

M-LEARNING ADOPTION MODEL FOR UTM

ELAHEH YADEGARIDEHKORDI

A dissertation submitted in partial fulfillment of the
requirements for the award of the degree of
Master of Science (Information Technology-Management)

Faculty of Computer Science and Information Systems
Universiti Teknologi Malaysia

JUNE 2011

This thesis dedicated to...

*My mother and father, who taught me that the best kind of knowledge to have is
that, which is learned for its own sake*

My beloved brother and sister

*My love to you will always remain and thank you so much for being
So patient and being there for me.*

ACKNOWLEDMENT

First and foremost I thank Allah that helps me to complete my dissertation successfully. I also wish to express my sincere appreciation to my supervisor, Dr. Noorminshah A. Iahad, for her kind advice and guidance. Her belief that it was, indeed, possible to finish kept me going. Special thanks to my parents who cheered me on from the beginning of my study. Last but not least, I am grateful to my beloved family and all my friends for their warm encouragements and supports.

ABSTRACT

M-learning is the use of electronic learning (E-learning) materials on mobile devices such as personal digital assistants (PDAs), Tablet PCs, mobile phones, Pocket PCs and in general every devices that are small and autonomous enough to help us in every moment of our life. With this new technology, learning will become more learner-centered and informal, rather than teacher-centered and formal. Adoption of M-learning refers to the interest of students and lecturers to use mobile devices in order to help them in their teaching and learning processes. But it is very considerable that decision of both students and lecturers to adopt M-learning is a long-term and complicated process and there are many factors that influence this adoption. In order to have successful adoption of M-learning determining these factors, eliminating problems, and highlighting the profits of this new technology for users are very essential. The aims of this project are to identify the factors that influence adoption of M-learning by users in UTM and to propose suitable M-learning adoption model for UTM. In order to reach this aim an interview is conducted by IT manager of CTL and two sets of questionnaire are distributed among students and lecturers. Analyzing these information shows that factors like Perceived Ease of Use, Perceived Usefulness, perceived Mobility Value, Prior Use of E-learning, Self-efficacy, Attitude Toward Using are main factors influencing adoption of M-learning in UTM . Furthermore, faculty and age differences are two moderators that also can impact this adoption. Finally, some recommendations are given to help CTL to have successful M-learning adoption in UTM.

ABSTRAK

Pembelajaran mobil merupakan pembelajaran secara elektronik menggunakan peranti elektronik seperti pembantu digital peribadi (PDA), Tablet PC, telefon bimbit, Pocket PC dan pada umumnya apa sahaja peranti yang kecil dan bebas untuk dibawa ke mana-mana. Pembelajaran akan lebih berpusatkan kepada pelajar dan tidak formal berbanding dengan pembelajaran masa kini yang kebanyakannya masih berpusatkan kepada pengajar dan berbentuk formal. Terma yang digunakan untuk merujuk kepada minat dan keinginan pelajar serta pengajar untuk menerima pembelajaran mobil dalam proses pengajaran dan pembelajaran ialah 'adaptasi terhadap pembelajaran mobil'. Tahap penerimaan atau adaptasi pelajar dan pengajar terhadap pembelajaran mobil melibatkan proses yang rumit dan kompleks. Terdapat banyak faktor yang menyumbang kepada adaptasi tersebut. Bagi memastikan adaptasi penggunaan pembelajaran mobil yang berkesan, faktor-faktor yang menyumbang kepada kejayaan proses adaptasi, kekangan yang timbul serta penekanan terhadap kelebihan penggunaan pembelajaran mobil perlu dikaji. Matlamat projek ini adalah untuk mengenalpasti faktor-faktor yang mempengaruhi adaptasi pembelajaran mobil di Universiti Teknologi Malaysia (UTM) dan mencadangkan model yang sesuai untuk adaptasi penggunaan pembelajaran mobil dalam proses pengajaran dan pembelajaran. Bagi mencapai matlamat tersebut, kutipan data melalui kaedah temubual dan borang kaji selidik telah dijalankan di kalangan pelajar dan pensyarah di UTM. Faktor-faktor berkaitan adaptasi yang telah dikenalpasti yang menyumbang kepada model adaptasi pembelajaran mobil di UTM adalah: Persepsi Kemudahan Penggunaan, Persepsi Kegunaan, Nilai Mobiliti yang dirasakan, Pengalaman Penggunaan E-learning, Efikasi Kendiri dan Sikap Penggunaan. Selain itu, fakulti dan perbezaan usia adalah dua pembolehubah moderator yang juga boleh mempengaruhi adaptasi ini. Beberapa cadangan telah diberikan untuk membantu Pusat Pengajaran & Pembelajaran, UTM bagi menjayakan adaptasi pembelajaran mobil di UTM.

TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	DECLARATION	ii
	DEDICATION	iii
	ACKNOWLEDGEMENTS	iv
	ABSTRACT	v
	ABSTRAK	vi
	TABLE OF CONTENTS	vii
	LIST OF TABLES	xi
	LIST OF FIGURE	xiii
1	PROJECT OVERVIEW	1
1.1	Introduction	1
1.2	Background of the Problem	3
1.3	Problem Statement and Research Question	5
1.4	Project Objectives	5
1.5	Project Scope	6
1.6	Importance of Research Study	6
1.7	Summary	6
2	LITERATURE REVIEW	8
2.1	Introduction	8
2.2	Usage of Technology for/ in Education	9
2.3	Generation of Learning	11
2.4	Moving from E-learning to M-learning	13

2.5	M-learning	16
2.5.1	Introduction to M-learning	16
2.5.2	Definitions of M-learning	17
2.5.3	Advantages of M-learning	19
2.6	M-learning Tools	20
2.6.1	PDA's	20
2.6.2	Pocket PC	21
2.6.3	Cell Phones	22
2.7	M-learning Case Studies	22
2.7.1	SMS Technologies for Education in the Philippines	22
2.7.2	Mobile Cell Phone as Educational Tool in Bangladesh	23
2.7.3	Lessons Learned From Case Studies	24
2.8	Diffusion Procedure	25
2.8.1	Adoption and Individuals' Differences	27
2.9	Technology Acceptance Model (TAM)	28
2.9.1	M-learning Adoption Case Studies	30
2.9.1.1	Case Study in University Campuses of New Zealand	30
2.9.1.2	Case Study in Zhejiang Normal University in China	33
2.9.2	Other M-learning Adoption Models	35
2.9.2.1	Teresa L. Ju, Wathanaporn Sriprapaipong , Do Nhut Minh Model	35
2.9.2.2	Jen-Hung Huang , Yu-Ru Lin, Shu-Ting Chuang Model	36
2.10	Factors Influencing Adoption of M-Learning	38
2.11	Chapter Summary	39
3	RESEARCH METHODOLOGY	41
3.1	Introduction	41
3.2	Research Location	42
3.3	Research Participants	42
3.4	Research Design	43
3.5	Phase 1(Initial Planning)	46
3.5.1	Identify Research Objectives and Problem Definition	46

3.6	Phase 2 (Preliminary Study)	46
3.6.1	Select Basic Research Method	46
3.6.2	Data Collection	48
3.6.2.1	Conduct Survey	49
3.6.3	Preliminary Finding Analysis	53
3.7	Phase 3(Data Collection and Analysis)	53
3.7.1	Conduct Survey	53
3.7.1.1	Pilot Survey	57
3.7.1.2	Main Study	58
3.8	Phase 4(Discussion and Conclusion)	60
3.9	Chapter Summary	61
4	PRELIMINARY STUDY	62
4.1	Introduction	62
4.2	Implementation of E-Learning in UTM	63
4.2.1	Reasons of Implementing E-Learning in UTM	63
4.2.2	Vision and Mission	64
4.2.3	Previous and Current Challenges of E-Learning	65
4.2.4	Usage of E-Learning in UTM	66
4.2.5	Plan for Future	68
4.3	Questionnaire Development	69
4.4	Student Questionnaire Analysis	72
4.4.1	Background of the Participants	72
4.4.2	Usage of E-learning	75
4.4.3	Ownership of Mobile Devices and Their Functions	78
4.4.4	M-learning	80
4.4.5	Preferred M-learning Content and Applications	85
4.5	Lecturers Questionnaire Analysis	87
4.5.1	Background of the Participants	87
4.5.2	Usage of E-Learning	91
4.5.3	Ownership of Mobile Devices and Their Functions	92
4.5.4	M-learning	94
4.5.5	Preferred M-learning Content and Applications	98
4.5.6	Main Points of Open-Ended Question	101

4.6	Conclusion of Analyzing Questionnaires	102
4.6.1	Interest in Using M-learning	102
4.6.2	Discuss in Ownership of Mobile Devices	103
4.6.3	Discuss in Benefits and Barriers That Encourage and Discourage Users to Adopt M-Learning	105
4.6.4	Preferred M-learning Content	106
4.7	Proposing M-learning Adoption Model	107
4.8	Chapter Summary	111
5	DATA COLLECTION AND ANALYSIS	112
5.1	Introduction	112
5.2	Questionnaire Development	113
5.3	Questionnaire Analysis	113
5.3.1	Demographic Information	113
5.3.2	Opinion Related to M-learning	117
5.3.3	Effects of Demographic Variables	127
5.3.4	Conclusion	134
5.4	Recommendations	136
5.5	Chapter Summary	141
6	DISCUSSION AND CONCLUSION	142
6.1	Introduction	142
6.2	Achievements	143
6.3	Constraints and Challenges	145
6.4	Future Works	146
6.5	Chapter Summary	146
	REFERENCES	147
	APPENDICES	154-167

LIST OF TABLES

TABLE.NO	TITLE	PAGE
2.1	Nomenclature comparisons (Refined from Laouris & Eteokleous)	13
2.2	Comparison between Electronic and M-Learning environments Refined from(K.Sharma & L.Kitchens, 2004)	14
2.3	Lesson learned from case studies	24
2.4	Factors influencing adoption of M-learning	38
3.1	Details of research methodology phases	45
3.2	Types of research methods	47
3.3	Krejeie and Morgan list	50
3.4	Number of samples based on sampling method	50
3.5	Item map of questionnaire	55
3.6	Cronbach's Alpha questionnaire reliability analysis	58
4.1	Number of undergraduate and postgraduate student	74
4.2	Usage of E-learning among students	75
4.3	Discourage reasons of using E-learning based on faculty	77
4.4	Interest in M-learning based on faculty	80
4.5	Possible benefits to M-learning	82
4.6	Possible barriers to M-learning	83
4.7	Course information	85
4.8	Course content	86
4.9	Preferred applications	87
4.10	Educational background of participants	89
4.11	Years of experience in teaching	90
4.12	Years of experience in using E-learning	90

4.13	Usage of E-learning among lecturers	91
4.14	Interest in M-learning based on faculty	95
4.15	Possible benefits to M-learning	96
4.16	Possible barriers to M-learning	97
4.17	Possible barriers of M-learning and differences of faculties	98
4.18	Course information	99
4.19	Course content	100
4.20	Preferred applications	101
4.21	Positive and negative points of M-learning	101
4.22	Main benefits that encourage usage of M-Learning	105
4.23	Main barriers that discourage usage of M-Learning	106
5.1	Questionnaire map and summary of mean for each factor	118
5.2	Regression analysis	119
5.3	Differences between genders based on PEOU	128
5.4	Differences between genders based on PU	129
5.5	Differences between age groups based on PEOU	130
5.6	Differences between age groups based on PU	131
5.7	Differences between faculties based on PEOU	132
5.8	Differences between faculties based on PU	133
5.9	List of recommendations	137

LIST OF FIGURES

FIGURE.NO	TITLE	PAGE
2.1	Mind map of chapter 2	9
2.2	Basic variables of TAM and their relationships (Davis, 1989)	29
2.3	M-learning adoption model(Lu & Viehland, 2008)	32
2.4	M-learning adoption model(Liu, et al., 2009)	34
2.5	M-learning adoption model (Ju, et al., 2007)	36
2.6	M-learning adoption model (J.-H. Huang, et al., 2007a)	37
3.1	Phases of research methodology	44
3.2	Usage of E-learning in UTM based on faculties	49
4.1	Usage of E-learning in UTM based on faculties	66
4.2	Development trends of E-learning	67
4.3	Four main parts of questionnaires	71
4.4	Percentage of participants based on gender	72
4.5	Percentage of participants based on faculty	73
4.6	Percentage of undergraduate and postgraduate participants	74
4.7	Semester of study	75
4.8	Frequency of Using E-learning based on 3 faculties	76
4.9	Discourage reasons for using E-learning	77
4.10	Ownership of mobile devices	79
4.11	Mobile devices' functions	79
4.12	Interest in M-learning based on faculty	80
4.13	Interest in M-learning for non E-learning platform participants	81
4.14	Possible benefits of M-learning and differences of faculties	82
4.15	Possible barriers of M-learning and differences of faculties	84

4.16	Percentage of participants based on gender	88
4.17	Percentage of participants based on faculties	89
4.18	Frequency of using E-learning based on 3 faculties	91
4.19	Ownership of mobile devices	93
4.20	Mobile devices' functions	93
4.21	Experience in using M-learning	94
4.22	Interest in M-learning based on faculty	95
4.23	Possible benefits of M-learning and differences of faculties	96
4.24	Proposed model	110
5.1	Percentages of participants based on gender	114
5.2	Percentages of participants based on age groups	114
5.3	Percentages of participants based on experience in using E-learning	115
5.4	Ownership of mobile devices	116
5.5	Ownership of mobile devices with internet access ability	116
5.6	Length of time accessing the internet from mobile devices	117
5.7	Regression analyse results	121
5.8	Percentages of PUE's items	123
5.9	Percentages of PEOU's items	124
5.10	Percentages of PU's items	124
5.11	Percentages of SE's items	125
5.12	Percentages of AT's items	126
5.13	Percentages of PMV's items	126
5.14	Percentages of BI's items	127
5.15	Final M-Learning adoption model	135

CHAPTER 1

PROJECT OVERVIEW

1.1 Introduction

In the technology world with rapid changing, the only one main way to win the competition is to become more active and energetic. We live in a complex networked planet so we should adopt our life with new technologies and use them to improve ourselves.

According to Hanna (2009):"big revolution in information and communication technology (ICT) has been a basic source of the fundamental changes and a key driving force for innovation and learning. ICT has provoked the hopes and fears of countries at all levels of development. Rapid advances in ICT have been shaping globalization, and business networking and enterprise transformation".

Some reasons cause big changes in the services of network both in the scale and pace, such as becoming universal, increasing automation, use of the Internet, and mobile devices. Rapid advances of wireless technology and mobile devices lead us to this point that training and education cannot ignore the use of mobile devices in the learning process.

In a period of time main focus was on the development of examples and methods to deliver the educational materials on the personal computers that were located in the learner's home or office .These computers are very heavy and have large screens. However, nowadays a big motivation has been seen among students and lecturers to use mobile devices for educational purposes .Therefore, we can have any time and any where educational world (Attewell & Savill-Smith, 2004). Students and staff are willing to improve Mobile Learning (M-learning) system in their educational processes.

There are many definitions given to M-learning, but in this research M-learning is defined as: the use of electronic learning (E-learning) materials on mobile devices such as personal digital assistants (PDAs), Tablet PCs, mobile phones, Pocket PCs, palmtop computers and in general every devices that are small and autonomous enough to help us in every moment of our life (Attewell & Savill-Smith, 2004). M-learning is a new model of E-learning, which combines mobile computing and E-learning. With this new technology learning will become more learner-centered and informal, rather than teacher-centered and formal.

1.2 Background of the Problem

Recently , web is considered as a new and modern and effective learning environment in field of E-learning(Y.-M. Huang, Chen, Huang, Jeng, & Kuo, 2008).

Valderrama, Ocaña, & Sheremetov (2005) stated that:" in E-learning systems learners are not restricted to a particular content system (interoperability), The material does not have to be rewritten if the course or an interactive training electronic manual is updated, and the development of a high quality course avoids duplicating effort from the design process (reusability)".

Many universities have used Learning Management Systems (LMS) and made a flexible learning environment by promote the collaboration and online communication. In addition, LMS suggests many opportunities to students, but it really depends on a computer terminal and it is the main problem of this technology .Recently, there are many discussions on generation Y which is the new generation. The prominent characteristic of generation Y is to use the mobile and small devices to improve the learning procedure by complete existing systems (Mellow, 2005).Nowadays, Short Message Service (SMS) text messages are used for learning in some educational institutes. With regard to the emotion of students to adopt and use mobile devices, institute and organization should think about some form of mobile delivery and this is the best time to start this new educational stage (Mellow, 2005).

An open-source, user-friendly Learning management System (LMS), Moodle have been used from the beginning of 2004 in Universiti Teknologi Malaysia with the aim of better and easier learning. This technology is like a bridge of communication and collaboration between students and lecturers. This system is not limited in the physical places and even is not bounded by the class time. Current E-

learning solves many problems of the students for example: it makes the relationships faster and easier for both students and lecturers, the students do not have to meet their lecturers every day. They can communicate with each other, gain their assignments, and check their marks via E-learning anytime and anywhere. Furthermore, lecturers can use new teaching plans, save their time, and identify excellence students easier.

The main target of E-learning is to have excellent teaching practice and to improve that practice. But still this aims could not be achieved in the E-learning at UTM. Unfortunately lecturers and students in some faculties of UTM do not use E-learning fully. Some of the lecturers use E-learning 3-4 times a week, and some other use E-learning less than once a week (Yahya, 2009). Furthermore, Kurnia (2009) found that most of the students have difficulty to access E-learning in UTM because of network connection problems. And also he claimed that E-learning in UTM already has communication and sharing features like discussion forum and siswa mail but these services are not used frequently by students. Mobile technology with its new features can solve some of these problems. It provides many opportunities for widening participation and enabling easier access to learning. M-learning makes basic changes in the way learning can be regarded and allow users to make benefits from its countless capabilities for educational context (MacCallum & Jeffrey, 2009). But it is very important that decision of both students and lecturers to adopt M-learning is a very long-term and complicated process and there are many factors that influence this adoption (Callum). In order to have successful adoption of M-learning determining these factors, eliminating problems, and highlighting the profits of this new technology for users are very essential.

With regard to above-mentioned discussion and portability, low cost, and communications features of mobile devices, this study focuses on identifying the factors that influence adoption of M-learning by users in UTM and proposing a suitable model for this adoption.

1.3 Problem Statement and Research Question

In order to address key issues as mentioned at previous sections, the main research question for this study is:

”How can M-learning be adopted by users in UTM to support teaching and learning?”

The three sub questions have been formulated:

1. What are the factors that influence the adoption of M-learning in higher education?
2. What is the model for M-learning adoption in UTM?
3. What are the recommendations for UTM to adopt M-learning?

1.4 Project Objectives

Objectives of this study are:

1. To identify the factors that influences the adoption of M-learning in higher education
2. To propose a model for M-learning adoption in UTM.
3. To provide recommendations for adoption of M-learning in UTM.

1.5 Project Scope

This project focuses are only on the **students and lecturers** in 2 faculties which are high usage of E-learning which are the faculty of **Computer Science & Information Systems (FSKSM)**, and **the Faculty of Education (FP)**, and also one faculty which is low usage of E-learning **Faculty of Built Environment (FAB)**.

1.6 Importance of Research Study

The benefits of this study are:

- Main contribution of this research is proposing a M-learning adoption model for UTM.
- Identifying the factors that contribute to adoption of M-learning by users is another target of this research.
- This research will also be able to give recommendations to help CTL to make adoption of M-learning easier in UTM.

1.7 Summary

In this chapter at first an introduction about the main points of the project has been discussed. The problem background and statements have also been mentioned

in order to clear introduction of the project, and to explain why this project has been chosen. The objectives, scope and importance of this project have also been described.

REFERENCES

- Agarwal, R., Sambamurthy, V., & Stair, R. (2000). Research report: the evolving relationship between general and specific computer self-efficacy – an empirical assessment". *Information Systems Research*, 11, 418-430.
- Agrawal, G. D., Rathore, A. P. S., & Gupta, A. B. (2007). Multiple regression analysis for the estimation of energy content of municipal solid waste. *International Journal of Environment and Waste Management*, 1(4), 376 – 390.
- Anckar, B., & D’Incau, D. (2002). Value creation in mobile commerce: findings from a consumer survey. *JITTA: Journal of Information Technology Theory and Application*, 4(1), 43-64.
- Attewell, J., & Savill-Smith, C. (2004). *Mobile learning anytime everywhere*: Learning and Skills Development Agency.
- Bandura, A. (1997). *Self-efficacy : the exercise of control* W.H. Freeman and company.
- Beal, G., & Bohlen, J. (1957). The Diffusion Process". 1, 56-77.
- Bhattacharjee, A. (2001). Understanding Information Systems Continuance: An Expectation-Confirmation Model. *MIS Quarterly*, 25(3), 351-370.
- Biljon, J. v., & Kotzé, P. (2008). Cultural factors in a mobile phone adoption and usage model. *Journal of Universal Computer Science*, 14(16), 2650-2679.
- Broos, A. (2005). Gender and information and communication technologies (IT) anxiety: male self assurance and female hesitation. *CyberPsychology & Behaviour*, 8(1), 21-31.
- C.McNurlin, B., Ralph H.Sprague, J., & Bui, T. *information systems management in practice*.

- Callum, K. M. ADOPTION THEORY AND THE INTEGRATION OF MOBILE TECHNOLOGY IN EDUCATION.
- Callum, K. M. (2010, July 6-9). *Attitudes of educators to the introduction of mobile technology*. Paper presented at the 1st annual conference of Computing and Information Technology Research and Education New Zealand (CITRENZ2010), New Zealand.
- Cavus, N. Investigating mobile devices and LMS integration in higher education: Student perspectives. *Procedia Computer Science*, 3, 1469-1474.
- Cheong, J. H., & Park, M.-C. (2005). Mobile internet acceptance in Korea. *The Electronic Library* 15(2), 125-140.
- Corbeil, J. R., & Valdes-Corbeil, M. E. (2007). Are You Ready for Mobile Learning? *EDUCAUSE Quarterly (EQ)* 30(2).
- Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13(3), 319-340.
- Dillon, A., & Morris, M. G. (1996). User Acceptance of Information Technology: Theories and Models. *Annual Review of Information Science and Technology (ARIST)*, 31, p3-32.
- Durndell, A., & Haag, Z. (2002). Computer self-efficacy, computer anxiety, attitudes towards the Internet and reported experience with the Internet, by gender, in an East European sample. *Computers in Human Behavior*, 18, 521-535.
- Field, A. (2003). Designing a questionnaire *Questionnaire Design*.
- Geddes, S. (2004). Mobile learning in the 21st century: benefit for learners.
- Gefen, D., & Straub, D. (2000). The relative importance of perceived ease of use in IS adoption: A study of e-commerce adoption. *Journal of the Association for Information Systems*, 1(8), 1-28.
- Gururajan, V., Genrich, R., McDonald, J., & Gururajan, R. An Exploratory Qualitative Study to determine factors influencing the adoption of mobile learning for tertiary education.
- Hackbarth, G., Grover, V., & Yi, M. Y. (2003). "Computer playfulness and anxiety: positive and negative mediators of the system experience effect on perceived ease of use. *Information and Management*, 40(3), 221-232.

- Hanna, N. K. (2009). *Enabling Enterprise Transformation: Business and Grassroots Innovation for the Knowledge Economy Innovation, Technology, and Knowledge Management* (illustrated ed.): Springer.
- Henderson, R., & Divett, M. J. (2003). Perceived usefulness, ease of use and electronic supermarket use. *International Journal of Human-Computer Studies*, 59, 383-395.
- Hill, T. R., & Roldan, M. (2005). Toward third generation threaded discussions for mobile learning: opportunities and challenges for ubiquitous collaborative environments. *Information Systems Frontiers*, 7(1), 55-70.
- Huang, J.-H., Lin, Y.-R., & Chuang, S.-T. (2007a). Elucidating user behavior of mobile learning A perspective of the extended technology acceptance model. *The Electronic Library*, 25(5), 585-598.
- Huang, J.-H., Lin, Y.-R., & Chuang, S.-T. (2007b). Elucidating user behavior of mobile learning: A perspective of the extended technology acceptance model. *Electronic Library*, 25(5), 586 - 599.
- Huang, Y.-M., Chen, J.-N., Huang, T.-C., Jeng, Y.-L., & Kuo, Y.-H. (2008). Standardized course generation process using Dynamic Fuzzy Petri Nets. *Expert Systems with Applications*, 34(1), 72-86.
- Islam, Y. M., Ashraf, M., Rahman, Z., & Rahman, M. (2005). *Mobile telephone technology as a distance learning tool*. Paper presented at the Seventh International Conference on Enterprise Information Systems, Miami, USA.
- James, D. P. T. (December 2008). *The 5th Wave Challenges and Opportunities for Mobile-learning in Thailand*. Paper presented at the Fifth International Conference on eLearning for Knowledge-Based Society.
- Ju, T. L., Sriprapaipong, W., & Minh, D. N. (2007). On the Success Factors of Mobile Learning.
- K.Sharma, S., & L.Kitchens, F. (2004). Web Services Architecture for M-Learning. *Electronic Journal on e-Learning*, 2(1).
- Keegan, D. (2004). THE INCORPORATION OF MOBILE LEARNING INTO MAINSTREAM EDUCATION AND TRAINING.
- Kim, S. H., Mims, C., & Holmes, K. P. (2006). An Introduction to Current Trends and Benefits of Mobile Wireless Technology Use in Higher Education. *AACE*, 14(1), 77-100.

- Kurnia, R. D. (2009). *Effectiveness of E-learning Implementation at UTM*. Universiti Teknologi Malaysia, Johor Bahru.
- Lederer, A. L., Maupin, D. J., Sena, M. P., & Zhuang, Y. (2000). The technology acceptance model and the World Wide Web. *Decision Support Systems*, 29(3), 269-282.
- Lee, W. J., Kim, T. U., & Chung, J.-Y. (2002). *USER ACCEPTANCE OF THE MOBILE INTERNET*. Paper presented at the in M-Business 2002.
- Liu, Y., Li, H., & Carlsson, C. (2009). *Exploring the Factors Driving M-Learning Adoption*. Paper presented at the Proceedings of the Fifteenth Americas Conference on Information Systems AMCIS.
- Lu, X., & Viehland, D. (2008). *Factors Influencing the Adoption of Mobile Learning*. Paper presented at the 19th Australasian Conference on Information Systems, Christchurch.
- MacCallum, K., & Jeffrey, L. (2009). *Identifying discriminating variables that determine mobile learning adoption by educators: An initial study*. Paper presented at the Proceedings ascilite Auckland 2009.
- Masters, K. (2008). *M-learning: how much of what has been diffused? A systematic literature review*. Paper presented at the In J. Luca & E. Weippl (Eds.), Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2008, Vienna, Austria.
- Mellow, P. (2005). The media generation: maximize learning by getting mobile. *in ascilite 2005:balance, fidelity, mobility: maintaining the momentum? 2005*.
- Moon, J.-W., & Kim, Y.-G. (2001). Extending the TAM for a World-Wide-Web context. *Information & Management*, 38(4), 217-230.
- Nunnally, J. C., & Bernstein, I. H. (1994). *psychometric theory*: McGraw-Hill.
- Pedersen, E. (2003). Adoption of Mobile internet Services: An Exploratory study of mobile Commerce Early Adopters. *Organizational computing and Electronic Commerce*, 15(3), 203-222.
- Phuangthong, D., & Malisawan, S. (2005). *“Study of behavioral intention for 3G mobile technology: preliminary research on mobile learning*. Paper presented at the paper presented at the 2nd International Conference on eLearning for Knowledge-Based Society.

- Pijpers, G. G. M., Bemelmans, T. M. A., Heemstra, F. J., & van Montfort, K. A. G. M. (2001). Senior executives' use of information technology. *Information and Software Technology, 43*(15), 959-971.
- Pinkwart, N., Hoppe, H. U., Milrad, M., & Perez, J. (September 2003). Educational scenarios for cooperative use of Personal Digital Assistants. *Journal of Computer Assisted Learning, 19*(3), 383-391.
- Ramos, A. J. O. (2008). *Project MIND: The viability of mobile SMS technologies for non-formal distance learning in Asia: Philippines*: Molave Development Foundation, Inc.
- Ramos, A. J. O., & P. Trinona, J. (2009). Mobile technology in nonformal distance education. In J. Baggaley & T. Belawati (Eds.), *Distance education technology in Asia* 231-256.
- Rees, H., & Noyes., J. M. (2007). Mobile telephones, computers and the Internet: sex differences in adolescents' use and attitudes. *CyberPsychology and Behavior, 10*(3), 482-484.
- Rogers, E. (2003). *Diffusion of Innovation (5th edition)*, (5 ed.).
- Rosen, L. D. (March-April 2004). Understanding the Technological Generation Gap. Retrieved July, 2010, from <http://www.csudh.edu/psych/tnp45.htm>.
- Savill-Smith, C., & Kent, P. (2003). The use of palmtop computers for learning: A review of the literature. Retrieved July, 2010, from http://www.m-learning.org/docs/the_use_of_palmtop_computers_for_learning_sept03.pdf.
- Sek, Y.-W., lau, S.-H., teoh, K.-K., Law, C.-Y., & Parumo, S. B. (2010). Prediction of User Acceptance and Adoption of Smart Phone for Learning with Technology Acceptance Model. *Journal of Applied Sciences 10*(20).
- Sekaran, U. (2003). *Research Methods for Business. A Skill Building Approach* (4th ed.): Wiley & Sons.
- Selim, H. M. (2003). An empirical investigation of students acceptance of course websites. *Comput.Educ, 40*, 343-360.
- Tan, Q., Kinshuk, Yen-Hung, K., Yu-Lin, J., Po-Han, W., Yueh-Min, H., et al. (2009, 29-31 Aug. 2009). *Location-Based Adaptive Mobile Learning Research Framework and Topics*. Paper presented at the Computational Science and Engineering, 2009. CSE '09. International Conference on.
- Taylor, S., & Todd, P. (1995). Assessing IT Usage: The Role of Prior Experience. *MIS Quarterly, 19*(4), 561-570.

- Taylor, S., & Todd, P. A. (1995). Understanding Information Technology Usage: A Test of Competing Models. *Information Systems Research* 6(2), 144-176.
- Teijlingen, E. R. v., & Hundley, V. (2001). The importance of pilot studies. *Social Research Update*(35).
- Thacker, C. (2007). Why Use Technology in Education? Retrieved July 2010, from <http://www.macinstruct.com/node/7>.
- Thomas, G. (2009). *How to do your Research Project. A Guide for Students in Education and Applied Social Sciences*: Sage.
- Ting, R. Y. L. (2005). *Mobile learning: current trend and future challenges*. Paper presented at the Proceedings of the Fifth IEEE International Conference on Advanced Learning Technologies (ICALT 2005).
- Traxler, J. (2005). *DEFINING MOBILE LEARNING*. Paper presented at the IADIS International Conference Mobile Learning.
- Viehland, D., & Leong, R. (2008). Consumer Willingness to Use and Pay for Mobile Payment Services. *Journal of Principles and Applications of Information Science and Technology (forthcoming)*.
- Wains, S. I., & Mahmood, W. (2008). Integrating M-learning with E-learning. *Proceedings of the 9th ACM SIGITE conference on Information technology education*.
- Wang, Y.-S., Wang, Y.-M., Lin, H.-H., & Tang, T.-I. (2003). Determinants of user acceptance of Internet banking: an empirical study. *International Journal of Service Industry Management*, 14(5), 501-519.
- Wei-Mann, L., & Yung-Sheng, C. (2008, 23-26 March 2008). *A SWOT Analysis of m-Learning Diffusion in China and Taiwan*. Paper presented at the Wireless, Mobile, and Ubiquitous Technology in Education, 2008. WMUTE 2008. Fifth IEEE International Conference on.
- Yahya, Y. Q. (2009). Strategies for enhancing E-learning implementation in UTM.
- Yang, K. C. C. (2005). Exploring factors affecting the adoption of mobile commerce in Singapore. *Telematics and Informatics*, 22(3), 257-277.
- Yu-Liang Ting, R. (2005, 5-8 July 2005). *Mobile learning: current trend and future challenges*. Paper presented at the Advanced Learning Technologies, 2005. ICALT 2005. Fifth IEEE International Conference on.
- Yu, W. D. (2005, 19-22 Oct. 2005). *Work in progress - a mobile computing collaborative framework for problem-based learning environment*. Paper

presented at the *Frontiers in Education, 2005. FIE '05. Proceedings 35th Annual Conference.*