influence (SI) in the northeastern region was 3.41, which was agreed. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of learner interaction (LI) in the northeastern region was 3.33, which was moderate. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative).

The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of facilitating condition (FC) in the northeastern region was 3.48, which was agreed. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of behavioral intention to use (BI) in the northeastern region was 3.56, which was agreed. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of actual usage (AU) in the northeastern region was 3.77, which was agreed. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of student satisfaction (SS) in the northeastern region was 3.23, which was moderate. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

Table 4.31 Descriptive statistics of 8 latent variables from southern region sample

Region	Latent Variables	$\overline{X}$	SD	Sk	Ku
Southern	PE	3.21	0.93	-0.08	-0.32
	EE	3.22	0.83	-0.09	0.05
	SI	3.33	1.13	-0.24	-0.51
	LI	3.08	0.94	-0.07	-0.19
	FC	3.34	1.14	-0.13	-0.61
	BI	3.69	0.94	-0.26	-0.37
	AU	3.87	1.00	-0.48	-0.42
	SS	2.83	0.97	-0.09	-0.33

According to Table 4.31, the mean of performance expectancy (PE) in the southern region was 3.21, which was moderate. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of effort expectancy (EE) in the southern region was 3.22, which was moderate. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is leptokurtic. When the kurtosis value is more than 3 (or kurtosis -3 more than 0), the data center around the mean and distribution has fatter tails.

The mean of social influence (SI) in the southern region was 3.33, which was moderate. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of learner interaction (LI) in the southern region was 3.08, which was moderate. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of

kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of facilitating condition (FC) in the southern region was 3.34, which was moderate. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of behavioral intention to use (BI) in the southern region was 3.69, which was agreed. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of actual usage (AU) in the southern region was 3.87, which was agreed. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

The mean of student satisfaction (SS) in the southern region was 2.83, which was moderate. Low variation was indicated by a standard deviation of less than 1.25. In terms of data distribution, it was discovered that the data was skewed a bit to the left. (Skewness is negative). The value of kurtosis is platykurtic. When the kurtosis value is less than 3 (or kurtosis -3 less than 0), the data disperses out of the mean and the distribution's tails are thinner.

To summarize from table 4.27 to table 4.31, it was evidence that the northeastern region has the highest score of mean in performance expectancy, which was 3.41. The lowest was the eastern region with the score of 2.91. It can mean that students in northeastern region agreed that performance expectancy was more important than students in the eastern region agreed. For effort expectancy, the northeastern region has the highest score of mean with the score of 3.46. The lowest was the eastern region with the score of 3.17. This latent variable, students agreed that it was important with not much different level in each region. For social influence, the northeastern region has the highest score of mean with the score of 3.41. The lowest was the northern region with the score of 3.19. For facilitating condition, the northern region has the highest score of mean with the

score of 3.69. The lowest was the southern region with the score of 3.34. For behavioral intention to use, the southern region has the highest score of mean with the score of 3.69. The lowest was the eastern region with the score of 3.43. For actual usage, the central region has the highest score of mean with the score of 3.98. The lowest was the eastern region with the score of 3.68. Lastly, for student satisfaction, the northeastern region has the highest score of mean with the score of 3.23. The lowest was the eastern region with the score of 2.39 which indicated not satisfied (not agreed). It may be derived that students from eastern region were not satisfied with the online education system with far lower score than in the northeastern region.

4.3.2 The Result of Confirmatory Factor Analysis

The data was examined in this step before the researcher moves on to analyze the structural equation model. Based on the conceptual framework generated from the analysis of related papers and research, the authors examined the confirmatory components of the researcher's endogenous latent variables and exogenous latent variables. The corroborative component was examined using Lisrel program and statistical criteria for Goodness of Fit Statistics.

The results of the confirmatory component analysis of exogenous latent variables including performance expectancy (PE), effort expectancy (EE), social influence (SF), learner interaction (LI), and facilitating condition (FC)

According to Figure 4.1, the chi-square value was 21.08, the df value was 29, the P-value was 0.85613, which was larger than 0.05, and the RMSEA value was 0.000, which was less than 0.05, as a result of the confirmatory component analysis being in good agreement with empirical data and discovering that the standard component weights ranged between 0.64 and 0.89. It was shown that this model was a structural component of the variables performance expectancy (PE), effort expectancy (EE), social influence (SF), learner interaction (LI), and facilitating condition (FC), and that all sub-variables in the structural equation were adequately appraised

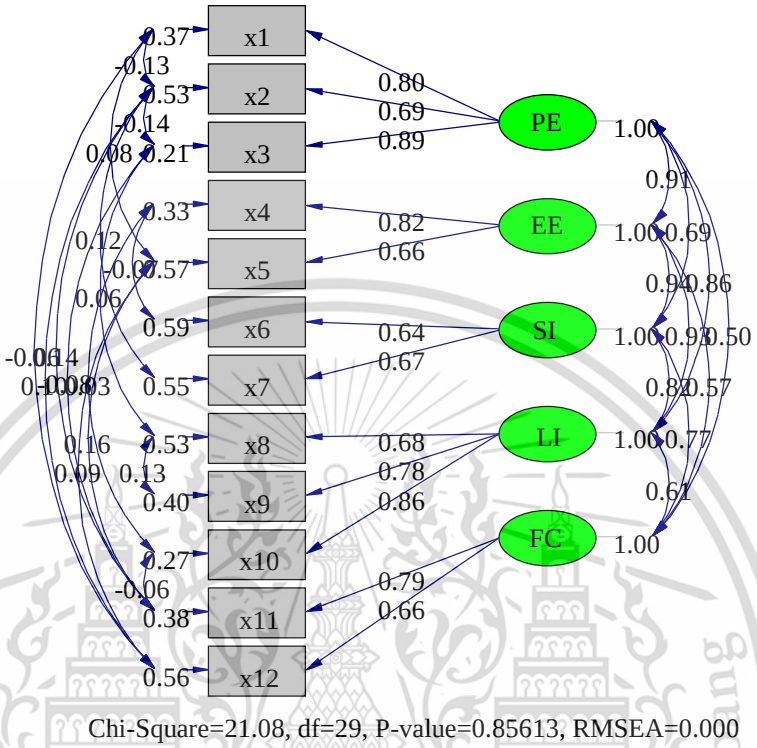
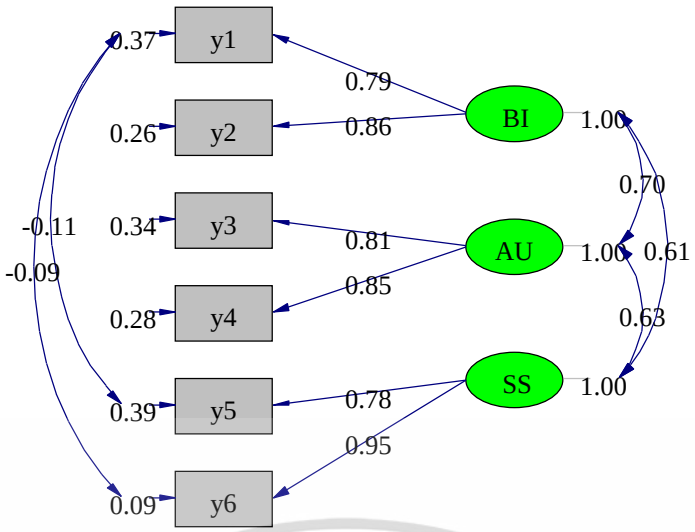


Figure 4.1 The results of the confirmatory factor analysis of exogenous latent variables

The results of the confirmatory component analysis of endogenous latent variables including behavioral intention to use (BI), actual usage (AU), and student satisfaction (SS)

As a result of the confirmatory component analysis being in good agreement with empirical data and discovering that the standard component weights ranged between 0.78 and 0.95, the chi-square value was 0.91, the df value was 4, the P-value was 0.92337, which was larger than 0.05, and the RMSEA value was 0.000, which was less than 0.05, as shown in Figure 4.2. This model was proven to be a structural component of the variables behavioral intention to use (BI), actual usage (AU), and student satisfaction (SS), with all sub-variables in the structural equation being suitably appraised.



Chi-Square=0.91, df=4, P-value=0.92337, RMSEA=0.000

Figure 4.2 The results of the confirmatory factor analysis of endogenous latent variables

The componant analysis of latent variables (Convergent Model)

Finally, before incorporating the variables into the structural equation model the researcher looked at the composition of the latent variables in the Convergent Model, which were performance expectancy (intrinsic motivation, extrinsic motivation, and perceived usefulness), effort expectancy (perceived ease of use, and course design), social influence (subjective norm, and social factor), facilitating condition (infrastructure, and internet connectivity), behavioral intention to use (usage frequency prediction, and usage plan), actual usage (usage frequency, and usage length), and student satisfaction (student retention, and course quality). The standard component weights were used to check the validity of the latent construct. Latent variables with a value larger than 0.5 were said to have excellent structural integrity. And such empirical variables were particularly good at explaining the variation of latent variables.

From table 4.32, the chi-squared value was 102.02, the df=88 value was 88, the P-value was 0.14569, and the RMSEA value was 0.024, which is less than 0.05, suggesting strong compatibility with the empirical data. All standard component weight values were between 0.64 and 0.93. If the value is more than 0.50, the latent variables can very well explain the variation of the latent variables. And the structural equation may effectively evaluate these observable variables.

Table 4.32 The results of the latent variable component model analysis.

Latent variables	Items	Standardized Loading	t-value	R^2
Performance Expectancy	PE			
	X1	0.79	14.73	0.62
	X2	0.74	11.31	0.54
	X3	0.90	17.73	0.81
Effort Expectancy	EE			
	X4	0.81	14.85	0.66
	X5	0.68	11.99	0.46
Social Influence	SI			
	X6	0.64	10.34	0.41
	X7	0.69	11.26	0.48
Learner Interaction	LI			
	X8	0.69	12.15	0.47
	X9	0.79	14.69	0.62
	X10	0.84	16.34	0.72
Facilitating Condition	FC			
	X11	0.76	11.96	0.60
	X12	0.65	10.26	0.43
Behavioral Intention to Use	BI			
	Y1	0.72		0.53
	Y2	0.91	12.17	0.84
Actual Usage	AU			
	Y3	0.78		0.61
	Y4	0.88	12.56	0.78
Student Satisfaction	SS			
	Y5	0.80		0.65
	Y6	0.93	14.49	0.87

Noted: Chi-Square=102.02, df=88, P-value=0.14569, RMSEA=0.024

4.3.3 The statistical findings evaluated the model's fit with the empirical data

Following a component analysis of latent variables and observable variables, it was determined that all 18 observable variables were appropriate for structural equation model analysis. As a result, the researcher tested the structural equation model using the observed data. Initially, there was no concordance with empirical data when the researcher constructed a hypothetical structural equation model based on the concept and related theories since the estimated statistics did not fulfill the required criteria. As a result, the researcher altered the hypothetical structural equation model (Model Adjust) by enabling the variance of the standard error of some pairs of empirical variables to be connected. As a consequence, the researcher made changes and developed a structural equation model that is consistent with the empirical data by enabling the variance of the standard error to be correlated.

A Goodness of Fit (GOF) (Table 4.33) was performed utilizing multiple statistical software packages and varied GOF nomenclature and criteria. However, LISREL 9.1 frequently employs $\chi 2/df$. As with most indices, numerous criteria are utilized. However, based on similar research by other authors, we adopted standards of $\chi 2/df \leq 2.00$ (Sahoo, 2019). Jöreskog et al. (2016), for instance, suggests that in LISREL modeling, the goodness of fit index (GFI) ≥ 0.90, the comparative fit index (CFI) ≥ 0.95, $p \geq 0.05$, and the root mean square error of approximation (RMSEA) ≤ 0.05. In addition, Schumacker and Lomax (2016) propose values for the normed fit index (NFI) ≥ 0.90, the AGFI ≥ 0.90, the root mean square residual (RMR) ≤ 0.05, and the standardized root mean square residual (SRMR) ≤ 0.05. As a result, as shown in Table 4.28, all GOF values significantly above the specified minimal GOF requirement, indicating that the model fit was excellent (Cangur & Ercan, 2015).

Table 4.33 The GOF of factors affecting online study student satisfaction (SS)

	Criteria	Values	Results
Chi-square: $\chi 2$	$p \geq 0.05$	0.15	Valid
Relative Chi-square: $\chi 2/df$	≤ 2.00	1.16	Valid
RMSEA	≤ 0.05	0.02	Valid
df		88	Valid
GFI	≥ 0.90	0.96	Valid
AGFI	≥ 0.90	0.92	Valid
RMR	≤ 0.05	0.03	Valid
SRMR	≤ 0.05	0.03	Valid
NFI	≥ 0.90	0.99	Valid
CFI	≥ 0.95	1.00	Valid

4.4 The findings of the direct, indirect, and total effect analyses

The findings of the examination of the structural model's direct, indirect, and total effects were shown in Table 4.34. It can be explained as follows.

4.4.1 Performance expectancy (PE) had a positive direct effect on Behavioral Intention to Use (BI) of 0.08 and positive total effect of 0.08, both of which were not statistically significant at the 0.05 level.

Performance expectancy (PE) had a positive direct effect on Student Satisfaction (SS) of 0.42, a positive indirect effect of 0.01 and a positive total effect of 0.43, both direct and total effects were statistically significant at the 0.01 level.

4.4.2 Effort expectancy (EE) had a positive direct effect on Actual Usage (AU) of 0.25 and a positive total effect of 0.25, both of which were statistically significant at the 0.05 level.

Effort expectancy (EE) had a positive indirect effect on Student Satisfaction (SS) of 0.08 and positive total effect of 0.08, both of which were not statistically significant at the 0.05 level.

4.4.3 Social Influence (SI) had a positive direct effect on Behavioral Intention to Use (BI) of 0.28 and positive total effect of 0.28, both of which were statistically significant at the 0.05 level.

Social Influence (SI) had a positive indirect effect on Student Satisfaction (SS) of 0.04 and positive total effect of 0.04, both of which were not statistically significant at the 0.05 level.

4.4.4 Learner Interaction (LI) had a positive direct effect on Behavioral Intention to Use (BI) of 0.47 and positive total effect of 0.47, both of which were statistically significant at the 0.01 level.

Learner Interaction (LI) had a positive direct effect on Student Satisfaction (SS) of 0.12, a positive indirect effect of 0.06 and positive total effect of 0.18, all of which were not statistically significant at the 0.05 level.

4.4.5 Facilitating Condition (FC) had a positive direct effect on Actual Usage (AU) of 0.21 and a positive total effect of 0.21, both of which were statistically significant at the 0.05 level.

Facilitating Condition (FC) had a positive direct effect on Student Satisfaction (SS) of 0.02, a positive indirect effect of 0.06 and positive total effect of 0.08, all of which were not statistically significant at the 0.05 level.

4.4.6 Behavioral Intention to Use (BI) had a positive direct effect on Actual Usage (AU) of 0.41 and a positive total effect of 0.41, both of which were statistically significant at the 0.01 level.

Behavioral Intention to Use (BI) had a positive indirect effect on Student Satisfaction (SS) of 0.12, and positive total effect of 0.12, both of which were not statistically significant at the 0.01 level.

4.4.7 Actual Usage (AU) had a positive direct effect on Student Satisfaction (SS) of 0.30 and a positive total effect of 0.30, both of which were statistically significant at the 0.01 level.

Table 4.34 Summary of direct effect (DE), indirect effect (IE), and total effect (TE) of each construct

Endogenous Latent Variables	Effects	R^2	Exogenous Latent Variables						
			PE	EE	SI	LI	FC	BI	AU
Behavioral Intention to Use (BI)	DE	0.61	0.08	-	0.28*	0.47**	-		
	IE		-	-	-	-	-		
	TE		0.08	-	0.28*	0.47**	-		
Actual Usage (AU)	DE	0.53	-	0.25*	-	-	0.21*	0.41**	
	IE		0.03	-	0.12	0.19*	-	-	
	TE		0.03	0.25*	0.12	0.19*	0.21*	0.41**	
Student Satisfaction (SS)	DE	0.54	0.42**	-	-	0.12	0.02	-	0.30**
	IE		0.01	0.08	0.04	0.06	0.06	0.12**	-
	TE		0.43**	0.08	0.04	0.18	0.08	0.12**	0.30**

Noted: *Sig. < 0.05, **Sig. < 0.01, Chi-Square=102.02, df=88, P-value=0.14569, RMSEA=0.024

The analysis revealed that all of the model's causative factors had a positive effect on SS, which had a total R^2 of 54% (Table 4.34). Furthermore, when the latent variables were sorted, the TE values were PE (0.43), AU (0.30), LI (0.18), and BI (0.12), EE (0.08), FC (0.08), and finally, SI (0.04). Furthermore, there was a reasonably substantial relationship between BI and LI (0.47), as well as SS and PE (0.42).

4.5 The findings of the study hypotheses testing

Table 4.35 shows the outcomes of the sixteen-hypothesis testing, eight of which were supported (S) and eight of which were not (NS). Furthermore, substantial strength was discovered in the H4b association between LI and BI (r= 0.47, t-value = 3.20**), followed by H1c and the relationship between PE and SS (r= 0.42, t-value = 2.63**), and H6a and the relationship between BI and AU (r= 0.41, t-value = 3.87**). Hair et al. (2016) also recommended that CVs be acceptable when t-values are more than 1.96.

Table 4.35 Summary of Hypotheses test result

Hypotheses	Coef.	t-value	Validity
H1a: Performance Expectancy (PE) directly affects Behavioral Intention (BI).	0.08	0.65	NS
H1b: Performance Expectancy (PE) indirectly affects Student Satisfaction (SS).	0.01	0.63	NS
H1c: Performance Expectancy (PE) directly affects Student Satisfaction (SS).	0.42	3.22**	S
H2a: Effort Expectancy (EE) directly affects Actual Use (AU).	0.25	2.20*	S
H2b: Effort Expectancy (EE) indirectly affects Student Satisfaction (SS).	0.08	1.95	NS
H3a: Social Influence (SI) directly affects Behavioral Intention (BI).	0.28	2.03*	S
H3b: Social Influence (SI) indirectly affects Student Satisfaction (SS).	0.04	1.62	NS
H4a: Learner Interaction (LI) directly affects Behavioral Intention (BI).	0.47	2.63**	S
H4b: Learner Interaction (LI) indirectly affects Student Satisfaction (SS).	0.06	1.88	NS
H4c: Learner Interaction (LI) directly affects Student Satisfaction (SS).	0.12	0.81	NS
H5a: Facilitating Conditions (FC) directly affects Actual Usage (AU).	0.21	2.40*	S
H5b: Facilitating Conditions (FC) indirectly affects Student Satisfaction (SS).	0.06	1.93	NS
H5c: Facilitating Conditions (FC) directly affects Student Satisfaction (SS).	0.02	0.21	NS
H6a: Behavioral Intention (BI) directly affects Actual Use (AU).	0.41	3.87**	S

Hypotheses	Coef.	t-value	Validity
H6b: Behavioral Intention to use (BI) indirectly affects Student Satisfaction.	0.12	2.62**	S
H7: Actual Use (AU) directly affects Student Satisfaction (SS).	0.30	3.56**	S

Noted: *Sig. < 0.05, **Sig. < 0.01

4.6 The research finding of an online education model for the next new normal

From the hypothesis test results and the variable correlation results, including the results of verifying the consistency between the researcher-created models and the empirical data with a consistency value and harmony, Chi-square = 102.02, Chi-square/df = 1.16, p-value = 0.14569 GFI = 0.960, AGFI =0.921, RMR = 0.0327, and RMSEA = 0.024

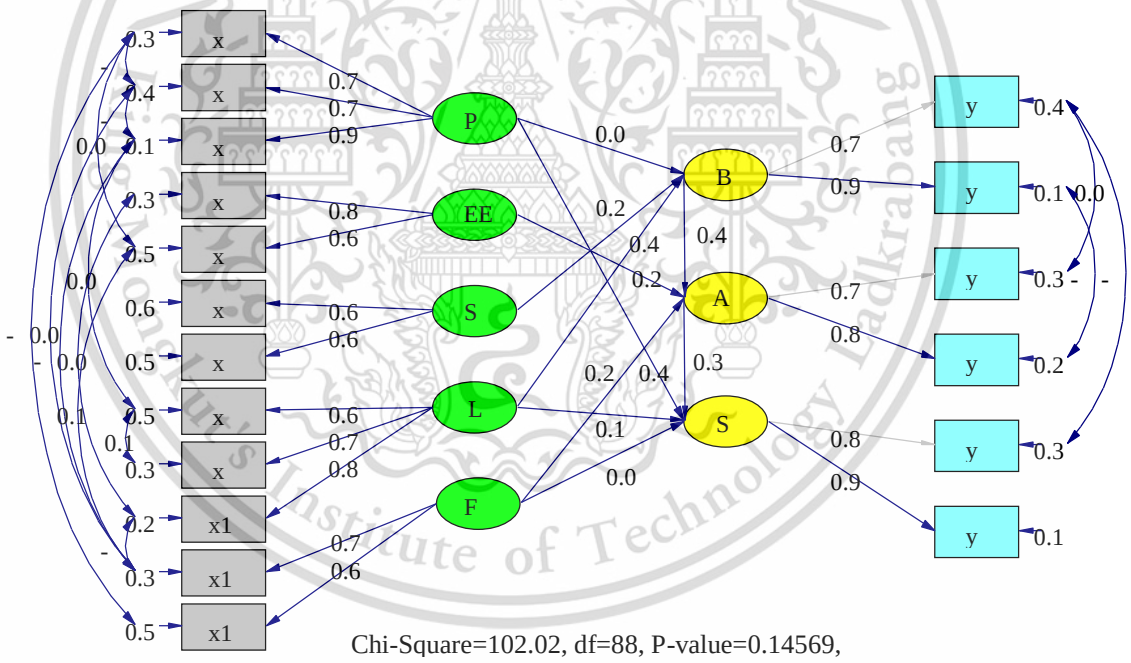


Figure 4.3 An Online Education Model for the Next New Normal

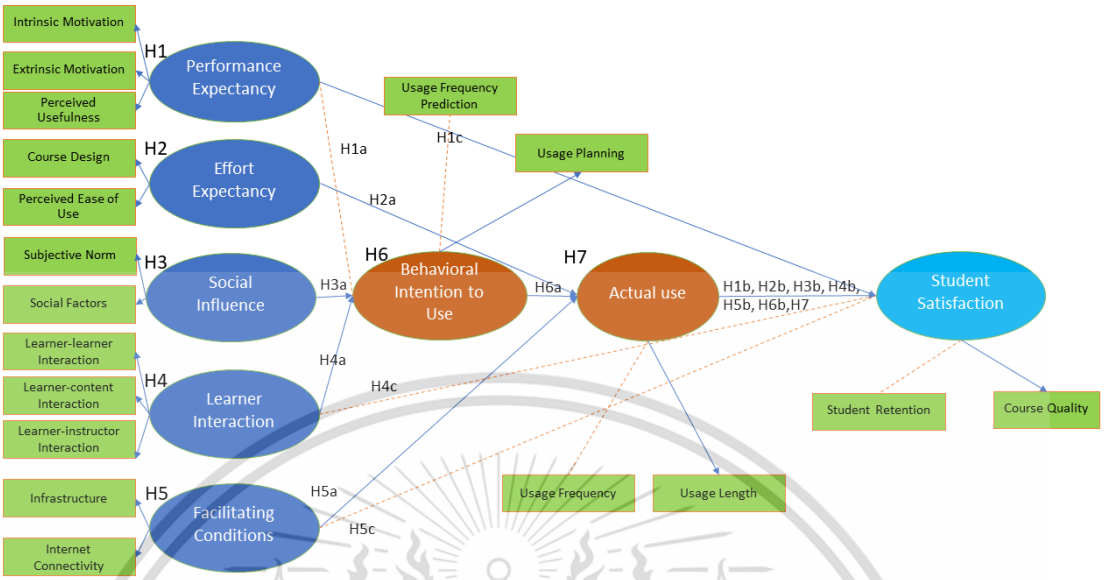


Figure 4.4 An Online Education Model for the Next New Normal

CHAPTER 5

CONCLUSION AND DISCUSSION

The study of developing an online education model for the next new normal: an empirical study of the learning satisfaction of Thai high school students in this chapter discussion and conclusion is presented with the following topics.

5.1 Conclusion

5.2 Discussion

5.2.1 Discussion of Hypothesis Test Result

5.2.2 Discussion of Research Questions and Objectives

5.3 Implication and Recommendations

5.4 Limitation of the Study and Direction for Future Research

5.1 Conclusion

The objectives of this study were

1) To study performance expectancy, effort expectancy, social influence, learner interaction, facilitating conditions, behavioral intention to use, actual use, and student satisfaction

2) To analyse the components of performance expectancy, effort expectancy, social influence, learner interaction, facilitating conditions, behavioral intention to use, actual use, and student satisfaction

3) To analyse direct effects and indirect effects of the variables.

4) To develop an online education model for the next new normal

Then, the conclusion will be described as follows.

5.1.1 The research finding of student general information

According to table 4.2, females made up the majority of high school student respondents, accounting for 62.20 percent of the total. The students were divided into nine groups of 30 from nine Thai provinces: Kalasin, Trang, Buriram, Pathum Thani, Phetchaburi, Phrae, Sa Kaeo,

Ayutthaya, and Ubon Ratchathani. Furthermore, table 4.3 demonstrates that 17-year-old students constituted the majority of responses, accounting for 34.81 percent of the total. With 87 (32.22 percent), 16-year-old students had the second-highest number of replies, followed by 15-year-old students, who received 49. (18.15 percent). The fourth group, with 38 students, consisted of 18-year-old-or-older students (14.07 percent). According to Table 4.4, students in grades 11 (mattayom 5) made up the majority of respondents, accounting for 35.19 percent of the total. Grade 12 (mattayom 6) received the second-highest number of responses, accounting for 33.33 percent of the total. Grade 10 (mattayom 4) received the third-highest number of responses, accounting for 31.48 percent of the total. In addition, according to table 4.5, 84.07 percent of students reported utilizing Google Meet as an online learning platform at their school, with Google Classroom coming in second with 202 respondents (74.81 percent). With 85 responders, Zoom Meeting was the third most favored system (31.48 percent). According to table 4.6, 136 people (50.37 percent) indicated their school's online learning system allowed them to study asynchronously. The remaining 134 respondents (49.63 percent) claimed that their school's online learning system did not provide asynchronous study. Table 4.7, on the other hand, shows that 38.50 percent of students paid extra online tuition to learn extra online lessons with institutions other than their school. When asked how many hours they spend studying online each day, 68.9 percent of the students in table 4.8 stated that they spent at least 7 hours per day. In addition to the personal data from table 4.9, 34.8 percent reported that their family's monthly income ranged from 10,000 to 25,000 baht ($300-$750). According to table 4.10, students lived with their parents the most, accounting for 68.52 percent of all respondents (185). With 44 respondents (16.30 percent), the second most popular response was father or mother (either one), followed by relatives or others with 39 respondents (14.44 percent). Furthermore, according to tables 4.11 and 4.12, 61.1 percent of students claimed to use smartphones to study online, with the laptop being the second most popular device, with 48 respondents (17.78 percent), followed by a PC desktop with 35 respondents (12.96 percent), and finally a tablet with 22 respondents (8.15 percent), with 89.60 percent indicating they already possessed a digital device when their online lessons began. In terms of internet coverage (table 4.13), 68.9 percent said they used a Wi-Fi signal to connect to the Internet, while the rest used their phone's SIM card. Because most students already had their own study equipment, the online learning cost for most students was between 0 and 5,000 baht, and it may be concluded that this cost included the monthly internet price (tables 4.14 and 4.15).

5.1.2 The conclusion of the study of performance expectancy, effort expectancy, social influence, learner interaction, facilitating conditions, behavioral intention to use, actual use, and student satisfaction.

The research finding found as follows:

- Confidence Intervals and Coefficient of determination

1. The coefficient of determination for each item of Performance Expectancy variables ranged from 0.47 to 0.79, while Cronbach's alpha for Performance Expectancy variables consisted of observable variables such as intrinsic motivation, extrinsic incentive, and perceived usefulness had a total value of 0.85. The data acquired from the analytical question item, which served as the study's metric, demonstrated that the variables' coefficient of determination and reliability are both high.

2. The coefficient of determination for each item of Effort Expectancy variables ranged from 0.67 to 0.87, while Cronbach's alpha for Effort Expectancy variables comprised of observable variables such as perceived ease of use and course design was 0.84. Data from the analytical question item, which served as the study's metric, demonstrated that the coefficient of determination and reliability of the variables are both high.

3. The coefficient of determination for each item of Social Influence variables ranged from 0.64 to 0.67, while Cronbach's alpha for Social Influence variables composed of observable variables including such subjective norms and social factors was 0.79. According to data produced from the analysis question item, which served as the study's measure, the coefficient of determination and variable reliability are moderate.

4. The coefficient of determination for each item of Learner Interaction variables ranged from 0.68 to 0.86, and Cronbach's alpha for Learner Interaction variables comprised of observable variables including such learner and learner interaction, learners and teachers' interaction, and learners and learning content interaction had a total value of 0.89. The data acquired from the analytical question item, which served as the study's metric, demonstrated that the variables' coefficient of determination and reliability are both high.

5. The coefficient of determination for each item of Facilitating Conditions variables ranged from 0.66 to 0.79, whereas Cronbach's alpha for Facilitating Conditions variables comprised of sub-variables such as ICT infrastructure and Internet availability was 0.79. According to data

produced from the analysis question item, which served as the study's measure, the coefficient of determination and variable reliability are moderate.

6. The coefficient of determination for each item of Behavioral Intention variables ranged from 0.63 to 0.74, while Cronbach's alpha for Behavioral Intention variables composed of sub-variables including such frequent usage prediction and intend to use was 0.84. Data from the analytical question item, which served as the study's metric, demonstrated that the coefficient of determination and reliability of the variables are both high.

7. The coefficient of determination for each item of Actual Use variables ranged from 0.66 to 0.72, yielding a total value of 0.82 for Cronbach's alpha for Actual Use variables, which included sub-variables including such frequency of use and usage time. The data acquired from the analytical question item, which served as the study's metric, demonstrated that the variables' coefficient of determination and reliability are both high.

8. The coefficient of determination for each item of Student Satisfaction variables ranged from 0.61 to 0.91, resulting in a total value of 0.85 for Cronbach's alpha for Student Satisfaction variables, which included sub-variables including such student retention and course quality. Data from the analytical question item, which served as the study's metric, demonstrated that the coefficient of determination and reliability of the variables are both high.

- Descriptive Statistic Data Conclusion

In this study, the basic statistical values of variables, including such mean, standard deviation, skewness, kurtosis, and variable criteria, were examined as follow:

1. In performance expectancy (PE), the mean of the latent variables was 3.22, which was considered moderate. A standard deviation of less than 1.25 suggested low variation. It was discovered that the data was skewed to the right in terms of distribution. (Skewness is positive.) Kurtosis has a platykurtic value. When the kurtosis value is less than 3, the data disperses away from the mean and the tails of the distribution become thinner.
2. In effort expectancy (EE), the mean of the latent variables was 3.31, which was considered moderate. A standard deviation of less than 1.25 indicated that there was little variance. When it comes to data distribution, the data was found to be slightly skewed to the right. (Skewness is positive.) Kurtosis has a platykurtic value. When the

kurtosis value is less than three, the data disperses away from the mean and the distribution's tails get thinner.

3. In social influence (SI), the mean of the latent variables was 3.34, which was considered moderate. A standard deviation of less than 1.25 indicated that the variation was low. When it came to data distribution, it was discovered that the data was somewhat skewed to the left. (Skewness is negative.) Kurtosis has the value platykurtic. When the kurtosis value is less than 3, the data scatters away from the mean and the distribution's tails get thinner.
4. In learner interaction (LI), the mean of the latent variables was 3.16, which was considered moderate. A standard deviation of less than 1.25 indicated that there was little variance. When it comes to data distribution, the data was found to be slightly skewed to the right. (Skewness is positive.) Kurtosis has a platykurtic value. When the kurtosis value is less than three, the data disperses away from the mean and the distribution's tails get thinner.
5. In the facilitating condition (FC), the mean of the latent variables was 3.49, which was considered moderate. A standard deviation of less than 1.25 indicated that there was little variance. When it comes to data distribution, the data was found to be slightly skewed to the left. (Skewness is a minor disadvantage.) Kurtosis has a platykurtic value. When the kurtosis value is less than three, the data disperses away from the mean and the distribution's tails get thinner.
6. In behavioral intention to use (BI), the mean of the latent variables was 3.58, which was considered moderate. A standard deviation of less than 1.25 indicated that the variation was low. It was discovered that the data was significantly biased to the left when it comes to distribution. (Skewness is a slight negative.) Kurtosis has the value platykurtic. When the kurtosis value is less than 3, the data scatters away from the mean and the distribution's tails get thinner.
7. In actual usage (AU), the mean of the latent variables was 3.84, which was considered moderate. A standard deviation of less than 1.25 indicated that there was little variance. When it comes to data distribution, the data was found to be slightly skewed to the left. (Skewness is a slight negative.) Kurtosis has a platykurtic value. When the

kurtosis value is less than three, the data disperses away from the mean and the distribution's tails get thinner.

8. In student satisfaction (SS), the mean of the latent variables was 2.91, indicating discontent. A standard deviation of less than 1.25 indicated that there was little variance. When it comes to data distribution, the data was found to be slightly skewed to the right. (Skewness is a minor plus.) Kurtosis has a platykurtic value. When the kurtosis value is less than three, the data disperses away from the mean and the distribution's tails get thinner.

5.1.3 The conclusion of the analysis of the components of performance expectancy, effort expectancy, social influence, learner interaction, facilitating conditions, behavioral intention to use, actual use, and student satisfaction

The research finding found as follows.

- Performance expectancy was composed of intrinsic motivation, extrinsic motivation, and perceived usefulness.
- Effort expectancy was consisted of perceived ease of use and course design.
- Social influence was composed of subjective norm and social factor.
- Learner interaction included all three types of interaction: learner-learner interaction, learner-instructor interaction, and learner-content interaction.
- Facilitating condition was consisted of infrastructure and internet connectivity.
- Behavioral intention to use was consisted of only usage planning.
- Actual usage was composed of only usage length.
- Student satisfaction was consisted of only course quality.

5.1.4 The conclusion of the Direct, Indirect, and Total Effect Analyses

The research finding found as follows.

5.1.4.1 Performance expectancy (PE) had a positive direct effect on behavioral intention to use (BI) of 0.08 and positive total effect of 0.08, both of which were not statistically significant at the 0.05 level. Also, performance expectancy (PE) had a positive direct effect on student satisfaction (SS) of 0.42 and a positive total effect of 0.43, both of which were statistically significant at the 0.01 level.

5.1.4.2 Effort expectancy (EE) had a positive direct effect on actual usage (AU) of 0.25 and a positive total effect of 0.25, both of which were statistically significant at the 0.05 level.

5.1.4.3 Social influence (SI) had a positive direct effect on behavioral intention to use (BI) of 0.28 and positive total effect of 0.28, both of which were statistically significant at the 0.05 level.

5.1.4.4 Learner interaction (LI) had a positive direct effect on behavioral intention to use (BI) of 0.47 and positive total effect of 0.47, both of which were statistically significant at the 0.01 level. Moreover, learner interaction (LI) had a positive direct effect on student satisfaction (SS) of 0.18 and positive total effect of 0.18, both of which were not statistically significant at the 0.05 level.

5.1.4.5 Facilitating vondition (FC) had a positive direct effect on actual usage (AU) of 0.21 and a positive total effect of 0.21, both of which were statistically significant at the 0.05 level. In addition, facilitating condition (FC) had a positive direct effect on student satisfaction (SS) of 0.02 and positive total effect of 0.08, both of which were not statistically significant at the 0.05 level.

5.1.4.6 Behavioral intention to use (BI) had a positive direct effect on actual usage (AU) of 0.41 and a positive total effect of 0.41, both of which were statistically significant at the 0.01 level.

5.1.4.7 Actual usage (AU) had a positive direct effect on student satisfaction (SS) of 0.30 and a positive total effect of 0.30, both of which were statistically significant at the 0.01 level.

5.1.5 The conclusion of the development of an online education for the next new normal.

The research finding found that the model consisted of 8 latent variables which are 1) performance expectancy 2) effort expectancy 3) social influence 4) learner interaction 5) facilitating condition 6) behavioral intention to use 7) actual usage and 8) student satisfaction. The model was fit from the statistics analyzed by SEM. The model's causal variables were then calculated to have a positive effect on student satisfaction, which had an R2 of 54 percent. Performance expectancy (PE=0.43) was shown to be the most significant when rated by total effect (TE) values, followed by actual usage (AU=0.30), learner interaction (LI=0.18), and behavioral intention (BI=0.12).

5.2 Discussion

5.2.1 Discussion of Hypothesis Test Result

The researcher discussed the research results based on the following hypotheses.

5.2.1.1 H1: Performance Expectancy has a direct and indirect effect to student satisfaction. This hypothesis was divided into H1a, H1b, and H1c.

H1a: Performance Expectancy (PE) directly affects Behavioral Intention (BI) and H1b: Performance Expectancy (PE) indirectly affects Student Satisfaction (SS) were not supported by the quantitative data analysis process. However, they showed a slight positive direct and indirect effect respectively. However, it is noted that perceived usefulness (x3 = 0.89) and intrinsic motivation (x1 = 0.80) were important to online students, which is supported by a study by Fagan et al. (2008), who discovered a positive relationship between intrinsic motivation and perceived ease of use, as well as a positive relationship between perceived ease of use and BI to use computers. These findings are also similar with Teo et al. (2019), who found that ease of use and usefulness were significant from a sample of students' opinions toward using Moodle in their study of university student use of Moodle online in Macau. Moreover, Lakhal, Khechine & Pascot (2013), Eom & Ashill (2016), Mendoza, Jung & Kobayashi (2017), Patricia Aguilera-Hermida (2020), Kornpitack & Sawmong (2020), Al-Rahmi, Shamsuddin & Alismaiel (2020), Baber (2020), and Jongkolthanalarp, Chaiyasoonthorn, & Chaveesuk (2021) have all come to similar conclusions as well. Nonetheless, according to the interviewees, performance expectancy was the significant factor that influenced students' use of online learning, particularly perceived usefulness (x3 = 0.89), this may be because students usually studied for their grade of GPA, and sometimes for their future goal, such as admission to a good university. As a result, if online learning can provide them with those benefits, students will use it.

H1c: Performance Expectancy (PE) directly affects Student Satisfaction (SS). H1c was supported by a relatively high correlation between PE and SS (r = 0.47, t-value = 3.20, p 0.01). Eom & Ashill (2016), Patricia Aguilera-Hermida (2020), Al-Rahmi, Shamsuddin & Alismaiel (2020), Baber (2020), and Jongkolthanalarp, Chaiyasoonthorn, & Chaveesuk (2021) have all come to similar conclusions. Moreover, according to the five experts from the interview, this factor was argued to be one of the most important factors to make student satisfied with online learning, as

they argued that students usually study for their grade of GPA, and sometimes for their future goal like an admission to a good university. (perceived usefulness (x3 = 0.89) and intrinsic motivation (x1 = 0.80))

5.2.1.2 H2: Effort Expectancy has an indirect effect to student satisfaction. This hypothesis was divided into H2a and H2b.

H2a: Effort Expectancy (EE) directly affects Actual Use (AU). The results revealed a modest but positive connection between EE and AU, with r = 0.25, t-value = 2.20, and p less than 0.05. This is similar with past studies in which course design (x5 = 0.93) has been demonstrated to be particularly essential to SS and a student's AU (Lee, 2014; Mendoza, Jung & Kobayashi, 2017; Liu et al., 2010; Sun and Chen, 2016). If interactive tools such as a discussion room and chat room are provided to an online course, students will use these channels to engage in their class and create an engaging learning environment. Furthermore, live streaming collaboration tools like Zoom, Microsoft Team, and Google Meet make it easier than ever for students to interact with their peers and instructors (Kanetaki et al., 2021). Furthermore, regarding the interview, experts agreed that course design played a very important role in satisfaction with online learning.

H2b: Effort Expectancy (EE) indirectly affects Student Satisfaction (SS). This hypothesis was not supported by the quantitative data analysis process. However, it showed a very slight positive indirect effect, which is in the similar way with the previous research including Lee (2014), Mendoza, Jung & Kobayashi (2017), Liu et al. (2010), Sun and Chen (2016). However, a very slight positive indirect effect may be due to students believing that learning online is a must during the epidemic. Thus, not every student has a willingness in studying online, and their satisfaction score with the online education was below 3 (2.91), and the score of the satisfaction with the effort expectancy related statement in the questionnaire was just around 3. It can mark a question that if the quality of factors providing effort expectancy was good enough during the pandemic time. However, the experts argued that this factor could be very vital for online learning in spite of the quantitative finding.

5.2.1.3 H3: Social Influence has an indirect effect to student satisfaction. This hypothesis was divided into H3a and H3b.

H3a: Social Influence (SI) directly affects Behavioral Intention (BI). The relationship between SI and BI in H3a was also weakly but positively supported, with r = 0.28, t-value = 2.03, and p less than 0.05. This is congruent with the findings of Venkatesh et al. (2000), who discovered

that, while attitude was more relevant for males, subjective norms and perceived behavioral control were more crucial for women in the early phases of technology adoption. Moreover, Venkatesh et al. (2003), Im, Hong & Kang (2011), San Martin & Herrero (2012), Jung & Lee (2015), El-Masri & Tarhini (2017), Kornpitack & Sawmong (2020), and Al-Rahmi, Shamsuddin & Alismaiel (2020) have all come to similar conclusions. Similarly, the experts from the interview agreed that social influence could have an impact on student satisfaction with online learning.

H3b: Social Influence (SI) indirectly affects Student Satisfaction (SS). This hypothesis was not supported by the quantitative data analysis process. However, it showed a slight positive indirect effect. Interestingly, despite the perspectives from the experts from the interview that they agreed that social influence could have an impact on student satisfaction with online learning, this aspect was stated less frequently than the others (regarding table 4.1 in chapter 4), implying that it was important but not as critical as the others. In addition, this was consistent with the findings of the quantitative analysis of H3a, which revealed the smallest effect among the validated hypotheses.

5.2.1.4 H4: Learner Interaction has a direct and indirect effect to student satisfaction. This hypothesis was divided into H4a, H4b, and H4c.

H4a: Learner Interaction (LI) directly affects Behavioral Intention (BI). We determined that the relationship in H4a from LI to BI was reasonably strong in its support. This was attributed to the following factors: $r = 0.47$, t-value = 2.63, and $p \leq 0.01$. This is congruent with the findings of Asmuni et al. (2012) and Pimdee and Leekitchwatana (2022), who found that kids watch their surrounding peers through the use of social media, peer pressure, and family interaction. This result was also concurrent with Moore (1989), Kuo et al. (2013), Parahoo et al. (2015), Bisht, Jasola, and Bisht (2020), Alqurashi (2018), and Baber, (2020). Moreover, the experts from the interview also agreed that learner interaction was the vital key for the use of online learning.

H4b: Learner Interaction (LI) indirectly affects Student Satisfaction (SS) and H4c: Learner Interaction (LI) directly affects Student Satisfaction (SS). These hypotheses were not supported by the quantitative data analysis process. It did, however, demonstrate a minor positive direct and indirect effect, which were consistent with the experts' perspectives from the interview. During the Thai COVID-19 outbreak, they highlighted that learner-learner and learner-instructor interactions were advised to play an important role in satisfying students in online learning. This view was also concurrent with Moore (1989), Kuo et al. (2013), Parahoo et al. (2015), Bisht, Jasola, and Bisht (2020), Alqurashi (2018), and Baber, (2020). However, the degree of effect was not as strong as

projected, which might be due to deficiencies in the processes and systems in use. According to previous research, LMS platforms such as Moodle considerably contribute to online learning satisfaction and collaboration. However, it was discovered that many courses are delivered online without the use of a learning management system. As a result, student interaction with their classmates, teachers, and assignments decreases (Kanetaki et al., 2021; Krouska et al., 2021; Teo et al., 2019; Yawson and Yamoah, 2020).

5.2.1.5 H5: Facilitating Conditions have a direct and indirect effect to student satisfaction. This hypothesis was divided into H5a, H5b, and H5c.

H5a: Facilitating Conditions (FC) directly affects Actual Usage (AU). In H5a, the relationship between FC and BI was found to be supported although weak. This was related to r = 0.21, t = 2.40, and p = 0.05. These findings are supported by a research of university students in both Indonesia (352) and Thailand (380), in which the authors said that in online courses in Thailand, service quality (SQ) reliability was rated as the most essential (Darawong & Widayati, 2021). Furthermore, in Thailand, the greatest SQ dimensions influencing SS were reliability, responsiveness, and competence, in that order. However, the most significant SS effects on SQ among Indonesian university students were empathy, responsiveness, competence, and reliability, in that order. Furthermore, we can see that the observed variables ICT infrastructure (x11) and Internet availability (x12) are seen as critical components of SS by online students in previous research (Bisht et al., 2020; Mendoza, Jung & Kobayashi, 2017; Nonthamand et al., 2021).

H5b: Facilitating Conditions (FC) indirectly affects Student Satisfaction (SS) and H5c: Facilitating Conditions (FC) directly affects Student Satisfaction (SS). These hypotheses were not supported by the quantitative data analysis process. It did, however, show a slight positive indirect and direct effect, which were consistent with the experts' thoughts from the interview. They said that this was a critical issue that needed to be solved in order to complete a successful online learning program. However, the magnitude of the effect was not as strong as anticipated due to the Thai government's obligations to provide Internet connectivity and supporting infrastructure (Oranop, 2016; Chardnarumarn, Sukkamart, & Kantathanawat, 2021)

5.2.1.6 H6: Behavioral Intention to use has an indirect effect to student satisfaction. This hypothesis was divided into H6a and H6b.

H6a: Behavioral Intention (BI) directly affects Actual Use (AU). The association between BI and AU was found to be relatively strong in hypothesis H6a. It was supported by r = 0.41, t-

value = 3.87, and p $\leq$ 0.01. This finding is congruent with the studies of Venkatesh et al. (2003), Im, Hong & Kang (2011), San Martin & Herrero (2012), Jung & Lee (2015), Kornpitack & Sawmong (2020), and Al-Rahmi, Shamsuddin & Alismaiel (2020).

H6b: Behavioral Intention to use (BI) indirectly affects Student Satisfaction (SS). The association between BI and SS was found to be strong in hypothesis H6b. It was supported by r = 0.12, t-value = 2.62, and p $\leq$ 0.01. This finding is congruent with the studies of Venkatesh et al. (2003), Im, Hong & Kang (2011), San Martin & Herrero (2012), Jung & Lee (2015), Kornpitack & Sawmong (2020), and Al-Rahmi, Shamsuddin & Alismaiel (2020).

5.2.1.7 H7: Actual Use (AU) directly affects Student Satisfaction (SS).

The relationship from AU->SS was found to be moderately strong and supported by r = 0.30, t-value = 3.56, p 0.01, in the study's tenth and final hypothesis, H7. This finding is supported by research from Thongsri et al. (2019), which determined that online course performance expectancy, social influence, information quality, and system quality significantly affect intention to use. Moreover, this finding is also supported by Aldholay et al. (2017), Hou (2012), and Isaac et al. (2017).

5.2.2 Discussion of Research Questions and Objectives

5.2.2.1 What are performance expectancy, effort expectancy, social influence, learner interaction, facilitating conditions, behavioral intention to use, and actual use to student satisfaction in online education?

The focus of this research was to look at the current state of online learning in Thailand, as well as how it affects student satisfaction in Thai secondary schools. During the COVID-19 pandemic, PE and AU were proven to be predictors of online learning SS (Sig. < .05). The degree of LI and FC can also be used to predict SS (not significant). Furthermore, EE can be a factor, but it will have an impact on the degree of actual usage, which will result in SS. However, because this study has a limitation that may have an impact on the findings, we cannot exclude the non-significant effects of other latent variables. In response to the open-ended question on how to improve Thailand's online learning system, course design from effort expectancy aspects and all three kinds of interaction were still addressed. Furthermore, because many responses showed political or vaccination-related responses, numerous students continue to have an emotional tie to the country's political concerns. Furthermore, it is believed that students' opinions about online

learning may have been impacted by the pandemic's unfavorable feelings (Patricia Aguilera-Hermida, 2020).

5.2.2.2 What are the components of performance expectancy, effort expectancy, social influence, learner interaction, facilitating conditions, behavioral intention to use, actual use, and student satisfaction?

All of the hypothesized observable factors for performance expectancy, effort expectancy, social influence, learner interaction, and facilitating conditions were found to be components. Performance expectancy was composed of intrinsic motivation, extrinsic motivation, and perceived usefulness. The components of effort expectancy were perceived ease of use and course design. The components of social influence were subjective norm and social factor. Learner interaction included all three types of interaction: learner-learner interaction, learner-instructor interaction, and learner-content interaction. In the final model, however, only usage planning, usage length, and course quality were shown to be able to explain behavioral intention to use, actual usage, and student satisfaction respectively. It was due to the current situation with online learning in Thailand, where it is required due to the pandemic, that the satisfaction score was low. It might lead to a poor student retention rate.

5.2.2.3 How each variable has a direct effect and indirect effect on each other?

Performance expectancy (PE) had a positive direct effect on behavioral intention to use (BI) of 0.08 and positive total effect of 0.08, both of which were not statistically significant at the 0.05 level. Also, performance expectancy (PE) had a positive direct effect on student satisfaction (SS) of 0.42, a positive indirect effect of 0.01 and a positive total effect of 0.43, both direct and total effects were statistically significant at the 0.01 level.

Effort expectancy (EE) had a positive direct effect on actual usage (AU) of 0.25 and a positive total effect of 0.25, both of which were statistically significant at the 0.05 level.

Social influence (SI) had a positive direct effect on behavioral intention to use (BI) of 0.28 and positive total effect of 0.28, both of which were statistically significant at the 0.05 level.

Learner interaction (LI) had a positive direct effect on behavioral intention to use (BI) of 0.47 and positive total effect of 0.47, both of which were statistically significant at the 0.01 level. Moreover, learner interaction (LI) had a positive direct effect on student satisfaction (SS) of 0.18 and positive total effect of 0.18, both of which were not statistically significant at the 0.05 level.

Facilitating condition (FC) had a positive direct effect on actual usage (AU) of 0.21 and a positive total effect of 0.21, both of which were statistically significant at the 0.05 level. In addition, facilitating condition (FC) had a positive direct effect on student satisfaction (SS) of 0.02 and positive total effect of 0.08, both of which were not statistically significant at the 0.05 level.

Behavioral intention to use (BI) had a positive direct effect on actual usage (AU) of 0.41 and a positive total effect of 0.41, both of which were statistically significant at the 0.01 level.

Actual usage (AU) had a positive direct effect on student satisfaction (SS) of 0.30 and a positive total effect of 0.30, both of which were statistically significant at the 0.01 level.

5.2.2.4 How high school student satisfaction with online education helps in developing an online education model for the next new normal?

In today's markets, student satisfaction is claimed to be one of the most essential variables in evaluating the quality of an education program, because it is seen as a key predictor of the quality of academic experiences (Yukselturk & Yildirim, 2008; Kuo, Walker, Belland & Schroder, 2013; Parahoo, Santally, Rajabalee & Harvey, 2015). Thus, investigating student satisfaction with online education helps in developing an online education model for the next new normal. It was found that performance expectancy and actual usage were predictors of online learning's student satisfaction. Whereas the other factors including such effort expectancy, social influence, and learner interaction cannot be dismissed as the experts from the interview supported that these factors were very important in developing the online education model for the next new normal. In order to develop the successful model for online education, these factors (performance expectancy, effort expectancy, social influence, learner interaction, and facilitating condition) need to be addressed. However, based on the structural equation modeling analysis and the quantitative data analysis in chapter 4, performance expectancy is the factor that need to be focused as the first priority in order to develop the successful model for the next new normal.

5.3 Implication and Recommendations

5.3.1 Implication for students, schools, online education industry, Thai government, and countries across the world

Implication for students

This research provided a focus for the stakeholders to improve the online education system. According to the research, performance expectancy is the predictor of student satisfaction with the online learning system. Furthermore, student satisfaction may be predicted by the degree of behavioral intention to use and actual usage. In addition, other factors also cannot be ignored as the experts and students also mentioned in the interview and the answer to the open-ended question on how to enhance Thailand's online learning system respectively. Also, this research pointed out the issue that schools or other stakeholders must solve. Thus, the online education system will be improved. Students will have the opportunity to acquire high-quality knowledge because there are no physical barriers with the development of the online education system at schools and the expansion of the options available to them to study online.

Implication for schools and Thai government

This research illustrated an effective model to explain student satisfaction in online education. According to the research, performance expectancy, effort expectancy, social influence, learner interaction, and facilitating condition are the factors that need to be focused, regarding the results and the experts' perspective. Also, in this study, there were more female respondents than male respondents in this study. It may be deduced that female students are more likely than male students to embrace an online educational method, which is consistent with Bisht et al (2020). Thus, schools should find the way to focus on male students to be able to embrace online learning method like female students. Moreover, 50.40 percent of respondents said their schools allow them to study both asynchronously and synchronously, but the rest said they don't. It was an area where every school could develop and provide assistance to children at this time. In addition, 38.50 percent of the students needed to take an additional online tutoring course. It might raise the question of whether all schools are held to the same educational standards, or whether the entrance exam assesses students' knowledge outside the curriculum. In terms of daily usage time, more than 68.90% of students studied for more than 6 hours, which they later claimed was excessive in the open-ended question. Another essential aspect to note is that the smartphone was the most commonly used main device. We can observe that the smartphone has a tiny screen, making it unsuitable for taking a long-hour online course. However, virtually all students already have a primary device, and the wifi signal served as their primary source of internet access. As can be seen, students in Thailand now have access to these infrastructures; nevertheless, whether these fundamental infrastructures are sufficient remains to be seen. As the last question demonstrates,

students still had an additional monthly expenditure linked to online learning, implying that students needed to update their internet access in order to have a consistent online learning experience. In response to the open-ended question, approximately 22.22 percent of respondents offered a response. The majority of responders were worried with the design of the online course, such as the fact that students were given too much homework. The online learning exam method was inapplicable and unsuitable for the majority of students. They also claimed that some of their teachers' online teaching methods were a waste of time. In addition, the way schools handle their online learning systems for pupils was not well-organized. Furthermore, students acknowledged that the length of time spent online learning was critical, not only for the efficacy of their learning process, but also because long-hour online studying had a negative impact on students' physical health. Thailand Physical Activity Knowledge Development Centre (TPAK) study backed up this claim (Diawkee, 2021). Students also said that teachers may be a crucial component in making students satisfied with online learning, but only a small percentage of them were able to do this.

For schools, this data can be gathered to enhance the effectiveness of their online learning programs and aid students in learning as much as possible. An effective online education can be an excellent option for schools to improve student academic achievement. Additionally, teachers will get the ability to interact with a wider range of students and learn about a diversity of viewpoints on the course material. Since teachers get to know their students better and can better understand how they are coping with the class and course contents, this not only results in deeper, more engaging courses but also fosters stronger relationships between teachers and students.

For Thai government, the surveys led me believe that online education in Thailand is currently not a success. Student satisfaction score with online learning was only about 3 out of 5, which was not particularly high. It may be concluded that students in Thailand are dissatisfied with the online learning system. There are still a lot of things that might be done better. The government might use this model as its main point of concentration, the government can offer a policy to enhance the online learning system. The government can also address the problems listed in the previous paragraphs. With the upgraded online education system, students will have the chance to receive high quality instruction, and their academic performance will be improved.

Implication for online education industry

This study presented a useful approach to explain why students are satisfied with their online education. According to the study's findings and the opinions of experts, it is important to concentrate on elements such as performance expectancy, effort expectancy, social influence, learner interaction, and facilitating conditions. Additionally, this research highlighted the problem with which stakeholders must deal. The online learning sector will be able to develop and raise the caliber of its offerings with the use of this information. As a result, there will be more competition in the market since all businesses may produce high-quality online courses that meet student expectations.

Implication for countries across the world

This study offered a helpful strategy for illuminating the extent to which students are satisfied with their online education. This study also spotlighted the issue that stakeholders must resolve. Education is one of the few things that all nations, regardless of cultural differences, require equally. In light of this, it would not be unreasonable for them to adopt and modify this concept. Students will have the opportunity to obtain high quality instruction with the improved online education system, and as a result, the society will have more knowledgeable graduates with high capability. These people are therefore more likely to secure well-paying jobs. They will have more career prospects the more educated and accomplished they are. Because education is about gaining knowledge and using it intelligently in our lives while also improving the lives of others, it contributes to the economic growth of nations. The development of the world economy will follow the development of each nation.

5.3.2 Recommendations

Recommendations to all stakeholders (students, online education industry, schools, Thai government, and countries across the world)

During the epidemic, the government or other stakeholders might initially focus on improving aspects connected to performance expectancy in order to boost student satisfaction. The stakeholders must have a policy to address the immediate benefits for studying online to students such as an extra point in class. As students need to see their reward and understand what they will get by studying online. Moreover, the stakeholders should have a session to train teachers to use necessary programs in order to teach online. Also, the core curriculum of Thai education must be

altered to accommodate online learning during the pandemic, and for the future use of online education. Another issue is the infrastructure. The government must find the way to get people to access both devices and networks with affordable costs. According to Expert 1 from chapter 4, three essential things need to be accomplished. First and foremost, the government needs to allocate funds for everyone's demand for study materials. Second, the government needs to guarantee complete nationwide coverage of internet signal. Thirdly, the government must alter the custom of teachers producing study materials that are uploaded to the cloud for use by students rather than writing textbooks. These recommendations also are similar to the way Chinese government done with their education system (Zhou, Li, Wu & Zhou, 2020).

Furthermore, another suggestion is to bring a number of experts in various area regarding teaching together with a production team to produce study materials and learning media that all schools can use, and all students can access. If we are unable to physically give students with a selection of qualified and experienced professors, we may be able to do it digitally.

In addition, for the benefit of students' physical health and the effectiveness of their learning process, schools and the government should establish a policy limiting the amount of time students spend each day studying online. Additionally, students should use their smartphones less after spending a lot of time studying online in order to preserve their physical health.

5.3.3 Contribution to the research

This research was conducted in the midst of the ongoing global COVID-19 outbreak. Despite this, we were able to survey 270 students who were daily active with taking online courses under Thailand's very controversial online education system. As a result, the study is one of the first to specify what variables influence a student satisfaction with online courses and provide solutions. Also, in term of academic finding, learner interaction appeared to be another factor added when it comes to student satisfaction with online learning. The research contribution of this study is that it was undertaken during the pandemic lockdown while students were enrolled in Thai Ministry of Education (MOE) online courses. In terms of course design, online platforms, and student retention, the findings have major practical implications for educational institutions and decision-makers. We believe it is research that will stimulate the interest of people all throughout the world, from course instructors to cabinet-level ministers.

5.4 Limitation of the Study and Direction for Future Research

Despite the fact that the study conducted in 2021 during extreme lockdown conditions caused by the multi-year COVID-19 epidemic, we were able to organize a survey of 270 students with the help of local teachers on an online questionnaire answer using Google Form. Nonetheless, since many replies indicated politic or vaccination linked answers, several students still have an emotional attachment to the country's political issues. Moreover, it is argued that the pandemic's negative sentiments may have influenced students' attitudes toward online learning (Patricia Aguilera-Hermida, 2020). Furthermore, there was a limitation during the interview because it was conducted solely through the internet platform Zoom Meeting. People in Thailand were compelled to be socially isolated and to work from home at the time. As a result, some of the emotional reactions that researchers often receive when they physically confront respondents were missing. As a consequence, the researcher may occasionally interpret the material incorrectly.

However, we expect that further investigations under less restrictive settings will provide more detail from a larger sampling population, maybe ASEAN (Association of Southeast Asian Nations) in nature. As, this research can explain the factors affecting student satisfaction with online leaning at the degree of 0.54 (R^2=0.54). Another process of quantitative data analysis apart from the SEM that this study conducted might be interesting as well if the result will be different. Moreover, because this study has a constraint that may have an impact on the results, we cannot rule out the non-significant effects of other latent variables. In addition, there might be other factors apart from the mentioned factors affecting student satisfaction with online learning as well. For instance, there should also be more accurate estimates of how much bandwidth online students receive from their primary point of connection to their online courses, how much it costs, and the carrier utilized to offer the link.

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0%B8%82%E0%B8%AD%E0%B8%87%E0%B8%99%E0%B8%B1%E0%B8%81%E0%B9%80%E0%B8%A3%E0%B8%B5%E0%B8%A2%E0%B8%99%E0%B8%95%E0%B8%B2%E0%B8%A1%E0%B8%8A%E0%B9%88%E0%B8%A7%E0%B8%87%E0%B8%84%E0%B8%B0%E0%B9%81%E0%B8%99%E0%B8%99%E0%B8%9C%E0%B8%A5.pdf

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APPENDIX

APPENDIX A

List of Selected Area of education and School Names by simple random technique

No.	Name of Selected Areas	Name of Selected Schools
1	Phetchaburi Secondary Educational Service Area Office	Prommanusorn Phetchaburi School
2	Kalasin Secondary Educational Service Area Office Area	Kalasinpittayasan School
3	Pathum Thani Secondary Educational Service Area Office	Thammasat Klongluang Wittayakom School
4	Trang and Krabi Secondary Educational Service Area Office	Wichienmatu School
5	Ubon Ratchathani and Amnat Charoen Secondary Educational Service Area Office	Narinukun School
6	Phrae Secondary Educational Service Area Office	Nareerat School Phrae
7	Sa Kaeo Secondary Educational Service Area Office	Sa Kaeo School
8	Phra Nakhon Si Ayutthaya Secondary Educational Service Area Office	Ayutthayawittayalai School
9	Buriram Secondary Educational Service Area Office	Lam Plai Mat School

APPENDIX B

List of Names and Addresses of Experts Determining the Research Questionnaire

No	Name-Surname	Position	Contact Address	e-mail
1	Assoc. Prof. Dr. Supamas Angsuchot	Lecturer of Sukhothai Thamathirat University	Sukhothai Thamathirat University	supamas_ang@hotmail.com
2	Pol.Col. Dr. Khwanchat Wongkajonpaiboon	Superintendent	Technology Crime Suppression Division	-
3	Asst.Prof. Dr. Singha Chaveesuk	Lecturer of KMITL Business School	KMITL Business School	singha@it.kmitl.ac.th
4	Asst.Prof. Dr. Nuttawut Rojniruttikul	Lecturer of KMITL Business School	KMITL Business School	nuttawut.ro@kmitl.ac.th
5	Dr. Nisakorn Chadchavalpanich	School Director of Kornpitacksuksa School	Kornpitacksuksa School	nisakorn_ch@hotmail.com

APPENDIX C

Interview Questions

Part	Answer
Part 1 Personal information of key informant such as gender age ant etc.	Answer
Part 2 Interview question about how to make a high school student satisfy with online education in Thailand	Answer
Part 3 How important of this factor on online education in Thailand in your opinion - Performance Expectancy (PE) -Social Influence (SI) -Learner Interaction (LI) -Facilitating Conditions (FC) -Behavioral Intention (BI) -Actual use (AU) -Student Satisfaction. (SS)	Answer

APPENDIX D

Research Questionnaire

Student Satisfaction with the school's online learning system

This questionnaire is part of the Ph.D. research study conducted by Mr. Piriyakorn Kornpitack

(A Ph.D. candidate in Industrial Business Administration program, KMITL Business School, King Mongkut's Institute of Technology Ladkrabang). Participants are Thai high school students who used or has used school's online learning system during COVID-19 pandemic. All responses will be analysed only for an academic purpose. They will never be traced back to any individuals. Your response will be combined with those of many others and summarized in a research report. I am truly grateful for your cooperation and thank you for completing this questionnaire.

Part 1 General Questions

Please fill in the blank or place a check mark (✓) in the box provided (❑)

(Please answer the following questions according to the truth)

1. Gender ❑ 1) Male ❑ 2) Female

2. Age ❑ 1) 14 years ❑ 2) 15 years
❑ 3) 16 years ❑ 4) 17 years
❑ 5) 18 years or older

3. Which grade are you in?

❑ 1) Grade 10 (Mattayom 4) ❑ 2) Grade 11 (Mattayom 5) ❑ 3) Grade 12 (Mattayom 6)

4. Which province is your school in? .....

5. The online learning system you use at school. (Can choose more than 1 choice)

❑ 1) Zoom Meeting ❑ 2) Google Classroom
❑ 3) Google Meet ❑ 4) Line Meeting
❑ 5) Facebook Live ❑ 6) Microsoft Team
❑ 7) Virtual School Online ❑ 8) Others

6. Can you access videos and other materials of your classes by the school's online learning system(s) after the specific class time?

❑ 1) Yes ❑ 2) No

7. In addition to studying online with the school, do you have extra online tuition with other places?

❑ 1) Yes ❑ 2) No

8. How many hours do you study online in a day?

❑ 1) Less than 1 hour ❑ 2) 1 - 3 hours

❑ 3) 4 - 6 hours ❑ 4) 7 - 8 hours

❑ 5) 8 hours or more

9. Family's average monthly income

❑ 1) Less than 10,000 baht ❑ 2) 10,001 baht to 25,000 baht

❑ 3) 25,001 baht to 40,000 baht ❑ 4) 40,001 baht to 55,000 baht

❑ 5) 55,001 baht to 70,000 baht ❑ 6) More than 70,000 baht

10. Who do you live with?

❑ 1) Parents ❑ 2) Father or Mother (either one)

❑ 3) Relatives or others ❑ 4) Alone

11. What devices do you primarily use for online learning?

❑ 1) PC Desktop ❑ 2) Tablet

❑ 3) Smartphone ❑ 4) Laptop

❑ 5) Smart TV

12. The device in question 11 already exists or needs to be purchased new.

❑ 1) Already owned ❑ 2) Buy new one

13. Internet signal used by phone SIM or Wi-Fi

❑ 1) Wi-Fi signal ❑ 2) Signal from phone sim

14. How much does online-learning expense cost, beside your regular monthly spending?

❑ 1) 0 - 5,000 baht ❑ 2) 5,001 - 10,000 baht

❑ 3) 10,001 - 15,000 baht ❑ 4) 15,001 - 20,000 baht

❑ 5) More than 20,000 baht

15. How much additional monthly expenses do you have each month?

❑ 1) 0 - 100 baht ❑ 2) 101 - 500 baht

❑ 3) 501 - 1,000 baht ❑ 4) More than 1,000 baht

Please place a check mark (✓) in the box (❑) that **mostly agree with your opinion**

Part 2 Performance Expectancy

Performance Expectancy	Strongly disagree ⇨ Strongly agree				
	1	**2**	**3**	**4**	**5**
Intrinsic Motivation					
1. Online learning will allow me to develop myself independently.					
2. Online learning will give me more opportunities to learn on my own.					
3. Online learning will make me feel fun and happy.					
Extrinsic Motivation					
4. I will concentrate on studying online in order to get good grades.					
5. I studied online in order to be able to take the entrance exam to the university I wanted.					
6. If I get good grades from online learning, it will be appreciated by my family and society.					
Perceived Usefulness					
7. Online learning will improve my learning outcomes.					
8. Online learning will enhance my other learning activities.					
9. Online learning will provide me with the knowledge I need to complete the homework assignments that my teachers have assigned to me.					

Part 3 Effort Expectancy

Effort Expectancy	Strongly disagree ⇨ Strongly agree				
	1	**2**	**3**	**4**	**5**
Perceived Ease of Use					
10. I find online learning system(s) easy to use.					
11. Steps to use online learning system(s) are simple.					
12. I will be able to use online learning system(s) easily.					
Course Design					
13. Materials used for online learning are fairly complicated, which cause the studying to be more challenging.					
14. Assessments in online learning are appropriate.					
15. My school's online learning system(s) encourages me to keep studying.					
16. Levels of difficulty of online exams vary depending on students' ability, which is challenging .					

Part 4 Social Influence

Social Influence	Strongly disagree ⇨ Strongly agree				
	1	**2**	**3**	**4**	**5**
Subjective Norm					
17. I study online because my friend(s) suggested it.					
18. I study online because my teacher(s) suggested it.					
19. I study online because my family suggested it.					
Social Factor					
20. I think online learning is a thing everyone does at the present.					
21. My teachers provide full support for online learning.					
22. My school fully supports online learning.					

Part 5 Learner Interaction

Learner Interaction	Strongly disagree ⟹ Strongly agree				
	1	2	3	4	5
Learner-learner Interaction					
23. I have more discussions about studying with other students through online learning.					
24. More discussions about learning between students in the classroom emerges as a result of this online learning.					
25. I have developed my knowledge from talking with fellow students in online learning more than in traditional learning.					
Learner-instructor Interaction					
26. I have had more conversations with my teachers through online learning.					
27. Instructors respond to questions from online learning with students rather quickly.					
28. The instructor's way of communicating in online learning has given me a better understanding of the lesson.					
Learner-content Interaction					
29. Online learning materials are interesting and stimulating to learn.					
30. Online learning materials are easily accessible.					
31. Online learning materials have helped me understand the lessons better.					

Part 6 Facilitating Condition

Facilitating Condition	Strongly disagree ⟹ Strongly agree				
	1	2	3	4	5
Learning Equipment					
32. I have necessary equipment for online learning.					
33. I have necessary programs for online learning.					
34. Online learning requires more equipment than a usual learning method.					
Internet Connectivity					
35. My internet speed for online learning is quite high.					
36. I have stable internet connection for online learning.					
37. I have nearby variety of internet networks to choose.					

Part 7 Behavioral Intention to Use

Behavioral Intention to Use	Strongly disagree ⟹ Strongly agree				
	1	2	3	4	5
Usage Frequency Prediction					
38. I will study online every time whenever I can.					
39. I will study online every day throughout the semester.					
Usage Plan					
40. I intend to study online every time according to my schedule.					
41. I intend to study online in order to review the course material later.					
42. I intend to study online in order to study the content in advance.					

Part 8 Actual Usage

Actual Usage	Strongly disagree ⟹ Strongly agree				
	1	**2**	**3**	**4**	**5**
Usage Frequency					
43. I study online every day.					
44. I study online every time whenever I can.					
Usage Length					
45. An online class, which is less than 1 hour per session, allows me to concentrate on the class.					
46. A short-time class prevents students from being bored.					
47. A short-time class is more effective to study than a long-time class.					
48. In a day, I am able to study online for a total of 5 hours, which is more efficient than to study 8 hours.					

Part 9 Student Satisfaction

Student Satisfaction	Strongly disagree ⟹ Strongly agree				
	1	**2**	**3**	**4**	**5**
Student Retention					
49. I want to continue using the online learning system(s) next semester.					
50. I want to use the online learning system(s) in the university.					
Course Quality					
51. I am satisfied with the knowledge gained from online learning.					
52. I can apply the knowledge in exams.					
53. I get better grades by studying online.					

54. Please provide an additional suggestion for improving online learning systems. (Optional)

……

……

……

$$$$$$$$***Thank you very much for your kind help***$$$$$$$

APPENDIX E

Summary of the tool's validity assessment form

Methods and Procedures

Each question in the questionnaire will be rated by five experts. For each query, the score value is then averaged to calculate the Index of Item-Objective Congruence (IOC). It is preferable if each query has an IOC of 0.6 or higher.

Score +1 = if the expert is certain that the item accurately calculates the attribute

Score 0 = if the expert is not certain that the item accurately calculates the attribute Score -1 = if the expert is certain that the object does not calculate the attribute

List of Names of Experts Determining the Research Questionnaire by using IOC Technique

No	Name-Surname	Position
1	Assoc.Prof. Dr. Supamas Angsuchot	Lecturer of Sukhothai Thamathirat University
2	Pol.Col. Dr. Khwanchat Wongkajonpaiboon	Police Lieutenant Colonel of Technology Crime Suppression Division
3	Asst.Prof. Dr. Singha Chaveesuk	Lecturer of KMITL Business School
4	Asst. Prof. Dr. Nuttawut Rojniruttikul	Lecturer of KMITL Business School
5	Dr. Nisakorn Chadchavalpanich	School Director of Kornpitacksuksa School

Questions	No. of experts					IOC
	1	2	3	4	5	
Personal Information and Opinion (Q1 – Q16)						
1. Gender	1	1	1	1	1	1
2. Age	1	1	1	1	1	1
3. What year are you in high school?	1	1	1	1	1	1
4. What province is your school in?	1	1	1	1	1	1
5. The online learning system you use at school	1	1	1	1	1	1
6. Is the school's online learning system able to study asynchronously?	1	1	1	1	1	1
7. In addition to studying online with the school, do you have extra online tuition with other places?	1	1	1	0	1	0.8
8. How many hours do you study online in a day?	1	1	1	1	1	1
9. Family's average monthly income	1	1	1	1	1	1
10. Who do you live with?	1	1	1	1	1	1
11. What devices do you primarily use for online learning?	1	1	1	1	1	1
12. The device in question 11 already exists or needs to be purchased new.	1	1	1	1	1	1
13. Internet signal used by phone SIM or Wi-Fi	1	1	1	1	1	1
14. Overall, how much does online learning cost more?	1	1	0	1	1	0.8
15. How much additional monthly expenses do you have each month?	1	1	1	0	1	0.8
16. Please provide an additional suggestion for improving online learning systems in Thailand. (Open-ended) (Optional)	1	1	1	1	1	1
Performance Expectancy (Intrinsic Motivation (Q17 – Q19))						
17. Online learning will allow me to develop myself independently.	1	1	1	1	1	1
18. Online learning will give me more opportunities to learn on my own.	1	1	1	1	1	1

Questions	No. of experts					IOC
	1	2	3	4	5	
19. Online learning will make me feel fun and happy.	1	1	1	1	1	1
Performance Expectancy (Extrinsic Motivation (Q20 – Q22))						
20. I will concentrate on studying online in order to get good grades.	1	1	1	1	1	1
21. I studied online in order to be able to take the entrance exam to the university I wanted.	1	1	1	1	1	1
22. If I get good grades from online learning, it will be appreciated by my family and society.	1	1	1	1	1	1
Performance Expectancy (Perceived Usefulness (Q23 – Q25))						
23. Online learning will improve my learning outcomes.	1	1	1	1	1	1
24. Online learning will enhance my other learning activities.	1	1	1	1	1	1
25. Online learning will provide me with the knowledge I need to complete the homework assignments that my teachers have assigned to me.	1	1	1	1	1	1
Effort Expectancy (Perceived Ease of Use (Q26 – Q28))						
26. I found online learning to be easy to use.	1	1	1	1	1	1
27. Online learning is a simple learning process	1	1	1	1	1	1
28. I will be able to use the online learning system fluently.	1	1	1	1	1	1
Effort Expectancy (Course Design (Q29 – Q32))						
29. The materials used for online learning are difficult enough to make learning challenging.	1	1	1	1	1	1
30. The scoring model in online learning is appropriate.	1	1	1	1	1	1
31.The school's online learning style keeps me constantly learning.	1	1	1	1	1	1

Questions	No. of experts					IOC
	1	2	3	4	5	
32. The difficulty of online exams varies according to the student's ability to study, making it challenging.	1	1	1	1	1	1
Social Influence (Subjective Norm (Q33 - Q35))						
33. I studied online because my friend suggested it.	1	1	1	1	1	1
34. I studied online because my teacher recommended it.	1	1	1	1	1	1
35. I studied online because my family recommended it.	1	1	1	1	1	1
Social Influence (Social Factor (Q36 - Q38))						
36. I think online learning nowadays is something everyone learns.	1	1	1	1	1	1
37. My teachers provide full support for online learning.	1	1	1	1	1	1
38. My school fully supports online learning.	1	1	1	1	1	1
Learner Interaction (Learner-learner Interaction (Q39 -Q41))						
39. I have more discussions about studying with other students through online learning.	1	1	1	1	1	1
40. More discussions about learning between students in the classroom emerges as a result of this online learning.	1	1	1	1	1	1
41. I have developed my knowledge from talking with fellow students in online learning more than in traditional learning.	1	1	1	1	1	1
Learner Interaction (Learner-instructor Interaction (Q42 -Q44))						
42. I have had more conversations with my teachers through online learning.	1	1	1	1	1	1
43. Instructors respond to questions from online learning with students rather quickly.	1	1	1	1	1	1

44. The instructor's way of communicating in online learning has given me a better understanding of the lesson.	1	1	1	0	1	0.8
	No. of experts					
Questions	1	2	3	4	5	IOC
Learner Interaction (Learner-content Interaction (Q45 - Q47))						
45. Online learning materials are interesting and stimulating to learn.	1	1	1	1	1	1
46. Online learning materials are easily accessible.	1	1	1	1	1	1
47. Online learning materials have helped me understand the lessons better.	1	1	1	1	1	1
Facilitating Condition (Infrastructure (Q48 - Q50))						
48. I have all the equipment I need for online learning.	1	1	1	1	1	1
49. I have all the necessary programs ready to study online.	1	1	1	1	1	1
50. The use of online learning requires more equipment than normal learning.	1	1	1	1	1	1
Facilitating Condition (Internet Connectivity (Q51 - Q53))						
51. Internet speed for online learning is quite high.	1	1	1	1	1	1
52. I have a relatively stable internet connection while studying online.	1	1	1	1	1	1
53. Where I live there is a wide variety of internet networks to choose from.	1	1	1	1	1	1
Behavioral Intention to Use (Usage Frequency Prediction (Q54 – Q55))						
54. I will study online whenever I can.	1	1	1	1	1	1
55. I will study online regularly every day throughout the semester.	1	1	1	1	1	1
Behavioral Intention to Use (Usage Plan (Q56 – Q58))						
56. I intend to study online every time according to my schedule.	1	1	1	1	1	1
57. I intend to study online in order to review the course material later.	1	1	1	1	1	1

Questions	No. of experts					IOC
	1	2	3	4	5	
58. I intend to study online in order to study the content in advance.	0	1	1	1	1	0.8
Actual Usage (Usage Frequency (Q59 – Q60))						
59. I study online every day.	1	1	1	1	1	1
60. I study online whenever I can.	0	1	1	1	1	0.8
Actual Usage (Usage Length (Q61 – Q64))						
61. Studying online that takes less than 1 hour per session allows me to concentrate on my studies.	0	1	1	1	1	0.8
62. Setting up an online teaching time that isn't too long. Help students not get bored.	1	1	1	0	1	0.8
63. Providing a shorter number of hours to study online makes it more effective for studying that takes longer.	1	1	1	0	1	0.8
64. In one day, I was able to study online for a total of 5 hours, which is more efficient than 8 hours of studying all day.	1	1	1	1	1	1
Student Satisfaction (Student Retention (Q65 – Q66)						
65. I want to continue using the online learning system next semester.	1	1	1	0	1	0.8
66. I would like to use the online learning system in my university studies	1	1	1	1	1	1
Student Satisfaction (Course Quality (Q67 – Q69)						
67. I am satisfied with the knowledge gained from online learning.	1	1	1	1	1	1
68. I can apply the knowledge I have gained in the exam.	1	1	1	1	1	1
69. I got better grades by studying online.	1	1	1	1	1	1

APPENDIX F

Expert's Profile and Certificate of Translation

PRAPATSORN TIRATANTI

Department of Linguistics, Faculty of Liberal Arts
Thammasat University, THAILAND
prapatsorn.t@arts.tu.ac.th

EDUCATIONAL BACKGROUND

2016-2017 **MSc Applied Linguistics – The University of Edinburgh, U.K.**
Completion with merit
Dissertation: The Speech Presentation of Thai News Reports
Supervisor: Professor Joseph Gafaranga

2012-2015 **BA (Thai – Honors Program) – Chulalongkorn University, THAILAND**
Completion with first-class honors and a gold medal reward for highest achievement
Honors program thesis: Speech act of requests by Burmese second language speakers of Thai: Interlanguage pragmatics and intercultural pragmatics
Supervisor: Dr. Natthaporn Panpothong

ACADEMIC POSITION

2018-present **Lecturer**
Department of Linguistics, Faculty of Liberal Arts, Thammasat University, THAILAND

GRANTS & SCHOLARSHIPS

2020 **Thammasat University's Research Fund**
Research Unit, Faculty of Liberal Arts, Thammasat University

2016 **Outstanding Thai Linguistics Student Scholarship**
Chatrachai – Orapim Pongprayoon Foundation

2012-2015 **Honors Program Scholarship**
Faculty of Arts, Chulalongkorn University

2012-2015 **Thai Language and Linguistic Expertise Development Project Scholarship**
Chulalongkorn University

PUBLICATIONS

To appear Tiratanti, P. Variation of [kʰáː] and [kʰàː] in written Thai and its relation to users' knowledge of tone marking system. *Manutsayasat Wichakan 29*(2). (in Thai)

2019 Tiratanti, P. & Tungviboonyakit, N. Difference between speech presentation of news reports in newspapers and online news in Thai: A case study of political news. *Journal of Language and Linguistics 37*(2), 21-46. (in Thai)

CONFERENCE PRESENTATION

2021 **Tiratanti, P.** Subjectivity in reported speech and writing in Thai Supreme Court judgments. *The 15th Biennial Conference of the International Association of Forensic Linguistics (IAFL)*, Aston Institute for Forensic Linguistics, Aston University, Birmingham, UK. [online conference due to Covid-19 situation].

2020 **Tiratanti, P.** Thought presentation embedded in speech presentation in Thai news reports. *The 53rd Annual Meeting of the Societas Linguistica Europaea (SLE) 2020*, The University of Bucharest, Romania. [online conference due to Covid-19 situation]. https://osf.io/juwhs/

2019 **Tiratanti, P.** The variation of female-specific final particles in Thai. *KU National Conference on Language, Culture and Societies*, Department of Linguistics, Faculty of Humanities, Kasetsart University. https://bit.ly/arSfDfd (in Thai)

2016 **Jiemwongsa (Tiratanti) P.** The speech act of request by Burmese Thai L2: The interlanguage and intercultural pragmatics. *Manee Panya – Wichayamala: A century of Thai Arts Chula*, Department of Thai, Faculty of Arts, Chulalongkorn University. (in Thai)

RESEARCH REPORT

2021 **Tiratanti, P.** *Speech presentation and writing presentation in Supreme Court judgment in Thai: A discourse analysis perspective.* (Thammasat University's Research Fund) (in Thai)

BOOK CHAPTER

To appear **Tiratanti, P. & Durongbhan, P.** Reported thought embedded in reported speech in Thai news reports. In Casartelli, D. E., Cruschina, S., Posio, P. & Spronck, S. (eds.). *The grammar of thinking: From reported speech to reported thought in the languages of the world*. De Gruyter Mouton.

TEACHING EXPERIENCE

Undergraduate Courses Taught at Department of Linguistics, Faculty of Liberal Arts, Thammasat University

Phonetics and Phonology (Sem 1 2021)

Language and Gender (Sem 1 2021, 2020, 2019)

Discourse Analysis (Sem 1 2021, 2020)

Thai Phonetics and Phonology (Sem 2 2020, 2019, 2018)

Pragmatics (Sem 2 2020, 2019, 2018)

Introduction to Linguistics (Sem 1 2019, 2018)

Varieties of Thai (Sem 1 2018)

ACADEMIC INTEREST

Phonetics/Phonology and talk-in-interaction, Sociophonetics, Discourse analysis

SKILLS

MS Office (Very good)
Praat (Fair)

LANGUAGES

Thai (native)
English (Overall – Good C1)
French (Reading – intermediate)

CERTIFICATE OF TRANSLATION

I, Prapatsorn Tiratanti, am competent to translate from Thai to English, and certify that the translation of the questionnaire (Student Satisfaction with School's Online Learning System) is true and accurate to the best of my abilities.

Prapatsorn Tiratanti, *MSc*
20 September 2021

E-mail: prapatsorn.t@arts.tu.ac.th

APPENDIX G

Ethical Approved Certificate

NIDA Clinical Trials Network

Certificate of Completion

is hereby granted to

Piriyakorn Kornpitack

to certify your completion of the six-hour required course on:

GOOD CLINICAL PRACTICE

MODULE:	STATUS:
Introduction	N/A
Institutional Review Boards	Passed
Informed Consent	Passed
Confidentiality & Privacy	Passed
Participant Safety & Adverse Events	Passed
Quality Assurance	Passed
The Research Protocol	Passed
Documentation & Record-Keeping	Passed
Research Misconduct	Passed
Roles & Responsibilities	Passed
Recruitment & Retention	Passed
Investigational New Drugs	Passed

Course Completion Date: 15 May 2021

CTN Expiration Date: 15 May 2024

Tracee Williams, Training Coordinator
NIDA Clinical Coordinating Center

Good Clinical Practice, Version 5, effective 03-Mar-2017

This training has been funded in whole or in part with Federal funds from the National Institute on Drug Abuse, National Institutes of Health, Department of Health and Human Services, under Contract No. HHSN272012010000024C.

APPENDIX H

62 Areas of Secondary Educational Service Area Office

Each area consists of schools from 1 to 2 provinces, which can illustrate as following.

1. Bangkok Secondary Educational Service Area Office Area 1
2. Bangkok Secondary Educational Service Area Office Area 2
3. Kanchanaburi Secondary Educational Service Area Office
4. Kalasin Secondary Educational Service Area Office
5. Kamphaeng Phet Secondary Educational Service Area Office
6. Khon Kaen Secondary Educational Service Area Office
7. Chanthaburi and Trat Secondary Educational Service Area Office
8. Chachoengsao Secondary Educational Service Area Office
9. Chonburi and Rayong Secondary Educational Service Area Office
10. Chaiyaphum Secondary Educational Service Area Office
11. Chiang Rai Secondary Educational Service Area Office
12. Chiang Mai Secondary Educational Service Area Office
13. Trang and Krabi Secondary Educational Service Area Office
14. Tak Secondary Educational Service Area Office
15. Nakhon Pathom Secondary Educational Service Area Office
16. Nakhon Phanom Secondary Educational Service Area Office
17. Nakhon Ratchasima Secondary Educational Service Area Office
18. Nakhon Si Thammarat Secondary Educational Service Area Office
19. Nakhon Sawan Secondary Educational Service Area Office
20. Nonthaburi Secondary Educational Service Area Office
21. Narathiwat Secondary Educational Service Area Office
22. Nan Secondary Educational Service Area Office
23. Bueng Kan Secondary Educational Service Area Office
24. Buriram Secondary Educational Service Area Office
25. Pathum Thani Secondary Educational Service Area Office
26. Prachuap Khiri Khan Secondary Educational Service Area Office

27. Prachinburi and Nakhon Nayok Secondary Educational Service Area Office
28. Pattani Secondary Educational Service Area Office
29. Phra Nakhon Si Ayutthaya Secondary Educational Service Area Office
30. Phayao Secondary Educational Service Area Office
31. Phang Nga, Phuket, and Ranong Secondary Educational Service Area Office
32. Phatthalung Secondary Educational Service Area Office
33. Phichit Secondary Educational Service Area Office
34. Phitsanulok and Uttaradit Secondary Educational Service Area Office
35. Phetchaburi Secondary Educational Service Area Office
36. Phetchabun Secondary Educational Service Area Office
37. Phrae Secondary Educational Service Area Office
38. Maha Sarakham Secondary Educational Service Area Office
39. Mukdahan Secondary Educational Service Area Office
40. Mae Hong Son Secondary Educational Service Area Office
41. Yala Secondary Educational Service Area Office
42. Roi Et Secondary Educational Service Area Office
43. Ratchaburi Secondary Educational Service Area Office
44. Lopburi Secondary Educational Service Area Office
45. Lampang and Lamphun Secondary Educational Service Area Office
46. Loei and Nong Bua Lamphu Secondary Educational Service Area Office
47. Sisaket and Yasothon Secondary Educational Service Area Office
48. Sakon Nakhon Secondary Educational Service Area Office
49. Songkhla and Satun Secondary Educational Service Area Office
50. Samut Prakan Secondary Educational Service Area Office
51. Samut Songkhram and Samut Sakhon Secondary Educational Service Area Office
52. Sa Kaeo Secondary Educational Service Area Office
53. Saraburi Secondary Educational Service Area Office
54. Sing Buri and Ang Thong Secondary Educational Service Area Office
55. Sukhothai Secondary Educational Service Area Office
56. Suphan Buri Secondary Educational Service Area Office
57. Surat Thani and Chumphon Secondary Educational Service Area Office

58. Surin Secondary Educational Service Area Office
59. Nong Khai Secondary Educational Service Area Office
60. Udon Thani Secondary Educational Service Area Office
61. Uthai Thani and Chai Nat Secondary Educational Service Area Office
62. Ubon Ratchathani and Amnat Charoen Secondary Educational Service Area Office

AUTHOR BIOGRAPHY

Education Background:

2016 - 2017 MSc Management (Completion with Merit)

School of Business Management, Queen Mary University of London

Dissertation: Job Satisfaction and Employee Retention in Family Business in Thailand (Distinction)

Supervisor: Assoc. Prof. Dr. Min Yan

2012 - 2016 BBA Finance (Minor in Human Resource and Organisations)

(First Class Honours)

Thammasat Business School, Thammasat University

Work Experience:

2017 - Present Being a managing director at EDUGEN Co., Ltd. (Online Tutoring Company)

2016 - 2017 Being an Online marketing manager at 168 Education Co., Ltd.

Extra activities:

2021 Being awarded "The Best Presentation Award" for the paper presented in The 4th International Conference on Business, Informatics, and Management

2020 - Present Being a coordinator between high schools in Thailand/ Taiwan University and KMITL Business School

2020 Received Certificate of Completion (Certified Award) from British Council Training Suite in a role of agent