



**UNIVERSITI PUTRA MALAYSIA**

***PREDICTORS OF LAPTOP USE IN TEACHING AND LEARNING AMONG  
SECONDARY SCHOOL MATHEMATICS AND SCIENCE TEACHERS***

**PRISCILLA MOSES**

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**By**

**PRISCILLA MOSES**

**Thesis Submitted to the School of Graduate Studies, Universiti Putra  
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Degree of Doctor of Philosophy**

**February 2012**

*To my parents,  
Moses and Packiam*

I am truly grateful for all your love, care, guidance and support.

For all that you are,  
I love you both so much!

Abstract of thesis presented to the Senate of Universiti Putra Malaysia  
in fulfilment of the requirement for the degree of Doctor of Philosophy

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**Chair : Wong Su Luan, PhD**

**Faculty : Faculty of Educational Studies**

With the growing emphasis on technology, Mathematics and Science teachers were provided with laptops as an instructional tool to improve their lesson delivery. The focus of this study was to investigate the factors that influence the use of laptops in the teaching and learning among the secondary school Mathematics and Science teachers. The predictor factors were laptop competence, perceived ease of use, perceived usefulness, attitude towards laptop use, administrator's support, and technical support.

This study was based on a quantitative descriptive research using a set of questionnaire. The validity of the instrument was established through a panel of experts. Pilot test was carried out among 38 teachers and the Cronbach's

alpha coefficient value was found to range from .731 to .978. The respondents of this investigation were secondary school Mathematics and Science teachers from the Central Region of Malaysia. The total sample of Mathematics and Science teachers was 473. Descriptive statistics and Structural Equation Modeling using SPSS and AMOS was employed in this study.

Several significant findings emerged from this study. The results attained from the analysis generated a model — the Malaysian Teachers' Laptop Use Model (MyTeLUM) that could be used to predict the use of laptops among the Mathematics and Science teachers for teaching and learning. The significantly emerged paths were: 1) laptop competence influenced perceived usefulness ( $\beta = .184, p < 0.05$ ); 2) perceived ease of use influenced perceived usefulness ( $\beta = .451, p < 0.001$ ); 3) perceived usefulness influenced attitude ( $\beta = .691, p < 0.001$ ); 4) perceived usefulness influenced laptop use ( $\beta = .256, p < 0.001$ ); 5) attitude influenced laptop use ( $\beta = .481, p < 0.001$ ); 6) technical support influenced perceived ease of use ( $\beta = .193, p < 0.001$ ); and 7) technical support influenced perceived usefulness ( $\beta = .119, p < 0.05$ ). However, only administrator's support ( $\beta = 0.022, p > 0.05$ ) was found to be insignificant in predicting the use of laptops among the teachers. In addition, two new additional paths that were statistically significant were also identified from the MyTeLUM. The first path showed that laptop competence predicted perceived ease of use ( $\beta = .623, p <$

0.001) and the second path that emerged showed that technical support influenced laptop competence ( $\beta = .199, p < 0.001$ ).

Meanwhile, the four mediating variables identified in this study were perceived ease of use, perceived usefulness, attitude towards laptop use, and laptop competence. Three of the intervening variables acted as partial mediators, except for the perceived usefulness which played the role of a total mediator between the variables. Furthermore, the MyTeLUM yielded dissimilar results on the influence of the variables for Mathematics (technical support on perceived usefulness;  $\beta = .128, p > 0.05$ ) and Science (laptop competence on perceived usefulness;  $\beta = .000, p > 0.05$ ) subjects.

Out of the six predictors, five were found to be significant in influencing the use of laptop either directly (perceived usefulness and attitude towards laptop use) or indirectly (laptop competence, perceived ease of use, and technical support). Consequently, nearly half of the variance (46.7%) in laptop use was explained by the five variables for the teaching and learning.

This study proposes that greater emphasis should be placed on the teachers' attitude towards laptop use and perceived usefulness in educating, preparing, and training the teachers to utilise the laptops for teaching and learning. Hence, the findings of this research may benefit and provide productive directions

especially to the Malaysian Ministry of Education as a laptop initiative policy maker in order to make the investment yield more effective results.

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

**PERAMAL KEPADA PENGGUNAAN KOMPUTER RIBA DALAM  
PENGAJARAN DAN PEMBELAJARAN DALAM KALANGAN  
GURU MATEMATIK DAN SAINS SEKOLAH MENENGAH**

Oleh

**PRISCILLA MOSES**

**Februari 2012**

**Pengerusi : Wong Su Luan, PhD**

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Guru Matematik dan Sains telah dibekalkan dengan komputer riba sebagai alat pengajaran untuk menambahbaikkan penyampaian pengajaran dengan penekanan yang semakin meningkat kepada teknologi. Fokus kajian ini adalah untuk mengkaji faktor yang mempengaruhi penggunaan komputer riba dalam pengajaran dan pembelajaran dalam kalangan guru Matematik dan Sains sekolah menengah. Faktor peramal adalah kompetensi komputer riba, persepsi kemudahan, persepsi kebergunaan, sikap terhadap penggunaan komputer riba, sokongan pentadbir, dan sokongan teknikal.

Kajian ini adalah berdasarkan penyelidikan deskriptif kuantitatif yang menggunakan satu set soal selidik. Kesahan instrumen telah diperakui oleh



satu panel pakar. Kajian rintis telah dijalankan dalam kalangan 38 orang guru dan nilai pekali alpha Cronbach didapati berada dalam julat antara .731 hingga .978. Responden kajian ini adalah guru Matematik dan Sains sekolah menengah dari Wilayah Tengah Malaysia. Jumlah sampel guru Matematik dan Sains ialah 473. Statistik deskriptif dan **Structural Equation Modeling** menggunakan perisian SPSS dan AMOS telah digunakan dalam kajian ini.

Beberapa penemuan yang signifikan telah didapati daripada kajian ini. Keputusan yang dicapai menerusi analisis yang dilakukan menghasilkan sebuah model — **Malaysian Teachers' Laptop Use Model** (MyTeLUM) yang boleh digunakan untuk meramalkan penggunaan komputer riba dalam kalangan guru Matematik dan Sains untuk pengajaran dan pembelajaran. Laluan signifikan yang dikenalpasti adalah: 1) kompetensi komputer riba mempengaruhi persepsi kebergunaan ( $\beta = .184, p < 0.05$ ); 2) persepsi kemudahan mempengaruhi persepsi kebergunaan ( $\beta = .451, p < 0.001$ ); 3) persepsi kebergunaan mempengaruhi sikap ( $\beta = .691, p < 0.001$ ); 4) persepsi kebergunaan mempengaruhi penggunaan komputer riba ( $\beta = .256, p < 0.001$ ); 5) sikap mempengaruhi penggunaan komputer riba ( $\beta = .481, p < 0.001$ ); 6) sokongan teknikal mempengaruhi persepsi kemudahan ( $\beta = .193, p < 0.001$ ); dan 7) sokongan teknikal mempengaruhi persepsi kebergunaan ( $\beta = .119, p < 0.05$ ). Walau bagaimanapun, hanya sokongan pentadbir ( $\beta = 0.022, p >$

0.05) sahaja yang didapati tidak signifikan dalam meramalkan penggunaan komputer riba dalam kalangan guru. Di samping itu, dua dapatan laluan baharu yang signifikan secara statistik telah dikenalpasti dari MyTeLUM. Dapatan pertama menunjukkan bahawa kompetensi komputer riba meramal persepsi kemudahan ( $\beta = .623$ ,  $p < 0.001$ ) dan dapatan kedua yang diperolehi menunjukkan bahawa sokongan teknikal mempengaruhi kompetensi komputer riba ( $\beta = .199$ ,  $p < 0.001$ ).

Empat pembolehubah pengantaraan yang dikenal pasti dalam kajian ini ialah persepsi kemudahan, persepsi kebergunaan, sikap terhadap penggunaan komputer riba, dan kompetensi komputer riba. Tiga daripada pembolehubah pengantaraan ini bertindak sebagai pengantara separa, kecuali persepsi kebergunaan yang memainkan peranan sebagai pengantara lengkap antara pembolehubah lain. Tambahan pula, MyTeLUM telah menghasilkan keputusan yang berbeza bagi pengaruh terhadap pembolehubah untuk mata pelajaran Matematik dan Sains (sokongan teknikal pada persepsi kebergunaan;  $\beta = 0.128$ ,  $p > 0.05$ ) dan Sains (kompetensi komputer riba pada persepsi kebergunaan;  $\beta = 0.000$ ,  $p > 0.05$ ).

Lima daripada enam peramal yang dikaji didapati signifikan dalam mempengaruhi penggunaan komputer riba sama ada secara langsung (persepsi kebergunaan dan sikap terhadap penggunaan komputer riba) atau tidak

langsung (kompetensi komputer riba, persepsi kemudahan, sokongan teknikal). Maka, hampir separuh daripada varians (46.7%) dalam penggunaan komputer riba telah dijelaskan oleh lima pembolehubah untuk pengajaran dan pembelajaran.

Kajian ini mencadangkan bahawa penekanan yang lebih perlu diberikan kepada sikap terhadap penggunaan komputer riba guru dan persepsi kebergunaan dalam mendidik, menyediakan, dan melatih guru untuk menggunakan komputer riba untuk pengajaran dan pembelajaran. Seterusnya, dapatan kajian ini memberi manfaat dan arah tuju yang produktif khususnya bagi pihak Kementerian Pendidikan Malaysia sebagai pembuat dasar inisiatif komputer riba agar pelaburan yang dicurahkan membuahkan hasil yang lebih berkesan.

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This thesis was submitted to the Senate of 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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## DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institution.

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**PRISCILLA MOSES**

Date: 27 February 2012

## TABLE OF CONTENTS

	<b>Page</b>
<b>ABSTRACT</b>	iii
<b>ABSTRAK</b>	vii
<b>ACKNOWLEDGEMENTS</b>	xi
<b>APPROVAL</b>	xiv
<b>DECLARATION</b>	xvi
<b>LIST OF TABLES</b>	xxi
<b>LIST OF FIGURES</b>	xxvi
<b>LIST OF ABBREVIATIONS</b>	xxxii
<b>CHAPTER</b>	
<b>1 INTRODUCTION</b>	
1.1 Background	1
1.2 Laptop Initiatives	4
1.3 Benefits and Challenges of Laptop Initiatives	9
1.4 Statement of the Problem	14
1.5 Objectives of the Study	16
1.6 Hypotheses of the Study	17
1.7 Significance of the Study	20
1.8 Scope and Limitations of the Study	24
1.9 Definition of Terms	27
1.9.1 Laptop Use	27
1.9.2 Teaching and Learning	27
1.9.3 Laptop Competence	28
1.9.4 Perceived Ease of Use	29
1.9.5 Perceived Usefulness	29
1.9.6 Attitude towards Laptop Use	30
1.9.7 Administrator's Support	30
1.9.8 Technical Support	31
1.9.9 Influence	31
1.9.10 Mediator	32
1.9.11 Moderator	32
1.9.12 Subject Matter	32
1.9.13 Secondary School Mathematics and Science teachers	33
<b>2 LITERATURE REVIEW</b>	
2.1 Introduction	34
2.2 Theories Related to the Study	35
2.2.1 Theories of Reasoned Action	35

	2.2.2	Technology Acceptance Model	38
2.3		Technology Use in Teaching and Learning	45
2.4		Laptop Use among Teachers	48
2.5		Subject Matter as a Moderator for Laptop Use among Teachers Teaching Mathematics and Science Subjects	52
2.6		Predictor Factors Related to Technology Use among Teachers	56
	2.6.1	Laptop Competence	61
	2.6.2	Perceived Ease of Use	67
	2.6.3	Perceived Usefulness	69
	2.6.4	Attitude towards Laptop Use	72
	2.6.5	Administrator's Support	74
	2.6.6	Technical Support	77
2.7		Theoretical Framework	81
2.8		Conceptual Framework	85
<b>3</b>		<b>METHODOLOGY</b>	
	3.1	Introduction	88
	3.2	Research Design	88
	3.3	Location of the Study	92
	3.4	Population	94
	3.5	Sample Size	95
	3.6	Sampling	98
	3.7	Instrumentation	103
	3.7.1	Reverse Scoring	111
	3.7.2	Double Back Language Translation	112
	3.8	Validity and Reliability	113
	3.8.1	Validity	113
	3.8.2	Reliability	116
		3.8.2.1 Pilot Test	117
	3.9	Data Collection and Data Entry	126
	3.10	Data Analysis	129
<b>4</b>		<b>RESULTS AND FINDINGS</b>	
	4.1	Introduction	145
	4.2	Preliminary Statistical Analysis	146
	4.3	Demographic Information	153
	4.4	Structural Equation Modeling	158
	4.4.1	The Influence of Predictors on the Model Measuring the Use of Laptop in the Teaching and Learning	158

4.4.1.1	Defining Individual Constructs	159
4.4.1.2	Developing the Overall Measurement Model	159
4.4.1.3	Designing a Study to Produce Empirical Results	165
4.4.1.4	Assessing Measurement Model Validity	165
4.4.1.5	Specifying the Structural Model	240
4.4.1.6	Assessing Structural Model Validity	243
4.4.2	Mediating Variables	257
4.4.3	Subject Matter as a Moderator	271
<b>5</b>	<b>SUMMARY, DISCUSSION, CONCLUSION, IMPLICATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH</b>	
5.1	Introduction	281
5.2	Summary of the Study	281
5.3	Discussion	285
5.3.1	The Influence of Predictors on the Model Measuring the Use of Laptop in the Teaching and Learning	286
5.3.2	Mediating Variables	292
5.3.3	Subject Matter as a Moderator	296
5.4	Conclusion	299
5.5	Implications	300
5.5.1	Theoretical Implications	301
5.5.2	Practical Implications	303
5.6	Recommendations for Future Research	308
	<b>REFERENCES</b>	<b>312</b>

<b>APPENDICES</b>		328
<b>A</b>	<b>Original Data</b>	329
A1	Nine Challenges of Vision 2020	330
A2	North Carolina Educational Technology Competency	332
<b>B</b>	<b>Sample</b>	337
B1	List of Schools Randomly Selected in this Study	338
<b>C</b>	<b>Research Instrument</b>	340
C1	Questionnaire	341
<b>D</b>	<b>Letters of Authority</b>	356
D1	Author's Permission to Modify and Translate the Instrument	357
D2	Written Permission from the Educational Planning and Research Division, Ministry of Education	359
D3	Written Permission from the Educational Departments in the Central Region	361
<b>E</b>	<b>Credentials</b>	366
E1	Credentials for Language Experts	367
E2	Credentials for Panel of Experts	369
E3	Credentials for Statistician (SEM expert)	371
<b>F</b>	<b>Data</b>	372
F1	Extreme Outliers	373
F2	Normality Test	374
F3	Linearity Test	381
F4	Inter-item Correlation for Items to Measure Laptop Competence	382
<b>BIODATA OF STUDENT</b>		383
<b>LIST OF PUBLICATIONS</b>		384