



**UNIVERSITI PUTRA MALAYSIA**

***FACTORS THAT INFLUENCE SATISFACTION  
TOWARDS FROG VIRTUAL LEARNING ENVIRONMENT  
AMONG CHAMPION SECONDARY SCHOOL TEACHERS IN SOUTHERN  
REGION OF MALAYSIA***

**CHEOK MEI LICK**

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**By**

**CHEOK MEI LICK**

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia,  
in Fulfillment of the Requirements for the Degree of Doctor of Philosophy**

**May 2018**

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment  
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**Chairperson : Professor Wong Su Luan, PhD**  
**Faculty : Educational Studies**

The focus of the study was to investigate factors that influence satisfaction towards the FROG Virtual Learning Environment (VLE) in the teaching and learning among the Champion Secondary Schools teachers. It is imperative for MOE to determine the factors that predicts satisfaction towards FROG VLE due to its implications to teachers' continuous usage of the system. It has been reported that there is an association between user satisfaction and a continued usage of an e-learning system. This would help e-learning developers, MOE, school administrators and teachers to be more apt in designing strategies that are more likely to increase teachers' satisfaction, thus continue the use of e-learning.

The predictors studied were from three categories; characteristics of the teachers, the system and the organisation. Specifically, the factors studied from each category were computer anxiety, computer attitude and internet self-efficacy for teacher's characteristics; training, technical support and school management in relation to organisation's characteristics; and perceived usefulness, perceived ease of use, flexibility and interaction in studying FROG VLE's characteristics. Use of the FROG VLE was studied as a mediator and gender as a moderator.

The study was based on a quantitative method with correlational research design conducted by analysing the statistics of mean, standard deviation, percentage and frequency. The statistical analysis of Structural Equation Modeling (SEM) had used SPSS and AMOS Version 22 in analysing the data. The validity of the instrument was established through a panel of content and language experts. A pilot test was carried out among 64 teachers and the Cronbach Alpha Coefficient was found ranging from .81 to .97. The Confirmatory Factor Analysis (CFA) was conducted in

order to test for consistency of constructs and to determine the constructs validity. The study involved 350 respondents from the Champion FROG VLE secondary school teachers from three states, namely, Negeri Sembilan, Melaka and Johor. In selecting the sample, the technique used was the proportionate stratified cluster sampling.

Several significant findings emerged from this study. The results attained from the analysis generated a model – the Malaysian Teachers' Satisfaction Model that could be used to explain factors that affect satisfaction towards the FROG VLE among school teachers. There were five significant paths in influencing Satisfaction which are the Internet Self-Efficacy, Computer Attitude, Training, Flexibility and Use of FROG VLE. Consequently, 86% of the variance in satisfaction was explained by the five variables of the study.

Mediation analysis has found the construct Use of FROG VLE to be significant, acting as a partial mediator between Internet Self-efficacy and Satisfaction. Full mediation were found in the relationship between Computer Anxiety, Perceived Usefulness, Perceives Ease of Use, Interaction and School Management on Satisfaction. Gender was found not significant as a moderator between Use and Satisfaction.

Factors that were found to influence teachers satisfaction towards FROG VLE include Internet Self-Efficacy, Computer Attitude, Training, Flexibility and Use of Frog VLE. Through the mediation test, it can be concluded that with greater use of the FROG VLE, it would lead variables like Computer Anxiety, Perceived Usefulness, Perceives Ease of Use, Interaction and School Management towards Satisfaction. As gender is not significant as a moderator, no differentiation of trainings is needed between the male and female teachers. Hence, the findings of this research will guide and direct stakeholders into specifically focusing on factors that have direct relevance and influence onto teachers satisfaction towards the FROG VLE. As satisfaction will ensure continued use of the system, this in turn will help to further build teachers' pedagogical skills and techniques in teaching through the FROG VLE. The hope for a more sophisticated utilisation of technology across the schools would then be realised. This will also benefit and yield greater returns to the Ministry of Education in line with the investment made towards the virtual learning initiative for classroom teaching and learning.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Doktor Falsafah

**FAKTOR YANG MEMPENGARUHI  
TAHAP KEPUASAN PENGGUNAAN APLIKASI FROG VLE DALAM  
KALANGAN GURU SEKOLAH MENENGAH CHAMPION DI BAHAGIAN  
SELATAN MALAYSIA**

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Fokus kajian ini adalah untuk mengkaji faktor yang mempengaruhi kepuasan terhadap pengajaran dan pembelajaran dalam kalangan guru Sekolah Menengah *Champion*. Faktor-faktor yang mempengaruhi tahap kepuasan ini dikaji daripada tiga kategori iaitu ciri-ciri guru itu sendiri, ciri-ciri *FROG VLE*, dan ciri-ciri pihak pengurusan. Secara terperinci, kajian ini akan mengkaji ciri-ciri pengguna dari aspek tahap kerisauan terhadap komputer, sikap terhadap literasi komputer, dan keyakinan diri dalam penggunaan internet untuk aspek ciri-ciri guru; latihan, sokongan teknikal dan pengurusan pihak sekolah bagi aspek ciri-ciri organisasi dan persepsi kebergunaan, persepsi kemudahan, interaksi dan fleksibiliti sistem bagi ciri-ciri sistem *FROG VLE*.

Kajian ini berdasarkan kaedah kuantitatif dengan kajian korelasi yang telah dianalisis melalui analisis statistik min, sisihan piawai, peratus dan kekerapan. Analisis statistik Permodelan Persamaan Berstruktur (SEM) menggunakan SPSS dan AMOS Versi 22 telah digunakan. Kesahan instrumen telah diperakui oleh sekumpulan pakar dari aspek kandungan dan bahasa. Kajian rintis telah dijalankan dalam kalangan 64 orang guru dan nilai pekali alpha Cronbach didapati berada dalam julat di antara .81 hingga .97. *Confirmatory Factor Analysis* (CFA) telah dijalankan bagi tujuan menguji konsistensi konstruk dan menentukan kesahan konstruk. Responden kajian ini telah melibatkan 350 orang guru-guru Sekolah Menengah *Champion* di Negeri Sembilan, Melaka dan Johor. Pemilihan sampel telah menggunakan teknik persampelan *Randomised Proportionate Stratified Cluster Sampling*.

Beberapa penemuan yang signifikan telah diperolehi daripada kajian ini. Keputusan yang telah diperolehi daripada analisis data telah menghasilkan – “*Malaysian Teachers’ Satisfaction Model*” yang boleh digunakan untuk mengkaji faktor-faktor yang mempengaruhi kepuasan terhadap penggunaan *FROG VLE* dalam kalangan guru sekolah. Terdapat lima laluan signifikan yang dikenal pasti iaitu keyakinan diri dalam penggunaan internet, sikap terhadap literasi komputer, latihan, fleksibiliti dan penggunaan *FROG VLE*. Justeru, 86% daripada varians kepuasan telah dijelaskan oleh lima pemboleh ubah kajian ini.

Analisis pemboleh ubah pengantara telah menunjukkan penggunaan *FROG VLE* bertindak sebagai pengantara separa di antara keyakinan diri dalam penggunaan internet dan kepuasan terhadap *FROG VLE*. Pengantara penuh pula didapati di dalam hubungan antara tahap kerisauan terhadap komputer, persepsi kebergunaan, persepsi kemudahan, dan pengurusan sekolah dengan kepuasan terhadap *FROG VLE*. Jantina tidak signifikan sebagai moderator antara penggunaan *FROG VLE* dan kepuasan terhadap *FROG VLE*.

Kajian ini mencadangkan penekanan yang lebih, perlu diberikan kepada keyakinan terhadap kebolehan diri dalam penggunaan internet, sikap terhadap literasi komputer, latihan, fleksibiliti dan penggunaan *FROG VLE*, kerana ini merupakan faktor-faktor yang mempengaruhi tahap kepuasan terhadap *FROG VLE*. Melalui ujian terhadap pemboleh-ubah pengantara, didapati melalui penggunaan *FROG VLE*, ianya dapat mempengaruhi pembolehubah seperti tahap kerisauan terhadap komputer, persepsi kebergunaan, persepsi kemudahan, interaksi dan pengurusan sekolah ke arah kepuasan terhadap *FROG VLE*. Oleh kerana jantina tidak signifikan sebagai moderator, tiada keperluan untuk membezakan latihan yang diberi kepada guru-guru lelaki dan perempuan. Penemuan kajian ini dapat membimbing dan mengarah pihak berkepentingan memberi fokus spesifik kepada faktor-faktor yang mempunyai kaitan dan pengaruh langsung ke atas kepuasan guru terhadap *FROG VLE*. Kepuasan guru dapat memastikan penggunaan sistem ini secara berterusan, dan seterusnya membantu membina kemahiran pedagogi dan teknik guru dalam pengajaran melalui *FROG VLE*. Justeru itu, harapan untuk menggunakan teknologi pada tahap yang lebih canggih di seluruh sekolah akan dapat direalisasikan. Kajian ini juga dipercayai akan dapat memberikan manfaat dan keberhasilan yang tinggi kepada Kementerian Pendidikan Malaysia setimpal dengan pelaburan yang telah diperuntukkan dalam inisiatif pembelajaran maya untuk pengajaran di dalam bilik darjah.

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Last but not least, my family and friends, who had to endure my absence, both emotionally and physically throughout the process of me pursuing my studies.



This thesis was submitted to the Senate of the Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

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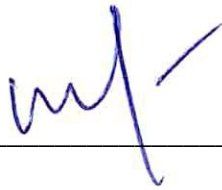
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## TABLE OF CONTENTS

	<b>Page</b>
<b>ABSTRACT</b>	i
<b>ABSTRAK</b>	iii
<b>ACKNOWLEDGEMENTS</b>	v
<b>APPROVAL</b>	vi
<b>DECLARATION</b>	vii
<b>LIST OF TABLES</b>	xiii
<b>LIST OF FIGURES</b>	xv
<b>LIST OF ABBREVIATIONS</b>	xvi
<b>CHAPTER</b>	
<b>1 INTRODUCTION</b>	
1.1 Background	1
1.2 Virtual Learning Environment Initiatives	2
1.3 Malaysian E-Learning Initiative	3
1.4 Challenges of the Virtual Learning Environment	4
1.5 Statement of the Problem	6
1.6 Objectives of the Study	8
1.7 Hypotheses of the Study	9
1.8 Significance of the Study	10
1.9 Scope and Limitations of the Study	12
1.10 Definition of Terms	13
1.10.1 Satisfaction	13
1.10.2 Virtual Learning Environment	13
1.10.3 USE	14
1.10.4 Perceived Usefulness	14
1.10.5 Interaction	14
1.10.6 Perceived Ease of Use	14
1.10.7 Flexibility	15
1.10.8 Computer Attitude	15
1.10.9 Computer Anxiety	15
1.10.10 Internet Self-Efficacy	15
1.10.11 Training	16
1.10.12 Technical Support	16
1.10.13 School Management	16
1.10.14 Champion Schools	16
<b>2 LITERATURE REVIEW</b>	
2.1 Introduction	17
2.2 E-Learning Initiatives	18
2.3 Virtual Learning Environment in Teaching and Learning	20
2.4 FROG VLE	22
2.5 End-User Satisfaction	23
2.6 Theories Related to the Study	27
2.6.1 Technology Acceptance Model (TAM)	27
2.6.2 DeLone and McLean updated Information	

	System Success Model	29
	2.6.3 Post-Acceptance Information System Continuance Model	30
2.7	Antecedents to Satisfaction	32
	2.7.1 Organisation Characteristics	34
	2.7.1.1 Technical Support	35
	2.7.1.2 Training	35
	2.7.1.3 School Management	37
	2.7.2 Virtual Learning Environment Characteristics	38
	2.7.2.1 Interaction	39
	2.7.2.2 Flexibility	40
	2.7.2.3 Perceived Ease of Use	41
	2.7.2.4 Perceived Usefulness	42
	2.7.3 User Characteristics	43
	2.7.3.1 Computer Attitude	43
	2.7.3.2 Internet Self-Efficacy	44
	2.7.3.3 Computer Anxiety	46
2.8	Use as a Mediator	47
2.9	Gender as a Moderator for FROG VLE Use among Teachers	49
2.10	Theoretical Framework	52
2.11	Conceptual Framework	56
<b>3</b>	<b>METHODOLOGY</b>	
	3.1 Introduction	58
	3.2 Research Design	58
	3.3 Location of the Study	58
	3.4 Population	59
	3.5 Sample Size	60
	3.6 Sampling	61
	3.7 Instrumentation	63
	3.7.1 Double Back Language Translation	68
	3.8 Validity and Reliability	69
	3.8.1 Validity	69
	3.8.2 Reliability	71
	3.8.2.1 Pilot Test	71
	3.9 Data Collection and Data Entry	73
	3.10 Ethical Consideration	74
	3.11 Data Analysis	75
	3.12 Structural Equation Modeling	75
	3.13 Assessing Confirmatory Factor Analysis	76
<b>4</b>	<b>RESULTS AND FINDINGS</b>	
	4.1 Introduction	80
	4.2 Preliminary Statistical Analysis	80
	4.3 Demographic Information	85
	4.4 Structural Equation Modelling	89
	4.4.1 Factors Influencing Satisfaction towards the Frog VLE in the Teaching and Learning	89

4.4.2	Defining Individuals Constructs	89
4.4.3	Developing the Overall Measurement Model	90
4.4.4	Designing a Study To Produce Empirical Results	99
4.4.5	Assessing Measurement Model Validity	101
4.4.5.1	Satisfaction	101
4.4.5.2	Perceived Usefulness	104
4.4.5.3	Perceived Ease of Use	107
4.4.5.4	Flexibility	110
4.4.5.5	Interaction	113
4.4.5.6	Computer Anxiety	117
4.4.5.7	Computer Attitude	120
4.4.5.8	Internet Self-Efficacy	122
4.4.5.9	Training	126
4.4.5.10	Technical Support	128
4.4.5.11	School Management	131
4.4.5.12	Use of Frog VLE	135
4.4.6	Measurement Model of the Study	138
4.4.7	Measurement Validation	143
4.4.8	Specifying the Structural Model Validity	146
4.4.9	Assessing Structural Model Validity	149
4.4.10	Mediating Variables	155
4.4.11	Gender as a Moderator	163
4.5	Summary of Testing the Structural Model	164

## **5 SUMMARY, DISCUSSION, CONCLUSION, IMPLICATIONS AND RECOMMENDATIONS**

5.1	Introduction	165
5.2	Summary of the Study	165
5.3	Discussion	171
5.3.1	The Influence of Predictors on the Model	
	Measuring Satisfaction in the FROG VLE Use	171
5.3.2	Mediating Variable	171
5.3.3	Gender as a Moderator	172
5.4	Conclusion	172
5.5	Implications	173
5.5.1	Research Implications	173
5.5.2	Practical Implications	174
5.6	Recommendations for Future Research	177

<b>REFERENCES</b>	179
-------------------	-----

<b>APPENDICES</b>	204
-------------------	-----

<b>BIODATA OF STUDENT</b>	258
---------------------------	-----

<b>LIST OF PUBLICATIONS</b>	259
-----------------------------	-----

## LIST OF TABLES

<b>Table</b>	<b>Page</b>	
3.1	Population of Champion Secondary School Teachers in the Southern Region Malaysia	60
3.2	SEM Sample Size	60
3.3	Sample Size based on Proportion of Teachers in the Southern Region Champion Secondary Schools	62
3.4	Components of the Questionnaire	64
3.5	Items on Computer Attitude (CAT)	65
3.6	Items on Internet Self-efficacy (ISE)	65
3.7	Items on Computer Anxiety (CAX)	65
3.8	Items on Perceived Usefulness (PU)	66
3.9	Items on Perceived Ease of Use (PEOU)	66
3.10	Items on Interaction (INT)	66
3.11	Items on Flexibility (FLX)	67
3.12	Items on School Management (SM)	67
3.13	Items on Training (TR)	67
3.14	Items on Technical Support (TS)	67
3.15	Items on Use (Use)	68
3.16	Items on Satisfaction (S)	68
3.17	Comments from Experts	69
3.18	Number of Items Before and After Pilot Study	72
3.19	Reliability of the Instrument	73
3.20	Chronology of the Data Collection	74
3.21	Variable Codes	74
3.22	Statistical Analysis	77
4.1	Descriptive Statistics for Normality	82
4.2	Correlation between Constructs	83
4.3	Collinearity Statistics	84
4.4	The Calculated and Actual Samples	84
4.5	Distribution of Respondents by Gender	85
4.6	Distribution of Respondents by Age	85
4.7	Distribution of Respondents by Reasons for Using VLE	86
4.8	Distribution of Respondents by Number of Training Sessions Attended	86
4.9	Distribution of Respondents by Number of Years Teaching	87
4.10	Distribution of Respondents by Level of Classes Taught	87
4.11	Distribution of Respondents by Subject Matter	88
4.12	Distribution of Respondents by Education Level	88
4.13	Distribution of Respondents who Own a Laptop	88
4.14	Distribution of Respondents by Length of VLE Use	89
4.15	CFA for Individual Constructs	92
4.16	Recommended Criteria for Fit Indices	100
4.17	Descriptive Statistics for Satisfaction Construct	101
4.18	Inter-item Correlation for Items in Satisfaction Construct	102
4.19	Descriptive Statistics for Perceived Usefulness Construct	105
4.20	Inter-item Correlation for Items in Perceived Usefulness	105

4.21	Descriptive Statistics for Perceived Ease of Use Construct	108
4.22	Inter-item Correlation for Items in Perceived Ease of Use	108
4.23	Descriptive Statistics for Flexibility Construct	110
4.24	Inter-item Correlation for Items in Flexibility	111
4.25	Descriptive Statistics for Interaction Construct	114
4.26	Inter-item Correlation for Items in Interaction	115
4.27	Descriptive Statistics for Computer Anxiety Construct	118
4.28	Inter-item Correlation for Items in Computer Anxiety	118
4.29	Descriptive Statistics for Computer Attitude Construct	120
4.30	Inter-item Correlation for Items in Computer Attitude	121
4.31	Descriptive Statistics for Internet Self-Efficacy Construct	123
4.32	Inter-item Correlation for Items in Internet Self-Efficacy	124
4.33	Descriptive Statistics for Training Construct	126
4.34	Inter-item Correlation for Items in Training	127
4.35	Descriptive Statistics for Technical Support Construct	129
4.36	Inter-item Correlation for Items in Technical Support	130
4.37	Descriptive Statistics for School Management Construct	132
4.38	Inter-item Correlation for Items in School Management	133
4.39	Descriptive Statistics for Use Construct	135
4.40	Inter-item Correlation for Items in Use	136
4.41	Parameter Summary for the Measurement Model	140
4.42	Parameter Summary for the Modified Measurement Model	142
4.43	Results of Confirmatory Factor Analysis	142
4.44	Correlation between Constructs	143
4.45	Assessment of Normality	144
4.46	Regression Weights and Standardised Regression Weights for Revised Structural Model	152
4.47	Summary of the Results of Testing Hypotheses for Objective One	153
4.48	Regression Weights and Standardized Regression Weights for the Parsimonious Revised Structural Model	155
4.49	Explained Variance (Squared Multiple Correlation) for the Structural Model	155
4.50	Decision Criteria	157
4.51	Results of Bootstrap Analysis for the Twelfth Hypothesis	158
4.52	Results of Bootstrap Analysis for the Thirteenth Hypothesis	158
4.53	Results of Bootstrap Analysis for the Fourteenth Hypothesis	159
4.54	Results of Bootstrap Analysis for the Fifteenth Hypothesis	159
4.55	Results of Bootstrap Analysis for the Sixteenth Hypothesis	160
4.56	Results of Bootstrap Analysis for the Seventeenth Hypothesis	160
4.57	Results of Bootstrap Analysis for the Eighteenth Hypothesis	161
4.58	Results of Bootstrap Analysis for the Nineteenth Hypothesis	161
4.59	Results of Bootstrap Analysis for the Twentieth Hypothesis	162
4.60	Results of Bootstrap Analysis for the Twenty-One Hypothesis	162
4.61	Summary of the Results of Testing Hypotheses for Objective Two	163
4.62	Hypothesised Effect of Gender towards Use and Satisfaction	163
4.63	Results of the Moderation Effect	164
4.64	Pairwise Parameter Comparison for Critical Ratios for Differences	164

## LIST OF FIGURES

Figure		Page
2.1	Modified Technology Acceptance Model	28
2.2	Updated DeLone and McLean's Information System Success Model (2003)	30
2.3	Post-Acceptance Model of Information System Continuation	31
2.4	Conceptual Framework of the Study with its Hypotheses	57
3.1	Map of Malaysia	59
3.2	Procedure for Selecting the Proportional Stratified Cluster Sample	63
3.3	Chronology of the Data Collection	74
4.1	Overall Measurement Model	90
4.2	The Initial Measurement Model of Satisfaction	103
4.3	The Revised Measurement Model of Satisfaction	104
4.4	The Initial Measurement Model of Perceived Usefulness	106
4.5	The Revised Measurement Model of Perceived Usefulness	107
4.6	The Initial Measurement Model of Perceived Ease of Use	109
4.7	The Revised Measurement Model of Perceived Ease of Use	110
4.8	The Initial Measurement Model of Flexibility	112
4.9	The Revised Measurement Model of Flexibility	113
4.10	The Initial Measurement Model of Interaction	116
4.11	The Revised Measurement Model of Interaction	117
4.12	The Initial Measurement Model of Computer Anxiety	119
4.13	The Revised Measurement Model of Computer Anxiety	119
4.14	The Initial Measurement Model of Computer Attitude	121
4.15	The Revised Measurement Model of Computer Attitude	122
4.16	The Initial Measurement Model of Internet Self-Efficacy	125
4.17	The Revised Measurement Model of Internet Self-Efficacy	125
4.18	The Initial Measurement Model of Training	127
4.19	The Revised Measurement Model of Training	128
4.20	The Initial Measurement Model of Technical Support	130
4.21	The Revised Measurement Model of Technical Support	131
4.22	The Initial Measurement Model of School Management	134
4.23	The Revised Measurement Model of School Management	134
4.24	The Initial Measurement Model of Use	137
4.25	The Revised Measurement Model of Use	138
4.26	The Initial Measurement Model of the Study	139
4.27	The Modified Measurement Model of the Study	141
4.28	Path Diagram Showing Specified Hypothesised Structural Path and Measurement Specification	148
4.29	The Proposed Structural Model of the Study	150
4.30	The Revised Structural Model with Significant and Non-Significant Paths	153
4.31	The Parsimonious Revised Structural Model	155
4.32	Direct Model	156
4.33	Full Mediation Model	156



## LIST OF ABBREVIATIONS

LMS	Learning Management System
FROG	Facilitated Rapid Online Global
VLE	Virtual Learning Environment
ICT	Information Communication Technology
ISSM	Information System Satisfaction Model
TAM	Technology Acceptance Model
ECM	Expectation-Confirmation Model
PU	Perceived Usefulness
PEOU	Perceived Ease of Use
FLX	Flexibility
INT	Interaction
SM	School Management
TR	Training
TS	Technical Support
CAT	Computer Attitude
CAX	Computer Anxiety
ISE	Internet Self-Efficacy
SAT	Satisfaction

# CHAPTER 1

## INTRODUCTION

### 1.1 Background

Most countries would allocate a large amount of money for education as this supports the assumption that a nation's human capital which is built by its education system is a fundamental driver of economic and social development growth (Wade, Rasmussen & Fox-Turnbull, 2013). The Malaysian Education Policy Review conducted by UNESCO (2013) reported Malaysia as lagging behind in terms of technology integration in education in comparison to many other countries in the region. This significantly reflect the quality of our education which should lead to some policy implications.

In 2011, Malaysia spent an equivalent of 3.8 percent of its gross domestic products on education more than twice the average 1.8 percent within the ASEAN region. The centralised education system in Malaysia with its high expenditure has expanded access to education in the country resulting in a marked increase in student enrolment in primary education (UNESCO, 2015). However, the quality of education, as reflected in the PISA scores does not compare well with other countries in the region. The unfavourable outcomes on international achievement tests such as TIMSS and PISA did not do justice to the amount of money spent. The 2013 survey results of the International Students Assessment (PISA) showed Malaysia being placed at 52<sup>nd</sup> overall, out of the 65 countries involved (OECD, 2013). In another international indicator, a report by The World Bank has highlighted Malaysia's continued decline in the Trends in International Mathematics and Science Study (TIMSS). The above standardized international tests reflect the quality of Malaysian students, which is not on par with our aspiration to become a high-incomed economy. Malaysia not only lagged far behind high-performing education systems in the East Asia but also if we compare ourselves among the poorer nation like Vietnam who scored 17<sup>th</sup> in the PISA.

So how do we improve the aforesaid situation and context that we are in? Improving and empowering teachers and school leadership was given top priority under the Malaysian Education Blueprint (MEB). The MEB will open new horizons for the country's future education. The Ministry of Education (MOE) will be giving extra focus in improving teaching professionalism, learning skills, knowledge and quality teaching as part of the MEB. The transformation reflects the seriousness of the government in taking Malaysian education to a high international quality and standard.

The first key area of transformation is the empowerment of teachers. This is crucial as many studies have shown that high performing teachers will be able to improve their students' performances, by up to 50 percent over a three-year period. As with

any educational reforms, a number of variables must be considered, but competent teachers remain the most significant agent of change and determinant of students' achievements and economic growth (Ng, 2012). Besides the MEB, Malaysia has earlier embarked on a new Malaysia Economic Transformation Programme (METP) in 2010, of which the provision of high quality education is stressed. According to the METP, teachers are expected to perform effectively and innovatively (Economic Planning Unit, 2010).

In 2010 also, the Malaysian government had announced the Government Transformation Programme which aimed to address seven National Key Result Areas (NKRA) concerning people of the country. The NKRA addressed teachers' quality amongst other issues by providing opportunities for teachers to upgrade themselves and to undergo large-scale trainings in technology integration in the teaching and learning process. The Information and Communication Technologies (ICT) with their widespread influence on contemporary society and economies can provide an impact in education specifically through virtual teaching platforms for teaching and learning processes (Martin-Rodriguez & Fernandez-Molina, 2014).

However, although computers have been in schools since the 1980s, teachers have yet to use them in promoting and supporting meaningful student outcomes (Keengwe, Onchwari & Wachira, 2008). The urge for pedagogical goals as opposed to technological tools, when it comes to using technology in teaching and learning is nothing new. We also lacked classroom environments that allow students to interact with technology in such a way that can prepare them to use technology in the real world the same way. We have yet to achieve meaningful technology use in our schools. One way of addressing this is by getting teachers to be more competent and comfortable in teaching through technology. This is the reason that the latest educational reform in Malaysia under the MEB (2013-2025), all schools are provided with a learning management system, known as the FROG Virtual Learning Environment (VLE) as an attempt to see an increase in technology use and integration in the classrooms.

## **1.2 Virtual Learning Environment (VLE) Initiatives**

E-learning is one of the most recent development in the IS industry (Wang, 2003). There are various types of information systems, for example transaction processing systems, decision support systems, knowledge management systems, learning management systems, database management systems and office management systems. Features that are common amongst most information systems are information technologies, which are typically designed to enable humans to perform tasks for which the human brain is not well suited, such as handling large amounts of information, performing complex calculations and controlling many simultaneous processes (Laudon & Laudon, 1988).

E-Learning or Virtual Learning Environment (VLE) is also sometimes referred to as the Learning Management System (LMS), Digital Learning Environments, Course Management Systems and Electronic Learning Environment (De Smet, Bourgonjon, Wever, Schellens & Valcke, 2012). The VLE is a web-based application which runs on a server and is accessible with a web browser from any place that has an Internet connection. It is an expandable, on demand service and tools that are connected to the user via the Internet from data centres (Johnson, Becker, Estrada & Freeman, 2014). It allows teachers to create online course websites with learning materials by providing a number of functionalities and tools like the navigation, document publishing, announcements, student tracking, assessment modules and forum. Some examples of well-known VLE include Blackboard, Dokeos, Smartschool and Moodle. Of late, there has been a rise in the use of VLE in the higher education and schools (Moskal, Dziuban & Hartman, 2013).

VLE represents an alternative way of teaching and learning in today's knowledge-economy environment and the number of organisations adopting this is on the rise. Thorne (2003) claimed that e-learning is a natural evolution which will present itself as one of the most important advancements of this century. Some even went as far as believing that e-learning will simply be regarded as learning. In the US, online learning is seen as an integral part of high school reform whereby it allows high schools the freedom to customize instruction and to differentiate course offerings to meet a wide variety of student needs (Picciano, Sheaman, Shea & Swan, 2012). As such, it was predicted in their book that by the year 2016, one-quarter of all high school courses in US will be online and doubled by 2019 (Christensen, Horn & Johnson, 2008).

According to Powell and Barber (2011), Mexico and China had digitised their entire primary and secondary curriculum and have their teachers trained to teach online while India's government is into developing \$10 laptop to aid in the new distribution model of education. South Korea on the other hand had introduced a national virtual school that offered online courses as a way to provide private tutoring to those who cannot afford otherwise. These examples give us a glimpse on how blended and online learning are reforming education globally. So in not wanting to be left behind, Malaysia have also lined up a number of online learning initiatives and reform.

### **1.3 Malaysian E-Learning Initiative**

In the Malaysian context, one of the key aims of the MOE in today's information technology enabled classrooms is to make students more active in the learning process. For decades various ICT programmes have been introduced in schools in order to immerse technology into our classrooms. Over the last 20 years, many efforts have been carried out by the MOE whereby a huge amount of money have been spent for the advancement of ICT use in schools and other educational institutions (Wan Zah Wan Ali & Hajar Mohd Nor, 2010). In 2011, the MOE had launched a comprehensive review of the education system in Malaysia. Amongst others, the review found shortcomings of previous policies regarding ICT in

education and it also found that despite the massive expenditure on the SmartSchool initiative, 80 percent of the teachers were found to use ICT less than an hour per week (UNESCO, 2013). Though the SmartSchool programme which started in 1999 and completed in 2010 was an effort by the government to integrate ICT into classroom learning, administration matters and students' daily routines, ICT adoption rate among teachers still remain short of expectation (Hew & Sharifah Latifah, 2016).

The comprehensive review process which started in 2011, preceded the formation of the MEB. The MEB is a detailed plan of actions that maps out the education landscape for the next 13 years (2013-2025). Of the eleven policy shifts identified in the MEB, one was to leverage ICT in order to improve learning quality across Malaysia. 1BestariNet is the key component in Shift 7 of the MEB, which is to transform education in the country by leveraging on the Internet and technology use in order to improve teaching and learning, and bridge the digital divide between the rural and urban, primary and secondary schools. A single learning platform and a high-speed 4G connectivity are provided to all the schools in Malaysia. The project aims at linking six million school children from 10,000 schools in the area of 329, 847 km with 4.5 million parents and teachers via the high-speed 4G FROG VLE (Hew & Sharifah Latifah, 2016).

The project which started in March 2012 is being carried out in stages and all government-aided schools; both the primary and secondary, will be connected to the FROG VLE. To date there are 6,695 schools connected to a high-speed internet access while 2,245 are connected using the Asymmetric Digital Subscriber Line (ADSL) or the Very Small Aperture Terminal (VSAT) technology (MOE, 2016). However, the MOE is consistently conducting connectivity-mapping activities to identify potential upgrades from ADSL and VSAT to 4G technology.

As the education transformation journey through the MEB is complex and extensive, the ministry has sequenced the transformation into three waves. Wave 1 (2013-2015) is to turn around the system by supporting teachers and to focus on core skills while in Wave 2 (2016-2020) the education system improvement will be accelerated through structural changes. Wave 3 (2021-2025) would then see an increase in operational flexibility (MOE, 2016).

#### **1.4 Challenges of the Virtual Learning Environment**

Incorporating VLE into the teaching and learning processes is a trend which is becoming ubiquitous at the academic institutions around the world (Coates, James & Baldwin, 2005). Researchers predicted that by 2019, 50 percent of all high school courses will be delivered in an online format (Horn & Staker, 2011). It provides support and enhances traditional ways of learning (Georgouli, Skalkidis & Guerreiro, 2008). Teachers are expected to be able to apply a wide range of digital technologies in today's classrooms and optimize the teaching and learning processes within and

beyond their school settings. However, literature has shown that schools are lacking in teachers who are technologically advanced enough to effectively integrate technology into their lessons. Teachers in general are still using a minimum of its affordances (Rienties, Giesbers, Lygo-Baker, Ma & Rees, 2014).

Reasons of not using technology in the classroom may include lack of clear vision as to its real purpose and usefulness in shaping the educational system of the future (Ertmer & Ottenbreit-Leftwich, 2012), access support and training (Hew & Brush, 2007). Majority of teachers in schools are using the VLE as a simple repository for students to obtain resources, drill-and-practice software and there is no widespread evidence of transformation in pedagogic practice (Kinchin, 2012). Teachers need to start looking at VLE as a technology that enables and supports. They need to accept a professional obligation of doing whatever it takes to change their instructional practices to one that would truly prepare their students for the 21<sup>st</sup> century workforce.

For teachers to use technology, they need to develop knowledge that will enable them to transfer technological potentials into solutions to pedagogical problems. As mentioned by Hew and Brush (2006), an effective technology training for teachers should possess three characteristics. First, trainings should focus on technology skills and experiences within an educational context, followed by 'hands-on work' and lastly, the focus will have to be on teachers' needs in their classroom contexts. As teachers are the key to effective use of technology in the educational system, it is imperative that they understand the precise role of technology in teaching and learning so that they can learn to cope with the continual innovation in educational technology and the constant urges for them to leverage their use of technology in their lessons (Aldunate & Nussbaum, 2013). Their perceptions and attitudes toward technology, will influence their use of it in the teaching and learning processes (Paraskeva, Bouta & Papagianna, 2008).

Technologies introduced in many developing countries have created unexpected problems in the local community, especially in the areas of decision-making, related to expenditure, pedagogy and administrative processes (World Bank, 2008). Problems, barriers, and issues must be addressed within the context of the community where the technology is being integrated, using local skills, and resources (Jackelen & Zimmerman, 2011). As mentioned by Fler and Jane (1999), the best technology fit is not necessarily the most sophisticated, complex or expensive, but it should be what is most appropriate for our local specific situation and culture and use local resources for a successful intervention. Researchers, policy makers and practitioners also need to move beyond focusing on technology itself, but focus on teaching with technology (Zinger, Tate & Warschauer, 2017). Though the VLE brings new exciting frontier onto an otherwise mundane traditional teaching lessons, teachers need assistance and support before they could teach, and teach well in this new environment.

Recent studies have shown that teaching with technology remains an instructional challenge (Voogt, Erstad, Dede & Mishra, 2013). Implementation of the VLE can be

expensive to any organisations due to the relatively low adoption rate among users. This is because there is a low widespread change in pedagogic practices despite the varied functionality afforded by the VLE (Becker & Jokivirta, 2007). Concerns are being raised regarding the economic cost of implementing and maintaining the infrastructure in order to sustain the integration of technology into the classrooms (Dutta & Bilbao-Osorio, 2012).

Given the increasing availability and reliance of technology in the modern world, there is a dire need to understand factors that can help lead us to sustain and increase its adoption. Reasons as to why it worked or failed to work need to be understood. There are many reasons to this such as relevancy of the e-learning system, comfort level with the technology, and the kind of support rendered to teachers. Many schools lack the basics of electricity or building infrastructure (Hew & Brush, 2007) and the teachers may neither have the skills nor passion to integrate technology into the classroom environment. Across the world, education and government leaders are promoting the need for better preparation of teachers to integrate technology and extensive funds have been expanded to support these efforts. This move is partly because of the new advances in learning sciences which have provided new insights into how people learn. Technology is a powerful tool to help us in reimagining and redesigning the learning experiences that are provided for our students in schools.

Numerous past research have revealed that satisfaction is among the most important factor in the success of system implementation (Martin-Rodriguez & Fernandez-Molina, 2014; Teo, 2014) for reason being that it ensures continued usage of the system (Joo & Choi, 2016). When teachers are satisfied with the FROG VLE, they will continue using it even after its initial implementation. Teachers shared vision and commitment for the initial uptake of innovative learning technology and continuation of e-learning initiatives in schools are critically needed

## **1.5 Statement of the Problem**

Despite the massive expenditure and enthusiasm by the MOE, a report by the Auditor-General's (A-G) report (National Audit Department, 2014) revealed that the RM663 million 1BestariNet project is suffering from lack of usage. The report also revealed that usage of the FROG VLE by teachers, students and parents was between 0.01 and 4.69 percent while daily utilisation of the VLE by teachers was found to be between 0.01 and 0.03 percent. This seems to suggest that the VLE is underused or unused by most of the teachers. Instead of relishing the initiative, teachers are resisting the effort and challenge involved and this issue of FROG VLE's lack of acceptance have caught the attention of stakeholders in Malaysia (Chan, Norziha, Suraya, Nor Zairah, & Wan Azlan, 2017). Many recent research efforts have gone into understanding the aforesaid situation (Hew & Kadir, 2016; Mohd Rosli, Maarop & Narayana, 2015; Kaur & Hussein, 2014; Sa'don, Dahlan & Zainal, 2013).

In a newspaper report by Kong (2015), teachers are crying foul over the physical and mental pressure they are subjected to under the 1BestariNet Project while Fong, Ch'ng and Por (2013) claimed that despite the huge investment spent on ICT training

programmes for the in-service teachers, there is still so little use and change in their practices. Previous initiatives, to increase ICT usage in schools which is known as the Smart Schools' Project, despite having consumed massive expenditure, found that 80 percent of the teachers used ICT less than one hour per week, and this was also mostly limited to word-processing (UNESCO, 2013). The unique challenges raised by the digital and analog technologies seem to complicate the already complex context of teaching. The usage of FROG VLE in all Malaysian schools are under tremendous pressure to improve (Oh & Chua, 2016). We need to find ways to further understand how we can increase and sustain the use of the FROG VLE, therefore justifying the huge amount of expenditure on the FROG VLE and to also see a more active and effective use of the system in schools.

As past studies and research (DeLone & McLean, 1992; Al-Busaidi & Al-Shihi, 2012; Sun, Tsai, Finger, Chen & Yeh, 2008) have found that satisfaction does influence teachers' continuation of web-based learning system usage and has been used as a dependent variable in e-learning research (Teo, 2014; Teo & Wong, 2013), it must also be considered in our local context. User satisfaction can be broken down into subjective and multidimensional variables that can serve as elements for analytical study (Griffiths, Johnson & Hartley, 2007). In particular, variables like computer attitude (Yu & Yang, 2006), computer self-efficacy (Chen, Yeh, Lou & Lin, 2013), computer anxiety (Ozkan & Koseler, 2009), perceived usefulness (Teo, 2014), perceived ease of use (Teo, 2014), interaction (Rodriguez, Molina, Alonso & Gomez, 2014), flexibility (Ho, Nakamori, Ho & Lim, 2016), management support (Ho, Nakamori, Ho & Lim, 2016), training (Aggelidis & Chatzoglou, 2012), and technical support (Ozkan & Koseler, 2009) have been found to influence satisfaction towards a learning management system.

As these predictors have been found to influence satisfaction towards technology use, they are included as variables in this study, studying teachers' satisfaction towards FROG VLE in their teaching and learning processes. By knowing which factors affect our teachers' satisfaction, we can then make better decision in planning and assisting teachers in wanting to continue using the system. Transforming teachers instructional practice is no easy task, yet it has to be done. Concentrated effort can then be put at the right places based on the findings of this study.

The variable, Use of FROG VLE, not only directly influence satisfaction (Chen, 2010), but also acts as a mediator between other variables and satisfaction. It was also found that significant differences exist in computer use (Huffman, Whetten & Huffman, 2013; Tsai & Tsai, 2010; Dong & Zhang, 2011; Cho & Jialin, 2008; Chen & Tsai, 2007) and satisfaction (Abedalaziz, Leng & Siraj, 2013) between the male and female users when using a web-based learning system. This is an important aspect to be considered as then different trainings and continuous professional development (CPD) courses can then be tailored to the different genders. To assume that the male and female teachers Use of FROG VLE will lead to satisfaction in the same way may need to be questioned. If there are differences in findings, then different forms of trainings and CPD courses must be provided in order to ensure continued use of the FROG VLE by both the male and female teachers.



Past researchers have revealed that satisfaction is among the most important factors in the success of system implementation and it is influenced by the different facets of user satisfaction that can be attributed to various dimensions: teachers' factors, system design and environmental factors (Wang & Bagakas, 2003). Some scholars have supported the concept of a satisfaction-reuse chain and emphasised that user satisfaction can drive users to use the system frequently (Wang & Chiu, 2011).

Given the high stakes in e-learning and the growing reliance on technologies in education, there is a dire need for a research to be done in Malaysia to probe the determinants of satisfaction that would entice teachers to accept and continue to use FROG VLE in their teaching and learning processes. Only when teachers are using the FROG VLE can we expect a change in the teaching and learning environment. We can no longer educate our students based on an agricultural time-table and industrial setting, but expecting them to live in a digital age.

As pointed out in the Post-Acceptance Model of Information System Continuance (2001) explained that satisfied consumers/users are posited to continue their IS Continuance Intention, and so this study hypothesised that satisfied teachers will continue to repeat their use of the FROG VLE. As to date, there is a dearth of information on studies related to FROG VLE in Malaysian schools (Oh & Chua, 2016), it is therefore, pertinent that a study on factors that influenced satisfaction towards the FROG VLE be conducted in the schools in Malaysia.

## **1.6 Objectives of the Study**

The main objective of this study is to investigate factors that influence satisfaction in the use of the FROG VLE in teaching and learning among secondary school teachers. The independent variables used in this study are based on previous studies which include perceived usefulness, perceived ease of use, interaction, flexibility, computer attitude, computer anxiety, internet self-efficacy, technical support, training and school management. As such, this study was carried out to achieve the following objectives:

1. To investigate factors that influence satisfaction towards the FROG VLE in teaching and learning among secondary school teachers.
2. To investigate the role of Use of the FROG VLE as a mediator between the predictor variables and satisfaction towards the FROG VLE in teaching and learning among secondary school teachers.
3. To test whether gender acts as a moderator between use and satisfaction towards the FROG VLE in teaching and learning among the secondary school teachers.

## 1.7 Hypotheses of the Study

The following hypotheses were formulated based on the objectives of the study and the literature review and they will be tested in the study.

### Hypotheses for Objective 1

*H*<sub>1</sub> Computer Attitude has a significant influence on teachers' satisfaction towards the FROG VLE in teaching and learning;

*H*<sub>2</sub> Internet Self-Efficacy has a significant influence on teachers' satisfaction towards the FROG VLE in teaching and learning;

*H*<sub>3</sub> Computer Anxiety has a significant influence on teachers' satisfaction towards the FROG VLE in teaching and learning;

*H*<sub>4</sub> Perceived Usefulness has a significant influence on teachers' satisfaction towards the FROG VLE in teaching and learning;

*H*<sub>5</sub> Perceived Ease of Use has a significant influence on teachers' satisfaction towards the FROG VLE in teaching and learning;

*H*<sub>6</sub> Interaction has a significant influence on teachers' satisfaction towards the FROG VLE in teaching and learning;

*H*<sub>7</sub> Flexibility has a significant influence on teachers' satisfaction towards the FROG VLE in teaching and learning;

*H*<sub>8</sub> School management support has a significant influence on teachers' satisfaction towards the FROG VLE in teaching and learning;

*H*<sub>9</sub> Training has a significant influence on teachers' satisfaction towards the FROG VLE in teaching and learning;

*H*<sub>10</sub> Technical Support has a significant influence on teachers' satisfaction towards the FROG VLE in teaching and learning;

*H*<sub>11</sub> Use has a significant influence on teachers' satisfaction towards the FROG VLE in teaching and learning;

### Hypotheses for Objective 2

*H*<sub>12</sub> Use mediates the influence of computer attitude on satisfaction towards the FROG VLE in teaching and learning;

*H*<sub>13</sub> Use mediates the influence of internet self-efficacy on satisfaction towards the FROG VLE in teaching and learning;

*H*<sub>14</sub> Use mediates the influence of computer anxiety on satisfaction towards the FROG VLE in teaching and learning;

*H*<sub>15</sub> Use mediates the influence of perceived usefulness on satisfaction towards the FROG VLE in teaching and learning;

*H*<sub>16</sub> Use mediates the influence of perceived ease of use on satisfaction towards FROG VLE in teaching and learning;

*H*<sub>17</sub> Use mediates the influence of interaction on satisfaction towards the FROG VLE in teaching and learning;

*H*<sub>18</sub> Use mediates the influence of flexibility on satisfaction towards the FROG VLE in teaching and learning;

*H*<sub>19</sub> Use mediates the influence of school management support on satisfaction towards the FROG VLE in teaching and learning;

*H*<sub>20</sub> Use mediates the influence of training on satisfaction towards the FROG VLE in teaching and learning;

*H*<sub>21</sub> Use mediates the influence of technical support on satisfaction towards FROG VLE in teaching and learning;

### **Hypotheses for Objective 3**

*H*<sub>22</sub> Gender moderates the relationship between use and satisfaction towards the FROG VLE in teaching and learning;

## **1.8 Significance of the Study**

There are several rationale and important reasons as to why this research is needed. Firstly, it helps to determine the significant variables that influence satisfaction towards the FROG VLE in teaching and learning. It will be unique in terms of the setting, the independent variables analysed, the dependent variable explained and the analysis techniques used. This will help researchers and practitioners to develop a richer understanding of what works when influencing technology adoption or its sustainability among the teachers.

The degree of teachers' satisfaction provides a yardstick as to the success rate of the FROG VLE's adoption. Knowing the factors that influence satisfaction have practical applications whereby they can be used to support decision-making in many aspects of technology integration in educational related-matters. For example, school management can use findings from this study to determine which factors need more focus, or when they decide these are no longer needed in the context of their teachers. This enables decision-makers to understand more about the "inner workings" of satisfaction towards technology integration in schools.

This research applies the Modified Technology Acceptance Model (Davis, 1989), Updated DeLone and McLean ISSM (2003), and Post-Acceptance Model of Information System Continuance Model (ISCM) by Bhattacherjee (2001) in

examining and understanding the influence of some selected factors on satisfaction towards the FROG VLE in teaching and learning. Hence, this study will contribute to the existing insights of Modified TAM, DeLone and McLean ISSM, and Post-Acceptance Model of ISCM by including other external variables, such as computer attitude, internet self-efficacy, computer anxiety, interaction, flexibility, school management, training, and technical support. Through this study, the interaction and relationship between each and every variable can be observed and taken into consideration throughout the innovation implementation process.

To add, further investigation will help to determine factors that affect teachers' satisfaction towards the FROG VLE in order to accelerate the process of embedding e-learning in schools. Based on this study, antecedents that form satisfaction towards FROG VLE for instructional use among teachers were identified. Success of any technology innovation varies from curriculum to curriculum, place to place and class to class (BECTA, 2003). Knowing the factors that predict satisfaction towards the FROG VLE is pertinent in our context as it is useful to inform providers of professional development programmes and teachers' support system to reflect and devise strategies to be used in facilitating teachers to develop greater technological, pedagogical and content knowledge in their profession.

Besides, this study can help decision makers to understand why teachers are responding to the newly introduced FROG VLE in schools in a certain manner. For instance, as computer anxiety negatively impacts satisfaction of FROG VLE (Al-Busaidi & Al-Shihi, 2012), teachers need to have a positive calmed attitude. One example where teachers' anxiety can be reduced is by providing sufficient in-house training in order to ensure teachers have sufficient skills and knowledge to use the technology. As teachers become more competent in their ability to manage the technology, their anxiety level will be reduced. Decision makers can use the findings of this study to investigate the causes of computer anxiety in order to eliminate it and consequently improve the adoption of FROG VLE in teaching and learning in schools. Indirectly, results of this study are suggesting ways to enhance the learning environment and future delivery of instruction through FROG VLE among the teachers by considering factors that influence their satisfaction towards the e-learning system.

Furthermore, curriculum planners can replicate this study as a guide to future curriculum planning. Findings from this study will help to promote e-learning use in secondary schools with the provision of useful information for the policy makers to decide on new policies and strategies to enhance e-learning use in the teaching and learning processes.

Besides, it also provides comprehensive information to other researchers in generating more research concerning satisfaction towards the FROG VLE in teaching and learning. It will add on to the literature concerning the factors that influence satisfaction towards FROG VLE among secondary school teachers. It may serve as a guideline for researchers who want to examine end-users' satisfaction as

well as FROG VLE utilisation among different subject teachers within similar educational settings.

Besides that, developing countries have so much in common in terms of the state of technology initiatives as well as the barriers they face in the educational system. So despite this study being local in context, its findings can contribute to the international existing body of research on the diffusion of technology innovation in schools. Specifically, findings from this study can be supportive in making effective planning and funding decisions regarding future investments on FROG VLE or e-learning in teaching and learning.

Finally, it is hoped that the findings of this research will benefit the education system and enable the Ministry of Education in identifying factors that influence satisfaction towards the FROG VLE in teaching and learning among secondary school teachers. Factors that are directly influencing satisfaction can be integrated into future planning and development of Continuous Professional Development courses and trainings in order to maximise positive impacts of VLE in educational settings. With increased satisfaction and therefore, the use of the FROG VLE among the teachers, we can expect teaching to be more efficient and effective. As teachers alter their pedagogical approaches, the technology-based pedagogical strategies would result in four kinds of improvements in the classrooms. Firstly, students will be more motivated, advanced topics can be mastered more easily and readily, students can develop the ability to use problem-solving processes, and better outcomes on standardised tests, though not immediately (Dede, 1998).

## **1.9 Scope and Limitations of the Study**

Though, rigorous validation procedure had been undertaken, this study involves some limitations. Limitations are possible weaknesses or disadvantages in the design of the study (Creswell, 2017). There are some aspects of the research that the researchers have no control over.

Firstly, as this study only measure respondents' perceptions in a specific situation or an occurrence at a point of time, it limits the capability to generalise the results to different phases of time.

Population of the study is limited to Champion Secondary School teachers in the Southern Region as when the study started the FROG VLE was still at its infancy stage. As Champion Schools are the benchmarked schools for the FROG VLE, they were chosen for this study in order to ensure that respondents are using the e-learning system. Perhaps samples from different states in Malaysia, or countries can be gathered to either confirm or refine the model and further assess its reliability and validity. Findings may not be applicable to teachers at other levels; pre-school, primary or the higher institutions.

Although self-report inventory is a technique which allows researchers to collect massive information quickly, it may result in common method variance (Conway & Lance, 2010). It is defined as potential alterations to true correlations among the observed variables. Despite employing advanced statistical technique like CFA to empirically estimate and control for the effects of common method variance, this too has its own limitations (Conway & Lance, 2010).

Another limitation of this research that needs to be acknowledged is the accuracy of the data and honesty of the respondents. There is possibility that the respondents may not report their perceptions correctly. The statistics are subjected to individual bias and responding errors. However, the researcher tried to overcome this by assuring respondents' of their confidentiality and that all answers have no one right answer.

Though the study offers a reasonable complete account in terms of factors selected from three dimensions; psychological, contextual and the e-learning system, there are many other relevant and pertinent factors which may play a role in influencing satisfaction towards the FROG VLE in teaching and learning.

In conclusion, generalisation can only be applied to studies that have similar characteristics with this study. Despite the limitations, it is hopeful that the study will be significant in guiding relevant stakeholders in making more appropriate decisions in improving teachers' satisfaction towards FROG VLE and for further research.

## **1.10 Definition of Terms**

The key terms used in this study is defined conceptually and operationally to provide a clear understanding in carrying out this research.

### **1.10.1 Satisfaction**

Satisfaction is conceptualised as an affective attitude towards a computer system by someone who interacts with the system directly (Torkzadeh & Doll, 1999). It is a gap between the expected and the actual gained experience when using the system (Tsai, Yen, Huang & Huang, 2007). In this study satisfaction is defined as the positive affective reaction teachers' have towards their use of the FROG VLE in their teaching and learning.

### **1.10.2 Virtual Learning Environment**

VLE is the use of a web-based communication, collaboration, learning, knowledge transfer and training to add value to businesses and learners (Kelly & Bauer, 2004).

It is considered a type of Information System (Urbach & Muller, 2012). In the context of this study, the VLE is a cloud-based learning platform known as the FROG VLE provided by the MOE to all schools in Malaysia. FROG VLE takes on a supplementary role and it is used as an asynchronous web-based instruction.

### **1.10.3 Use**

The Updated DeLone and McLean ISSM posits that positive experience with initial Use of IS will lead to higher User Satisfaction (DeLone & McLean, 2003). Use represents the degree and manner in which an IS is utilised by its users. Measuring the usage of an information system is a broad concept that can be considered from several perspectives. Actual use of an IS may be an appropriate success measure (Urbach & Muller, 2012). Use of the FROG VLE in Thah (2014) has shown teachers 65.8 % of their teacher respondents claimed that they use the VLE for teaching and learning. This includes sending homeworks, looking up for resources and sharing ideas and opinions besides teaching and learning sites. In this study, Use refers to the various functionality of FROG VLE as a pedagogical tool for teaching and learning purposes.

### **1.10.4 Perceived Usefulness**

Davis (1989) mentioned that perceived usefulness is the extent to which an individual believes that using a particular software system will help improve a person's job. It has also been defined as the perceived degree of improvement after adoption of a system (Sun, Tsai, Finger, Chen & Yeh, 2008). In this study, perceived usefulness is defined as teachers' perceptions towards FROG VLE in helping them to improve their teaching and learning processes.

### **1.10.5 Interaction**

According to Wagner (1994), interactions in teaching and learning are reciprocal events that take place between a learner and the learner's environment with the purpose of changing learners and moving them towards the achievement of their goals. Interaction in this study is defined as the engagement that teachers have with the other teachers, their students and the technological medium which is the FROG VLE.

### **1.10.6 Perceived Ease of Use**

Perceived ease of use (PEOU) refers to the degree to which an individual believes that using a particular system would be free from physical and mental effort (Davis, 1989). Davis, Bagozzi and Warshaw (1992) stated that the easier it is to use a

system, the less the effort required to fulfill the task. In this study, PEOU refers to the extent to which teachers believe that FROG VLE can be easily integrated into their teaching and learning processes without much effort.

#### **1.10.7 Flexibility**

Flexibility is defined as teachers' perception of the efficiency and effects of adopting e-learning towards their work, and the teaching and learning process involved (Sun et al., 2008). Teachers' perceived flexibility in this study is the degree to which they perceived that FROG VLE will enable them to control the pace, sequence and their teaching content.

#### **1.10.8 Computer Attitude**

Teo and Lee (2010) defined computer attitude as a positive or negative disposition one has towards a particular technology. Wong, K.T., Hamzah, M.S.G., & Hamzah, M. (2014) define Computer Attitude as representing an individual's personal convictions and feelings towards a specific object or behaviour. Attitude in itself represents beliefs and feelings that one has towards something (Piccoli, Ahmad and Ives, 2001). In this study, computer attitude refers to the extent to which teachers' possess positive or negative feelings towards the FROG VLE.

#### **1.10.9 Computer Anxiety**

Anxiety is a result from mental pressure and is composed of trait anxiety and state anxiety (Cattell & Scheier, 1961). Powell (2013) defined Computer Anxiety as the situation where people feel uneasy, apprehensive or fearful about current or future use of computers. According to Barbeite and Weiss (2004), anxiety is an emotional fear of potential negative outcomes such as damaging the computer or looking foolish. The definition of anxiety in this study is the level of teachers' fear or apprehension level when they use FROG VLE in their teaching and learning.

#### **1.10.10 Internet Self-Efficacy**

According to Bandura (1977), self-efficacy reflects one's beliefs about the ability to perform certain tasks successfully. Internet self-efficacy refers to the belief that one can successfully perform a distinct set of behaviours required to establish, maintain and utilise the internet effectively, over and above basic personal computer skills (Eastin & LaRose, 2000). In this study, it is defined as teachers' perceptions of their abilities when using FROG VLE in their teaching and learning.



### **1.10.11 Training**

Training may include workshops, online tutorials, courses and seminars (Sumner & Hostetler, 1999). Training in this study is defined as the professional development courses given to teachers on how to use the FROG VLE in their teaching and learning.

### **1.10.12 Technical Support**

According to Moses, Abu Bakar, Mahmud and Wong (2012), in their study on teachers laptop use, define technical support as the assistance and guidance provided by the technical support personnel in the school to the teachers who encounter problems using ICT tools. Frost and Sullivan (2006) includes ICT facilities vendor and internal helpdesks provided within the education ministry in their definition of technical support. In this study, technical support refers to the help provided by the technical support personnel in schools to the teachers who needed it when they are using the FROG VLE in their teaching and learning.

### **1.10.13 School Management**

School management refers to the school's principal and his/her management personnel (Baylor & Ritchie, 2002). This study takes School Management as the group of people managing the administration of the school which includes the schools' principals and the three senior assistants in every school in Malaysia.

### **1.10.14 Champion School**

Champion Schools are schools which the Ministry of Education has enlisted as benchmarked schools for FROG VLE, whereby they act as mentors to the other schools in order to produce the multiplying effects (Hew & Syed Abdul Kadir, 2016). In March 2012, MOE has decided on a list of 351 schools which are named as Champion Schools. The choice was made based on three criteria; schools' connectivity, location and level (primary or secondary). The schools enlisted were given firsthand direct continuous training from Frog Asia itself. Population in this study came from Champion Secondary Schools from three states in Malaysia; Melaka, Johor and Negeri Sembilan.

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## LIST OF PUBLICATIONS

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