

**FACTORS INFLUENCING TECHNOLOGY  
ACCEPTANCE MODEL IN MOBILE LEARNING  
AMONG PRIVATE UNIVERSITY STUDENTS**

**RAJANI BALAKRISHNAN**

**DOCTOR OF PHILOSOPHY IN INFORMATION  
TECHNOLOGY**

**INFRASTRUCTURE UNIVERSITY KUALA  
LUMPUR**

**2018**

**Factors Influencing Technology Acceptance Model in Mobile Learning among  
private university students**

**By**

**RAJANI BALAKRISHNAN**

**Thesis Submitted in Fulfillment as the Requirement for Doctor of Philosophy in  
Information Technology by Research Degree in the Faculty of Information  
Technology Infrastructure**

**IUKL**

**2018**

Abstract of thesis presented to the Senate of Infrastructure University Kuala Lumpur  
in fulfillment of the requirement for the degree of Doctor of Philosophy in Information  
Technology

FACTORS INFLUENCING TECHNOLOGY ACCEPTANCE MODEL IN  
MOBILE LEARNING AMONG PRIVATE UNIVERSITY STUDENTS

By

**RAJANI BALAKRISHNAN**

**April 2018**

Chair: Dr. Robiatul A'dawiah Jamaluddin

Faculty: Faculty of Creative Media And Innovative Technology

This study explores students' acceptance of mobile learning with respect to their readiness, perception levels on technology and duly captures a student's attitude-to-technology, intention-to-use-technology among the Malaysian Higher learning community. On another perspective, this study extends to investigate mobile learning intervention with learning management system which improves learning outcomes. The rapid rise of technology and its related constructs have led to developers introducing a wide range of mobile applications complimented by the reshaping of the education institutes in harnessing the application for educational purposes. Mobile learning has attracted both teachers and students in their daily learning and teaching activities. Smart phones and technology are revolutionizing learning beyond classrooms and plays a crucial role in improving education. Technology enabled teaching and learning is expanding and studies have established the benefits of using technology in education through smart phones. Although smart phones offer connectivity and various preferences to learners, it is still in learning phase that technology enabled learning could improve learning outcomes. Students and teachers acceptance of mobile learning is essential to successful implementation of mobile learning in higher education. This study comprises a mix mode method consisting mainly undergraduate students of a university in the Klang Valley. Also lending credential to the study includes 10 expert interviews regarding the use of technology

and the impacts toward tertiary education. Findings from the study indicate participants' willingness in using mobile technology for educational purposes and the need to adopt such technology. Nevertheless, more technical infrastructure should be allotted in university campuses to assist students learning via their mobile devices. At the same time feedback and training is vital in creating a win-win situation for learners and educators alike.

## ACKNOWLEDGMENT

All praise to GOD; who is most gracious and most merciful; who is the master of judgment day; and to whom only, we seek help and refuge. On completion of this subject, the researcher feels so thankful, humble on the graces and strength imparted by GOD.

While thinking of this challenging journey, several individuals and institutions are in my best prayers and wish list. First and foremost, I would like to share my gratefulness and thankfulness for my supervisor Dr.Robiatul Ada'wiah, Co-supervisor Dr Sakina Sofia Binti. Baharom. Their sincere guidance, help, support, valuable comments and encouragements will always dish up in my judgment as a learning curve.

Moreover, I would wish to convey my earnest gratitude to all other IUKL lecturers and staff members especially Assoc. Prof Christianine Della, Prof. Dr. Faridah Ibrahim, Prof. Dr. Noor Saadah, Assoc. Prof. Dr. Manal Mohsen Abood , Dr.Asogan, Madam Sangeetha Valloo (Dean of FCMIT), Madam Janagi Ramasamy (HOP, of FCMIT), Dr. Mohammed Awadh Ahmed Ben Mubarak, Dr. Tadiwa Elisha Nyamasvisva, Ms. Kamaljeet Kaur, and Ms Rosinah Ibrahim for their counsel, suggestions, support, patience, and availability during the full period of my dissertation.

I offer my grateful thanks to all my friends who is undergoing the same journey as mine. Finally, I appreciate all the participants for sparing their valuable time to take part in the survey questionnaires and the interviews.

## **APPROVAL**

This thesis was submitted to the Senate of Infrastructure University Kuala Lumpur (IUKL) and has been accepted as fulfillment of the requirement for the degree of Doctor of Philosophy in Information Technology. The members of the thesis Examination Committee were as follows:

**SR. RANJIT SINGH A/L DHARAM SINGH (ASSOCIATE PROF)**

Senior Lecturer

Faculty of Infrastructure University Kuala Lumpur (IUKL)

(Chairperson)

**DR. FARES ANWAR SALEM HASAN**

Lecturer

Faculty of Creative Media and Innovative Technology

Infrastructure University Kuala Lumpur (IUKL)

(Internal Examiner)

**DR. MUHAMMAD MODI BIN LAKULU (ASSOCIATE PROF. DR.)**

Lecturer

Faculty of Art, Computing & Creative Industry,

Sultan Idris Education University (UPSI)

(External Examiner)

**DR. CHOO WOU ONN, (ASSOCIATE PROF. DR.)**

Lecturer

Faculty of Information Technology & Sciences (FITS)

INTI International University

(External Examiner)

.....  
**Assoc. Prof. Dr. Manal Mohsen Abood**

Director

Centre for Postgraduate Studies

Infrastructure University Kuala Lumpur (IUKL)

Date:

## **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 Infrastructure University Kuala Lumpur or at any other institutions.

Name: Rajani Balakrishnan

Signature:

Date:

## TABLE OF CONTENT

<b>ABSTRACT</b>	<b>ii</b>
<b>ACKNOWLEDGMENT</b>	<b>iv</b>
<b>APPROVAL</b>	<b>v</b>
<b>DECLARATION</b>	<b>vi</b>
<b>TABLE OF CONTENT</b>	<b>vii</b>
<b>LIST OF TABLES</b>	<b>xiv</b>
<b>LIST OF FIGURES</b>	<b>xvi</b>
<b>LIST OF PUBLICATIONS</b>	<b>xvii</b>

### CHAPTER

<b>1</b>	<b>INTRODUCTION</b>	<b>1</b>
	1.1 Overview	1
	1.2 Background of the Study	1
	1.3 Problem Statement	4
	1.4 Research Questions	7
	1.5 Research Objectives	8
	1.6 Significance of the Research	8
	1.7 Definitions of Terms	9
	1.8 Organization of the study	10
	1.9 Summary	11
<b>2</b>	<b>LITERATURE REVIEW</b>	<b>12</b>
	2.1 Introduction	12
	2.2 Learning Systems	13
	2.3 Mobile Technology	15
	2.4 Learning with Mobile Technology	16
	2.5 From Distance learning to Electronic learning to Mobile Learning	20
	2.5.1 Distance learning (D-learning)	20
	2.5.2 Electronic Learning (E-learning)	21
	2.5.3 Electronic-learning Advantages	22
	2.5.4 Mobile Learning (M-learning)	23
	2.5.5 E-learning to M-Learning	28
	2.5.6 E-learning and M-Learning	29
	2.5.7 M-Learning – Advantages	33
	2.5.8 M-Learning Challenges	34



2.6	Implication to learning using Mobile learning	34
2.7	M-Learning at 21 <sup>st</sup> century	35
2.7.1	M-Learning and Frameworks	36
2.7.2	M-Learning Tool	37
2.7.3	M-Learning Characteristics	39
2.8	Higher Learning Institutions (HLI)	40
2.9	Private University Students	41
2.10	M-Learning as an Additional Tool and Communication Tool	42
2.11	Implication of m-Learning as an additional learning tool	43
2.12	Learning Management System (LMS)	43
2.12.1	Flexibility	45
2.12.2	Scalability	45
2.12.3	Functionality	45
2.12.4	Connectivity	46
2.12.5	User Friendliness	46
2.12.6	Security	47
2.12.7	Availability	47
2.13	Implication of using Learning Management System (LMS) to m-Learning	47 47
2.14	Edmodo: Open Source Learning Management System (LMS)	51
2.14.1	E-Learning with Edmodo	52
2.14.2	M-Learning with Edmodo	53
2.14.3	Information and Communication Technology (ICT) Literacy	54
2.14.4	ICT Readiness	55
2.14.5	ICT Subjects using Edmodo	56
2.15	Implication of using Edmodo in m-Learning	57
2.16	Factors effecting the acceptance of mobile learning	58
2.17	Research Methods	62
2.18	Summary	65
<b>3</b>	<b>RESEARCH PARADIGM AND THEORIES OVERVIEW</b>	<b>66</b>
3.1	Introduction	66
3.2	Research Paradigm and Theoretical Framework	66
3.3	Research Paradigm	66
3.3.1	Scientific Paradigm	67
3.3.2	Critical Paradigm	68

3.3.3	Pragmatism Paradigm	69
3.3.4	Interpretive Paradigm	70
3.4	The Theories and Paradigms for M-Learning	73
3.4.1	Behaviorist Learning Paradigm	74
3.4.2	Cognitivist Learning Paradigm	75
3.4.3	Humanistic Learning Paradigm	76
3.4.4	Constructivist Theories	77
3.5	Implication of Learning Theorist to m-learning	79
3.6	Mobile Learning Theories	79
3.6.1	The Unified Theory of Acceptance and Use of Technology (UTAUT MODEL)	80
3.6.2	Theory of Planned Behavior (TPB)	82
3.6.3	Social Cognitive Theory (SCT)	83
3.6.4	Technology Acceptance Model - TAM	85
3.7	Limitations of Technology Acceptance Model	90
3.8	Conceptual Framework - Integrating TAM and TPB	91
3.8.1	M-Learning Readiness	92
3.8.2	M-Learning Perception	94
3.8.3	M-Learning Acceptance	97
3.8.4	Students' Acceptance towards M-Learning	99
3.8.5	Mobile Self Efficacy	101
3.8.6	ICT Anxiety	103
3.9	Hypothesis Development	105
3.10	Hypothesis for this Research	105
3.11	Summary	108
<b>4</b>	<b>METHODOLOGY</b>	<b>109</b>
4.1	Introduction	109
4.2	Research Approaches	109
4.3	Research Design	109
4.4	Quantitative Methods and Analysis	112
4.4.1	Quantitative Data Collection Procedure	112
4.4.2	Quantitative Instrument	112
	(A) Mobile Technology Usage Questionnaire (Survey – 1)	112
	(B) M-Learning Acceptance Questionnaire (Survey - 2)	114

4.4.3	Quantitative Data Analysis	114
4.4.3.1	Cronbach Alpha Test	115
4.4.3.2	Factor Analysis	115
4.4.3.3	Structured Equation Modeling (SEM)	115
4.5	Qualitative Methods and Analysis	115
4.5.1	Qualitative Data Collection Procedure	116
4.5.2	Qualitative Instruments	116
4.5.3	Semi Structured Interview	117
4.5.3.1	Respondent	118
4.5.4	Qualitative Data Analysis	121
4.5.4.1	Thematic Analysis	121
4.5.4.2	Verbatim	121
4.6	The Focus and Control Groups	123
4.6.1	Focus Group (Group A with Intervention)	124
4.6.2	The Control Group (Group B without Intervention)	124
4.7	Methodological Triangulation	125
4.8	Training on using the Mobile Learning Application (Edmodo)	126
4.9	Description of Population and Sample Frame	128
4.9.1	Sample Population	129
4.9.2	Sampling of the Students	129
4.10	Procedures and Ethical Concerns	130
4.11	Pilot Test	130
4.12	Measurement	131
4.13	Chapter Summary	131
<b>5</b>	<b>FINDINGS</b>	<b>132</b>
5.1	Introduction	132
5.2	Demographic Information	132
5.3	Reliability & Validity	132
5.2.1	Individual Reliability Score	133
5.2.2	Validity	134
5.3	Factor Analysis	134
5.3.1	Access to Technology	135
5.3.2	Communalities for ‘Access to Technology’	136
5.3.3	Total Variance for ‘Access to Technology’	136
5.3.4	Rotated Component Matrix <sup>a</sup>	138

5.3.5	Use of Technology in Everyday Life	138
5.4	Access to Technology	139
5.4.1	KMO and Bartlett's test for 'Use of Technology in everyday life'	139
5.4.2	Communalities on Use of Technology in everyday life	139
5.4.3	Total Variance / Factor Loadings	140
5.5	Use of Technology in Academic life	142
5.5.1	Sampling Adequacy for "Use of Technology in Academic life"	142
5.5.2	Communalities for 'Use of Technology in Academic life'	142
5.5.3	Total Variance	143
5.6	Attitude towards Technology	145
5.6.1	Sampling Adequacy for "Use of Technology in Academic life"	145
5.6.2	Communalities for 'Attitude towards Technology'	145
5.7	Attitude towards Use	146
5.7.1	Sampling adequacy for 'Attitude toward Use'	146
5.7.2	Communalities for 'Attitude towards Use'	146
5.7.3	Total Variance Explained	147
5.8	Intention to Use	148
5.8.1	Sampling adequacy for test for 'Intention to Use'	148
5.8.2	Communalities for 'Intention to Use'	149
5.8.3	Total Variance Explained	149
5.9	Hypothesis Testing –Correlation	150
5.9.1	Hypothesis 1	151
5.9.2	Hypothesis 2	152
5.9.3	Hypothesis 3	152
5.9.4	Hypothesis 4	153
5.10	Confirmatory Factor Analysis (CFA)	153
5.10.1	Measurement Model	154
5.10.2	Structural Model Evaluation	156
5.10.3	Hypothesis testing	157
5.11	Findings on Qualitative Data Analysis –Students	160
5.11.1	Technology	160
5.11.2	Mobile devices	161
5.11.3	Mobile learning	162

5.11.4	Acceptance	163
5.12	Findings on Qualitative Data Analysis – Experts	164
5.12.1	Results of the thematic analysis of Mobile Technology and Mobile Devices Usage in Learning	164
5.12.2	Results of the thematic analysis of Factors Influencing Acceptance of using Mobile Technology in Learning	165
5.12.3	Results of the thematic analysis of Model Integration (TAM and SCT)	166
5.12.4	Results of the thematic analysis of Benefit of this model in achieving the learning Outcome / Score.	166
5.13	Integration of TAM-ML with SCT theory Mobile self-efficacy and ICT Anxiety	167
5.14	Chapter Summary	170
<b>6</b>	<b>DISCUSSION, IMPLICATION CONTRIBUTION AND CONCLUSION</b>	<b>171</b>
6.1	Introduction	171
6.2	Discussions - Findings on Technology	171
6.3	Discussions - Findings on Perception, Readiness and Acceptance towards Mobile learning	174
6.3.1	Perception	175
6.3.2	Readiness	176
6.3.3	Acceptance	177
6.4	Discussions on Qualitative Data Analysis – Students	179
6.4.1	Technology	179
6.4.2	Mobile Devices	181
6.4.3	Mobile learning	182
6.4.4	Acceptance	183
6.5	Discussions on Qualitative Data Analysis – Experts	185
6.5.1	Advantages of learning using Mobile Technology	185
6.5.2	Factors Influencing Acceptance	186
6.5.3	Integration of TAM and SCT	186
6.5.4	Advantages of the TAM-ML Model – Achieve learning outcome	188
6.6	Research Contributions	188
6.7	Research Implications	189

6.7.1	Academic / Theoretical Implications	189
6.7.2	Educational Implications – Teaching and Learning	189
6.7.3	Methodological Implications	190
6.8	Future Studies	191
6.9	Limitations of the Study	192
6.10	Chapter Summary	1933
<b>REFERENCES</b>		<b>195</b>
<b>APPENDIX A</b>		<b>238</b>
<b>APPENDIX B</b>		<b>253</b>
<b>APPENDIX C</b>		<b>259</b>

## LIST OF TABLES

Table 2.1	Definitions for mobile learning from various researchers from year 2004 till current year	24
Table 2.2	Summary of the study in M-Learning	31
Table 2.3	The Learning Management System Compassion	49
Table 2.4	The factors effecting the acceptance of mobile learning	59
Table 2.5	Distinguished characteristics of qualitative and quantitative	64
Table 3.1	Characteristics of Interpretivism	72
Table 3.2	Construct in TAM, UTAUT, TPB & SCT	89
Table 4.1	Likert scale: 1 to 5	114
Table 4.2	Summary of data collection process for TAM-ML	120
Table 5.1	Reliability Score for Survey -1 Technology Usage	133
Table 5.2	Individual Reliability Score	133
Table 5.3	Bartlett's test for Sphericity	134
Table 5.4	KMO for 'Access to Technology'	135
Table 5.5	Communalities for 'Access to Technology'	136
Table 5.6	Total Variance Explained	136
Table 5.7	Rotated Component Matrix <sup>a</sup>	138
Table 5.8	KMO and Bartlett's test for 'Use of Technology in everyday life'	139
Table 5.9	Communalities on Use of Technology in everyday life	139
Table 5.10	Total Variance Explained	140
Table 5.11	Rotated Component Matrix	141
Table 5.12	KMO and Bartlett's test for 'Use of Technology in Academic life'	142
Table 5.13	Communalities for 'Use of Technology in Academic life'	142
Table 5.14	Total Variance Explained	143
Table 5.15	Rotated Component Matrix <sup>a</sup>	144
Table 5.16	KMO and Bartlett's test for 'Attitude towards Technology'	145
Table 5.17	Communalities 'Attitude towards Technology'	145
Table 5.18	KMO and Bartlett's test for 'Attitude toward Use'	146
Table 5.19	Communalities for 'Attitude towards Use'	146
Table 5.20	Total Variance Explained	147
Table 5.21	Component Matrix	148
Table 5.22	KMO and Bartlett's test for 'Intention to Use'	148

Table 5.23	Communalities for ‘Intention to Use’	<b>149</b>
Table 5.24	Total Variance Explained	<b>149</b>
Table 5.25	Component Matrix	<b>150</b>
Table 5.26	Correlation analysis for Hypothesis 1 (N= 81)	<b>151</b>
Table 5.27	Correlation analysis for Hypothesis 2 (N= 81)	<b>152</b>
Table 5.28	Correlation analysis for Hypothesis 3 (N= 81)	<b>152</b>
Table 5.29	Correlation analysis for Hypothesis 4	<b>153</b>
Table 5.30	Convergent validity of the model	<b>155</b>
Table 5.31	Fit indices of the model	<b>155</b>
Table 5.32	Regression weights and significant	<b>157</b>
Table 6.1	Device ownership	<b>171</b>
Table 6.2	Time spent on the following activities using Mobile Devices in a day	<b>172</b>



## LIST OF FIGURES

Figure 2.1	Four Types of Learning System (Source: Masrom and Ismail, 2010)	15
Figure 2.2	M-learning, E-learning and D-learning (Source: Georgiev et al., 2004)	26
Figure 3.1	The UTAUT Model (Venkatesh et al. 2003)	81
Figure 3.2	Theory of Planned Behavior (Source: Ajzen, 1991)	83
Figure 3.3	Technology Acceptance Model (Source: Davis et al., 1989)	86
Figure 3.4	Research Framework for this Research	107
Figure 4.1	Research Design for this Study	1111
Figure 4.2	The Research Group	123
Figure 4.3	The detail layout of how the Research is planned	1223
Figure 4.6	The Process flow of the research design	125
Figure 5.1	Scree Plot for Access to Technology	137
Figure 5.2	Scree Plot for Use of technology in everyday life	141
Figure 5.3	Scree Plot for Use of technology in Academic life	144
Figure 5.4	Scree Plot for ‘Attitude towards Use’	147
Figure 5.5	Scree Plot for ‘Intention to Use’	150
Figure 5.6	Structural Model	156
Figure 5.7	Path coefficient of the model	159
Figure 6.1	Device Ownership Bar Chart	172
Figure 6.2	Time spent on the following activities using Mobile Devices in a day	172

## LIST OF PUBLICATIONS

1.	Balakrishnan R., Dahnil D.P.B., Ben Mubarak M.A.A. (2016) Mobile Learning, Effective Integration of New Technologies into Existing Models. In: Luaran J., Sardi J., Aziz A., Alias N. (eds) <i>Envisioning the Future of Online Learning</i> . Springer, Singapore DOI <a href="https://doi.org/10.1007/978-981-10-0954-9_28">https://doi.org/10.1007/978-981-10-0954-9_28</a> Print ISBN 978-981-10-0952-5
2.	Rajani B, Dr.kalaimagal Ramakrishnan (2014) The Review of Mobile Learning in Higher Learning Institution <i>International Conference of Engineering, Information Technology, and Science, 2014 (ICEITS 2014)</i> Sunway Resort Hotel & Spa, Bandar Sunway, Malaysia, 4 – 5 December 2014
3	Rajani Balakrishnan, Dr. Dahlila Putri Binti Dahnil Ben Mubarak M.A.A. (2015) Mobile Learning, Effective Integration of New Technologies into Existing Models. ICeL; STELLAR; Stellar-ICeL 2015.. Kota Kinabalu, Sabah. STELLAR · ICeL. 26th-28th May 2015
4	Rajani Balakrishnan, Dr. Mohammed Awadh Ahmed Ben Mubarak, (2016) An investigation of readiness and perception of mobile learning in ICT subject among Undergraduate students in Private University in Kuala Lumpur, IUKL International Postgraduate Colloquia (IIPC 2016), 27 & 28 July 2016

# CHAPTER 1

## INTRODUCTION

### 1.1 Overview

Chapter 1 discuss about the background of the study, research questions, objectives and the significance of the research. Also discussion of the research approach and the outline of the thesis chapters.

### 1.2 Background of the Study

Mobile technology significantly contributes to learning environments and influences learners & academics in a greater way. Educational institutions face the rapid development of mobile devices and phones turning into a learning gadgets. The advantage of using mobile devices and phones over computers has offered continuous access, simplicity to communicate and collaborate with teachers and students.

The advantage of technology has been explored since the age of e-learning, and along with it, at the same time the present technology has lend the opportunity to learn through owning a mobile device. By owing a mobile device, a learner is not limited to time and geographical boundaries, rather these mobile device creates a sort of flexibility to learn anytime and anywhere (Kenan, 2015). Researchers Chen & Huang, (2012); Hwang, Yang, Tsai, and Yang, (2009) modernized the learning environments using mobile technologies and trained students on operating the devices.

Compared to traditional environments, mobile learning seems to be more attractive and activates interests among learners. According to researchers Oyelere, Paliktzoglou, & Suhonen (2016); Okeke & Umoru, (2012) adds that the potential of mobile learning not only provide materials in text but also includes videos and audio formats. Kate and Barter (2016) indicated that mobile devices such as iPad had a positive effect on student's achievement and progression. Despite the mobile learning pedagogy still growing tremendously; there is a continuous research in understanding the impact of learning and learning approaches (Schuck, Kearney, & Burden, 2017). Many authors used mobile technologies to offer learning activities for several courses,

## REFERENCES

- Abu-Al-Aish, A., Love, S., Hunaiti, Z., & Al-masaeed, S. (2013). Toward a sustainable deployment of m-learning in higher education. *International Journal of Mobile Learning and Organisation*, 7(3-4), 253-276.
- Abachi, H. R., & Muhammad, G. (2014). The impact of m-learning technology on students and educators. *Computers in human behavior*, 30, 491-496.
- Abdulahi, A., Samadi, B., & Gharleghi, B. (2014). A study on the negative effects of social networking sites such as facebook among asia pacific university scholars in Malaysia. *International Journal of Business and Social Science*, 5(10).
- Aboelmaged, M., & Gebba, T. R. (2013). Mobile banking adoption: an examination of technology acceptance model and theory of planned behavior. *International Journal of Business Research and Development*, 2(1).
- Aedo, I., Jemmi, M., Spector, J. M., Zaiceva, L., Ibáñez, M. B., García, J. J., & Berlanga, A. J. (2011). Special issue articles. *Journal of Educational Technology & Society*, 14(4).
- Agostinho, s, Oliver, R, Harper & Wills (2002). A tool to evaluate the potential for an ICT-based learning design to foster 'higher quality learning'. In *Proceedings of ASCILITE 2002, Auckland, New Zealand, UNITEC institute of Technology*.
- Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckmann (Eds.), *Action control: From cognition to behavior*. Berlin, Heidelberg, New York: Springer-Verlag. (pp. 11-39).
- Alabbadi, M. (2011). Mobile learning (mLearning) based on cloud computing: mLearning as a service (mLaaS). In *UBICOMM: The Fifth International Conference on Mobile Ubiquitous Computing, Systems, Services and Technologies*.
- Al-Adwan, A. & Smedley, J. K. (2012). "Implementing e-learning in the Jordanian Higher Education Systems: Factors affecting impact". *International Journal of*