



UNIVERSITI PUTRA MALAYSIA

***INTEGRATED USER-INTERFACE ACCEPTANCE MODEL
FOR E-LEARNING SYSTEM***

RAMADIANI

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MODEL
FOR E-LEARNING SYSTEM**

RAMADIANI

**DOCTOR OF PHYLOSOPHY
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BERILMU BERBAKTI

**INTEGRATED USER-INTERFACE ACCEPTANCE MODEL
FOR E-LEARNING SYSTEM**

By

RAMADIANI

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

December 2014

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DEDICATION

MY BELOVED FAMILY AND PARENT

My father Alm. Muhammad Yusuf

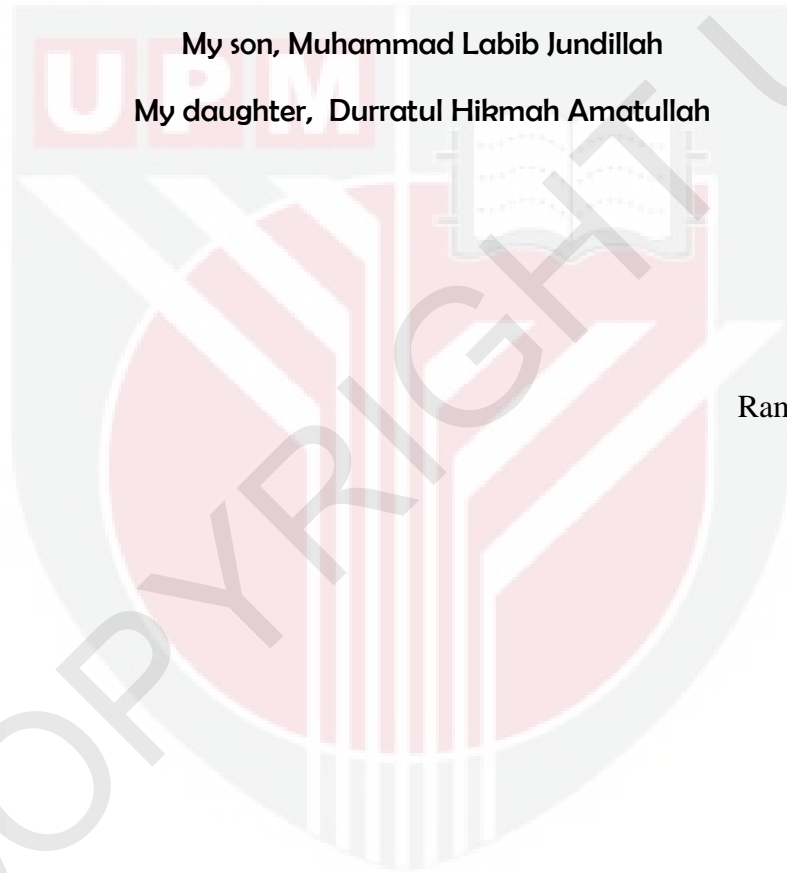
My mom, Kartina

My hubby, Dr. Azainil, M.Si

My son, Muhammad Labib Jundillah

My daughter, Durratul Hikmah Amatullah

Ramadiani



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

Integrated User-Interface Acceptance Model for E-Learning System

By

RAMADIANI

December, 2014

Chairman: Associate Profesor Rodziah binti Atan, Ph.D

Faculty: Computer Science and Information Technology

As a learning process, e-learning is aimed to achieve learning objectives, through which, the education is expected to become more accessible, cheaper, more fun, and easier to share and to learn. Disintegrated theories discussing separately e-learning interface usability evaluation and user technology acceptance caused gaps in understanding e-learning comprehensively. It creates challenges to incorporate the theories of user learning style, usability, and user benefit to evaluate and develop e-learning.

The purpose of this research is to identify user difficulties and user interface requirement, to develop an integrated user interface acceptance model for e-learning based on user learning style, usability and user benefits, to measure the attributes that support the integration of user interface acceptance model and to evaluate the significant, reliability and validity of the model. This research consisted of three phases of experiments. The first phase is identifying user difficulties and user interface requirements. From the study results, it shows that user interface difficulties covering user communication (21%), choice menu (17%), self-assessment (14%), and interactive media (12%) pose the most challenging aspects for the e-learning users. The results also show that the user interface requirements are user expectation (39%), communicativeness (32%) and media elements (29%).

The second phase is developing User Interface Acceptance Model by using Structural Equation Model and LISREL v8.80. There are twelve hypotheses for measurement model and three for structural model. Structural Equation Model was used to determine the suitability of model, while its validity and reliability were measured by composite construct reliability and variance extracted measure. Based on t-value, loading factors, and the relative suitability of each attribute, the User Interface Acceptance Model for e-learning can be accepted. Based on the Goodness of Fit statistical value in the first and the second model, the model of e-learning user interface has a highly significant correlation with e-learning acceptance. Strong construction between variables is evidenced by the construct reliability above 0.70 and variance extracted above 0.50.

The third phase of the research is developing UIA prototype by using Moodle v9 and MANOVA analysis to compare the difference level of twelve attributes in User Interface Acceptance toward two groups of experiment. Finally, it was found that there are significant effects between User Acceptance and groups which were obtained from knowledge, robustness, safety, communicativeness and expectation. It was also found the significant user acceptance effects to grade which were obtained from motivation, knowledge, know-ability, safety, media element and motivation.

It can be concluded that based on the e-learning users' requirements, this research has developed integrated user interface acceptance model for e-learning. It is expected this model can be used for developing and e-learning evaluation in the future. Hopefully this model could be an alternative to measure and to develop e-learning interface acceptance later.



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

Model Penerimaan Pengguna Antara Muka Bersepadu Sistem E-Pembelajaran

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Sebagai satu proses pembelajaran, e-pembelajaran bertujuan untuk mencapai objektif pembelajaran, di mana pendidikan yang dijangka akan menjadi lebih mudah, lebih murah, lebih menyeronokkan, dan lebih mudah untuk berkongsi dan belajar. Teori berpecah membincangkan maklumat secara berasingan, penilaian kebolegunaan antara muka e-pembelajaran dan teknologi penerimaan pengguna, menyebabkan jurang dalam pemahaman e-pembelajaran secara menyeluruh. Ia mencetuskan cabaran untuk menggabungkan teori gaya pembelajaran pengguna, kebolegunaan, dan manfaat pengguna untuk pengguna untuk membuat penilaian dan mengembangkan e-pembelajaran.

Tujuan kajian ini adalah untuk mengenal pasti masalah pengguna dan keperluan antara muka pengguna, untuk membangunkan model penerimaan pengguna antara muka bersepadu bagi e-pembelajaran, berdasarkan gaya pembelajaran pengguna, kebolegunaan dan manfaat pengguna, untuk mengukur sifat-sifat yang menyokong integrasi model penerimaan pengguna antara muka dan untuk menilai signifikan, kebolehpercayaan dan kesahihan model. Kajian ini terdiri daripada tiga fasa eksperimen. Fasa pertama adalah mengenal pasti masalah pengguna dan keperluan antara muka pengguna. Dari hasil kajian, ia menunjukkan bahawa masalah antara muka pengguna meliputi komunikasi pengguna (21%), menu pilihan (17%), penilaian sendiri (14%) dan media interaktif (12%) yang menimbulkan aspek paling mencabar bagi pengguna e-pembelajaran. Hasil kajian juga menunjukkan bahawa keperluan antara muka pengguna adalah jangkaan pengguna (39%), suka bercakap-cakap (32%) dan elemen-elemen media (29%)

Fasa kedua adalah membangunkan model penerimaan pengguna antara muka dengan menggunakan model persamaan struktur dan LISREL v8.80. Terdapat dua belas hipotesis untuk model pengukuran dan tiga untuk model struktur. Model Persamaan Struktur digunakan untuk menentukan kesesuaian model, manakala kesahihan dan kebolehpercayaan diukur dengan konstruk gabungan kebolehpercayaan dan varians yang diekstrak. Berdasarkan nilai t, faktor muatan, dan kesesuaian relatif setiap atribut, Model Penerimaan Pengguna Antara Muka bagi e-pembelajaran boleh diterima. Berdasarkan nilai kebaikan fit statistik dalam model pertama dan kedua, model pengguna antara muka e-pembelajaran mempunyai korelasi yang amat ketara dengan penerimaan e-pembelajaran. Pembinaan yang kukuh antara pembolehubah

terbukti dengan kebolehpercayaan konstruk di atas 0.70 dan varians yang diekstrak di atas 0.50.

Fasa ketiga penyelidikan adalah membangunkan prototaip UIA dengan menggunakan Moodle V9 dan analisis MANOVA untuk membandingkan tahap perbezaan dua belas atribut dalam Penerimaan Pengguna Antara Muka terhadap dua kumpulan eksperimen. Akhirnya, didapati bahawa terdapat kesan yang penting antara Penerimaan Pengguna dan kumpulan yang diperoleh dari pengetahuan, keteguhan, keselamatan, suka bercakap-cakap dan harapan. Kajian juga mendapati kesan yang ketara penerimaan pengguna pada gred yang diperolehi daripada motivasi, pengetahuan, tahu-keupayaan, keselamatan, elemen media dan motivasi.

Ia boleh membuat kesimpulan bahawa berdasarkan keperluan pengguna e-pembelajaran, kajian ini telah membangunkan model penerimaan pengguna antara muka bersepadu bagi e-pembelajaran. Ia dijangka model ini boleh digunakan untuk membangunkan dan penilaian pembelajaran pada masa akan datang. Semoga model ini boleh menjadi satu alternatif untuk mengukur dan untuk membangunkan penerimaan antara muka e-pembelajaran kemudian.

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TABLE OF CONTENTS

	Page
ABSTRACT	i
ABSTRAK	iii
ACKNOWLEDGMENTS	v
APPROVAL	vi
DECLARATION	viii
LIST OF TABLES	xiii
LIST OF FIGURES	xv
LIST OF ABBREVIATIONS	xviii
CHAPTER	
I INTRODUCTION	1
1.1 Background	1
1.2 Problem Statements	4
1.3 Research Questions	6
1.4 Research Objectives	7
1.5 Scope or Research	7
1.6 Term and Definition	7
1.6.1 User's Style	7
1.6.2 Usability	7
1.6.3 User Benefit	8
1.6.4 User Interface Acceptance	8
1.7 Thesis Organization	8
2 LITERATURE REVIEW	10
2.1 Introduction	10
2.2 E-Learning User Interface	10
2.3 E-Learning Acceptance Model	12
2.4 The E-Learning Interface Evaluation Model	17
2.4.1 Usability and E-Learning	19
2.4.2 Usability Attributes	24
2.4.3 Users's Learning Style	28
2.4.4 User Benefits	30
2.5 Structure Equation Model	32
2.5.1 Latent Constructs	32
2.5.2 Structure Model	33
2.5.3 Structure Error	34
2.5.4 Manifest Variables	35
2.5.5 Model of Measurement	35
2.5.6 Measurement Error	35
2.5.7 General Structure Equation Model	36
2.6 Literature Review Discussion	37

3	RESEARCH METHODOLOGY	38
3.1	Introduction	38
3.2	Experimental Design	38
3.3	First Phase of Research	40
	3.3.1 Information Gathering	40
	3.3.2 User Need Identification	40
	3.3.3 Envisioning and Evaluation	41
	3.3.4 Requirement Specification	41
3.4	Second Phase of Research	43
3.5	Model Hypothesis	43
3.6	Research Question Design	44
	3.6.1 User's Learning Style	45
	3.6.2 User Interface Usability	45
	3.6.3 User Benefits	47
	3.6.4 Research Sample	48
	3.6.5 Data Collection Method	48
3.7	Research Validate and Reliability	48
3.8	Estimation	48
3.9	Assessment	49
3.10	Modification	49
3.11	Model Fit for UIA	50
3.12	Third Phase of Research	50
	3.12.1 User Interface Acceptance Prototype	50
	3.12.2 User Interface acceptance Evaluation	51
4	PRELIMINARY EXPERIMENT	53
4.1	Introduction	53
4.2	First Phase of Research	53
4.3	Information Gathering	54
4.4	User Need Identification	55
	4.4.1 Data Collection Technique	55
	4.4.2 Research Participants	55
	4.4.3 Evaluation Setup	56
4.5	Envisioning and Evaluation	57
	4.5.1 User Interface Difficulties	57
	4.5.2 Descriptive Analysis	59
	4.5.3 Pearson Correlation Analysis	60
	4.5.4 User Interface Requirements	61
4.6	Discussion	63
5	USER INTERFACE MODEL DEVELOPMENT	64
5.1	Introduction	64
5.2	Model Estimation	64
	5.2.1 Research Respondent	67
5.3	Data Preparation	68
	5.3.1 Import Raw Data into PRELIS	68
	5.3.2 Determination of Data Type	69
	5.3.3 Creating Covariance Matrix and Correlation Matrix	73

5.4	User Interface Acceptance Model Assessment	78
5.4.1	The First UIA Model Estimation	79
5.4.2	User Interface Acceptance Model Estimation Maximum Likelihood	79
5.5	User Interface Acceptance Measurement	80
5.5.1	The First UIA Model Assessment	84
5.5.2	The Result of the First User Interface Model Assessment	85
5.6	User Interface Acceptance Model Modification	90
5.7	The Second UIA Model Measurement	91
5.7.1	Measurement Result of the Second User Interface Model	95
5.8	GOF Statistics on the Indicator Assessment	98
5.8.1	Chi-Square	99
5.8.2	RMR and Standardized Root Mean Square Residual	100
5.8.3	Root Mean Square Error of Approximation (RMSEA)	100
5.8.4	Goodness of Fit Index and AGFI	100
5.8.5	Goodness of Fit Index	101
5.8.6	Adjusted Goodness of Fit Index	101
5.8.7	Expected Cross-Validation Index	101
5.8.8	Akaike's Information Criterion (AIC) and CAIC	101
5.8.9	Fit Index	102
5.8.10	Relative Fit Index	102
5.8.11	NFI and Non-Normed Fit Index	103
5.8.12	Comparative Fit Index	103
5.9	Model Result Discussion	103
6	MODEL IMPLEMENTATION AND EVALUATION	106
6.1	Introduction	106
6.2	User Interface Acceptance Prototype Model	106
6.3	User Interface Acceptance Model Evaluation	112
6.4	User Interface Evaluation Model By Using MANOVA Analysis	114
6.5	User Interface Acceptance Contribution Using Bar Chart	118
6.6	Result Discussion	124
6.7	Research Summary	125
7	CONCLUSION AND RECOMMENDATION	127
7.1	Conclusion	127
7.2	Recommendations	128
	REFERENCES	129
	APPENDICES	135
	BIODATA OF STUDENT	148
	LIST OF PUBLICATION	149

LIST OF TABLE

Table	Page
2.1 Usability Attribute in Various Models	27
2.2 Comparison of Proposed Model with Existing Model	28
2.3 General Model of SEM	36
2.4 Submodel of SEM	37
3.1 Model Attributes	44
3.2 User Interface Requirement From Preliminary Research	51
4.1 E-Learning User Interface Difficulties	58
4.2 User Interface Acceptance	60
4.3 Correlation Between User Interface Acceptance	61
4.4 User Interface Requirements For E-Learning	62
5.1 UIA Model Hypothesis	66
5.2 The First UIA Measurement Model	87
5.3 The First UIA Structural Model	88
5.4 Hypothesis Results For The First UIA Measurement Model	88
5.5 Hypothesis Results For The First UIA Structural Model	89
5.6 Variance Extracted and Construct Reliability of UIA Model	89
5.7 The Second UIA Structural Model Estimation	97
5.8 The Second UIA Structural Model Estimates	98
5.9 GOF Statistics for E-Learning Interface Acceptance Model	99
6.1 Between Subject Factors	112
6.2 Respondent Group Based on Software and Grades	113
6.3 Box's Test of Equality of Covariance Matrix	114

6.4	Multivariate Tests	115
6.5	Levene's Test of Equality of Error Variances	116
6.6	Tests of Between-Subjects Effects	117



LIST OF FIGURES

Figure		Page
2.1	E-Learning Achievements And Course Satisfaction	12
2.2	Users' Acceptance Behavior on Web-Based Streaming	13
2.3	The Third Technology Acceptance Model For E-Learning	14
2.4	Research Model For E-Learning Continuance Intention	16
2.5	Usability Attributes	26
2.6	General Structure Equation Model	32
2.7	Structural Equation Model Graphic	33
3.1	UIA Research Model Activities	39
3.2	Model Identification	42
3.3	Adverbial Qualifier Scale for Questioners	44
4.1	Preliminary Research Participants	56
4.2	The Main Menu in Englishteststore.net Website	57
4.3	Sub Menu in Englishteststore.net Website	57
4.4	User Interface Difficulties According to Usability	58
4.5	E-Learning User Interface Difficulties According to Usab	59
4.6	User Interface Acceptances	60
4.7	User Interface Requirements	62
5.1	User Interface Acceptance Model	65
5.2	Research Respondent	67
5.3	Importing Raw Data From Other Program	69
5.4	SPSS Raw Data Was Store Into PRELIS	69
5.5	Data Menu To Select Define Variable	70

5.6	Covariance Metrics Can Be Read Using Notepad	73
5.7	Command For Normalized Data	77
5.8	Syntax Command To Construct The Model	79
5.9	First Model Estimation	81
5.10	Standard Solutions For The First Model	82
5.11	T-Value Measurements For The First Model	83
5.12	Standard Solution Y Model For The First Model	84
5.13	Modification Indicates For The UIA Model	90
5.14	SIMPLIS Syntax To Build The Second Model	91
5.15	Second Model Estimation	92
5.16	Standard Solution Model For The Second UIA Model	93
5.17	T-Value Measurements For The Second Model	94
5.18	Standard Solution Y Model The Second Model	95
6.1	Main Menu	106
6.2	Personal Message	107
6.3	Dialogs Between Teacher And Admin	108
6.4	Discussion Forum	108
6.5	Student Progress Report Export in Excel	109
6.6	Student Practice	109
6.7	Matching Questioner Exercise	110
6.8	System Feedbacks in Matching Questioner	110
6.9	Student Grade	111
6.10	Games For Learning Exercises	111
6.11	Crossword For Vocabulary	112
6.12	User Learning Style	119

6.13	User Motivation	119
6.14	User Knowledge	120
6.15	User Know-ability	120
6.16	Operability	121
6.17	Efficiency	121
6.18	Robustness	122
6.19	Safety	122
6.20	Subjective Satisfaction	123
6.21	Media Element	123
6.22	Communicativeness	124
6.23	User Expectation	124

LIST OF ABBREVIATIONS

AGFI	Adjusted Goodness of Fit Index
AHP	Analytic Hierarchy Process
AIC	Akaikes's Information Criterion
ANSI	American National Standards Institute
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
DV	Dependent Variable
ELS	English Learning School
ECVI	Expected Cross-Validation Index
ECM	Expectation-Confirmation Model
GFI	Goodness of fit indices
GOF	Goodness of Fit Index
GUIs	Graphical User Interface
IDV	Independent Variable
IEEE	Institute of Electrical and Electronics Engineers
IFI	Incremental Fit Index
ISO	International Standard Organization
INTEC	Interface Prototypes for a Database System
LCD	Learner Centered Design
LISREL	Linear Structural Relationship
LMS	Learning Management System
LTC	Language Technology Center
ML	Maximum Likelihood
MUSiC	Metrics for Usability Standards in Computing
NFI	Normed Fit Index
PAE	Post Adoption Expectation
QUIM	Quality in Use Integrated Measurement
RFI	Relative fit indices
RMSEA	Root Mean Square Error of Approximation
RMR	Root Mean Square Residual
SEM	Structural Equation Model
SRMSR	Standardized Root Mean Squared Residual
TAM	Technology Acceptance Model
TAM3	The third Technology Acceptance Model
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
UIA	User Interface Acceptance
UPM	Universiti Putra Malaysia
UNMUL	Universitas Mulawarman (Mulawarman University)

CHAPTER 1

INTRODUCTION

1.1 Background

E-Learning refers to generic term for all learning activities which are technologically supported, utilizing a range of teaching and tools supporting learning, such as audio videotapes, phone bridging, and teleconferences. Web-based courses or computer-aided learning and satellite transmissions can also commonly identified as online courses. E-learning is a distance learning system which offers training courses and custom tailored to the needs of learners (Soufiane, 2009). E-learning is a method of learning that is offered by many universities and educational institutions. It is a measure allowing users to progress at their own speed. Utilization of e-learning is expected to improve learning process and educational outreach to the many remote areas, especially for companies and institutions that have branches all over the world. They need e-learning to train employees and serve customers. E-learning will not work if the system is not used in accordance with user needs. In line with the other authors, Wang (2009) stated that e-learning has potentially been one of the most important components of the ICTs' significant development. In addition, for academia and corporate training, not only has e-learning been more important role but it also has been one of the most momentous applications and developments in information and technologies area (Al-Gahtani, 2014).

There are several different characteristics between conventional education and e-learning. The characteristics of conventional education are as follows: 1) the in-presence modality is characterized by the class (often active in fulltime), 2) It is centered on a teacher, who chooses topics and operational rules, 3) It has predefined schedules and time extents, 4) It may make use of technology on the basis of the teacher's competence, and 5) The student plays a reactive role in the in-presence paradigm. Meanwhile, the characteristics of e-learning education are as follows; 1) the distance modality is personalized for the student, 2) it focuses on the students and is directly controlled by themselves, 3) it occurs only if required and has the strictly necessary duration, 4) it is communicated by means of technology on the basis of the student's achieved knowledge, through a query and discovery process, and 5) it is a proactive role in the distance modality (Virginio.et.al.2004).

E-learning is creating rapid and deep changes not only in learning but also in teaching process. However, neither did the educational software nor the environments in this domain benefit the students more and better in learning process than in traditional training contexts. As a consequence, this condition often leads e-learning process to come to failure which results from users' information strategy and lack of evaluation studies pertaining to human cognitive models in learning process that underlies the software design currently being used (Maria and Vera, 2007).

According to Virginio et al (2004), there are several advantages of utilizing e-learning, such as faster, reduced delivery expense, self-paced, content consistency, conducted anytime and anywhere, easy and quick to update, retain longer and respond stronger to the subject, well coped with large number of student groups. In e-learning, varying types of content, building interaction which involves attention, giving feedback immediately, and boosting interaction among students and instructors can improve retention to the subjects. Since e-learning is tailored for specific users, students are more able to manage the process of learning and also it is possible that they better understand the materials.

Despite a number of e-learning advantages, it may gain some of the following risks: more cost is required to establish, new skills are also needed to produce contents, and it has to clearly show return on investment. In addition, technology related to e-learning might lead to intimidation, confusion, or frustration for the users. Using the technologies also tends to lacking informal social interaction, lacking face-to-face contact in conventional classroom activities. The application of this technology, particularly for content rich with advanced visual materials, also requires more cost. Furthermore, in e-learning environment, schedule and learning process are free and unconstrained, the learners are demanded to be more responsible and to have self-discipline to keep up (Virginio et al, 2004).

Like any other learning approach, e-learning is aimed to accomplish the learning objectives. Then the achievement of the objectives measures can be related to environment, technology, student, and instructor. In e-learning, technology, accessibility, and student engagement in learning models play crucial and critical successful factors. In e-learning based courses, the learners are required to have motivation and commitment, and responsibility of their learning pace (Hassan, 2007).

It basically involves two aspects to enable an e-learning system to be usable: pedagogical usability and technical usability. While pedagogical usability is aimed to support the learning process, technical usability covers various methods to ensure a trouble-free interaction with the system. These two usability aspects intertwine each other and enhance the user's cognitive potential. The usability primary goal in e-learning should minimize the cognitive load caused by interaction with the system in order to maximize more resources for the process of learning itself. The more of the brain the user has to allocate to the interface, the less is available for learning. Cognitive effort directed at learning is a good thing. However, attention that must be paid to things unrelated to the learning activity can be considered extraneous. It is the learning interface designer's responsibility to reduce extraneous cognitive load (Dorian P, 2014.) A requirement to do so, the engineer of usability has thorough knowledge about general characteristics of human learning process and particularly learning objectives and processes in a domain of the content.

According to Melis et al., (2001), the key feature for successful e-learning is its system usability. The usability engineering is mainly aimed to the user experience of interaction with system in optimum level. The engineers of usability always deal with creativity to find adaptive ways for the knowledge which exists with optimum practices within the design of system to the current system under evaluation. Usability, in ISO 9241-11, is defined as the degree to which a product a specified users can use to gain specified objectives efficiently, effectively, satisfactorily, and

completely in a specified use context. The main goal of usability is to optimize the user experience with an interactive system. When systems are different, in any case, their characteristics are also different, and only some attributes which can always be applied. Through determining the relative importance of each attribute corresponding to the usability concept for a given system, usability can be adapted to different systems (Alonso et al, 2010).

E-learning interface is also very essential, since the effectiveness of learning and design of the interface will be significantly related. The user interface is used to communicate with the user in an interactive system. E-learning will be less optimal if the system is not effectively used in accordance with user needs. Resource of learning process; design of content and interaction have to meet the learners' personality, their different activities, learning mental, and emotional positive impact. The design of interface includes creativity and production of two processes, which are design of media and interface (Yang et al, 2009).

In a number of projects, the problem with the user interface is not visible until the system is ready for use and the users complete their work. At that time, it may be very costly to make changes. This problem is caused by the interaction of the design process which is inadequate or even non-existent, as a result of which user interface is regarded as a byproduct of the overall program. Another problem which may be caused by changes in customer requirements during the project and becomes apparent after the program is run in stages. Based on some of the issues that arise, the design of the user interface is essential to the successful implementation of the overall program. In addition, for e-learning system, the application and adaptation of usability engineering techniques can be conducted (Sanjay, et al. 2012).

Well-designed interface, as good educators and instructional materials, must make a "teacher-student" relationship that guides the user to learn and enjoy what they do. Good interface can be challenging for users to expand their understanding of user interfaces and computer systems. Thus, the user interface is very crucial for designers to understand and be aware of user habits, physiology, and the ability of the user. Designing interface should be determined by 'the way people learn' and 'the task they require to accomplish in the program' (Guralnick, 2006). The goal of e-learning interface is to create an easier, efficient, and enjoyable interface in operation and production of the desired result. It means that e-learning is demanded to provide minimum input to obtain the desired output. In addition, the e-learning also provides less undesired outputs for the user. The important to determine whether application useful or not is usability (Olga, 2004).

Based on the study conducted by Wing and Si Shi (2014), it was found that the student's expectation confirmation would have positive effect on their perceptions in experiencing e-learning process, interaction between peers and tutor, and design of course after they have adopted the system of e-learning. Lee (2010) stated that the degree of students' expectation on the benefit they obtained by using e-learning can be referred as the expectations confirmation. From the studies, it indicates that positive effect on user's satisfaction can be achieved when there is confirmation. Furthermore, the satisfaction will drive to intention of continuance e-learning.

The success of e-learning process, like any other product, depends greatly on learners' satisfaction and some other factors that will encourage learners' intention

for continuous use (Chiu et al., 2007). The e-learning system implementation at universities has encouraged a number of studies. Yet, the influence of various students' experiences relating to their satisfaction and continuance intention is not clearly understood (Wing and Si Shi, 2014).

Many researchers agreed that adopting learning styles and motivation will increase knowledge ability and makes learning easier for students. In order to develop an e-learning system, one should understand the importance of learning style and motivation so as to enhance student achievement. E-learning system provides an opportunity to achieve the goals by considering factors of learning style, motivation and knowledge ability to personalise learning process (Sfenrianto et al, 2011). The learning style evolves from the characteristics of individual's physiology, and it will get influence from psychological development; educational experience, and social environment (Yang et al. 2009). Several studies being conducted recently which draw upon TAM have assessed the two salient beliefs' effects on characteristics of technology, which are ease of use and perceived usefulness, on behavioural intention or learners' attitude e-learning context or distance learning (Chiu et al., 2007).

Learning styles, achievements of academic, and objectives of learning process of different groups of students on the network greatly vary. The efficiency of learning process can be improved by personality learning system using different learning programs for different students. The system of e-learning which focuses on the personality learning can deliver the students with personalized teaching styles and teaching resources (Yang et al. 2009). The definition of learning style is the behaviors and an attitudes determining an individual's preferred way of learning. It is believed by several researchers that their learning motivation, regulate emotions should be monitored by students, and motivational strategies for active involvement in learning should be used. Thus, a student with higher motivation to struggle towards success in a course will likely caused higher self ability, than low motivation to struggle (Sfenrianto et al, 2011).

Value is conceptualized by researchers as a function of a "get" component, i.e., the advantages an individual obtain, and a "give" component, i.e., in which an individual's costs acquires and uses a product. Advantages comprise the intrinsic and extrinsic utilities which are delivered by the relationship going on with a service provider. In fact, value or advantages creates loyalty, satisfaction, behavioural intention to keep loyalty and intention of repurchase. The value is a centrally kept and maintaining belief and has a central role in decisions of our everyday life. In the equity theory, it is theorized that individuals search for a fair balance between input and output (Chiu, et.al. 2007).

1.2 Problem Statements

Numerous universities have spent a huge amount of money to implement improved e-learning systems which could encourage the students to use the systems. Time, effort, and money have been invested to develop knowledge, grades, and credits in e-learning system. Even though e-learning system has been propagated to diverse users, the intention to carry on using such a system remains very low (Chiu et al., 2007). The students' acceptance of e-learning is crucial to achieve e-learning. So far, the actual usage still greatly depends on learner's loyalty (Lee, 2010). In addition the

acceptance discontinuity anomaly phenomenon in which users discontinue to use e-learning while they initially accept it still often occurs (Roca et al., 2006).

According to TAM theory, some of the reasons why students are reluctant to use the e-learning because of perceived usefulness and perceived ease of use. If they feel the system is advantageous and help them to solve their problem, the usage of e-learning will automatically increase. In different theories to predict and explain continuance intention of e-learning, such as technology acceptance model, unified theory of acceptance and use has been adopted in previous studies. From the previous study results, it is confirmed that students' perception regarding the advantages of implementing e-learning is important to determine continuance of the usage (Wing and Shi, 2014).

Besides, each student has different degree of influenced factors that related to how to get and process the information in the e-learning process. Some students respond to learning style in the form of visual or verbal faster than others. Some others have lower or higher learning motivation. When these varied factors are not properly addressed in the e-learning process, some previous research argues that this can cause the decrease of willingness to study. Most of e-learning systems are still applied as a media to enrich traditional learning system and do not really address the influences of inherent factors such as learning style, motivation, knowledge ability. Very often the students do not receive learning materials that suit those factors. Thus, the e-learning effectiveness becomes less optimal (Sfenrianto et al, 2011). The preferred learning time, habits in study (alone, pair or in groups), approach in learning, gender, ethnicity are among things that have great deal with the network learning time selection, the presentation of the learning resource and the learning process. The efficiency of e-learning process can be enhanced by personality learning system, which utilizes various learning activities for different learners (Yang et al. 2009).

Although technological characteristics importance is not doubtful, providing well-designed e-learning systems is not a guarantee for successful of e-learning process. This is because the issues of value and fairness seem to be significant to guide e-learning overall assessment of a learner's; hence, it influences the learner to decide continuance (Chiu et al. 2007). Yet, e-learning is possibly among the objects of evaluation which more challenge the usability engineers. It is because the e-learning aspect greatly varies respecting to the given content and technologies used, making it particularly obligatory to integrate knowledge from educational psychology and tailor the process of usability engineering to the particular system evaluated (Melis et al., 2001). In addition, there are several approaches that separate interface design process from instructional design. The user interface design is led by a graphic designer who does not have special knowledge or experience in learning theory. In some cases, there are some important features that are not available and missing data. Users face usability problems caused by inefficient interaction and confusing system, which leads to a waste of time, errors and the need for additional training.

The last reason is how to develop integrated model as required to evaluate and to design e-learning user interface acceptance effectively. Many theories discuss the e-learning interface separately. In the usability evaluation, the model lacking consistency results in serious problems since researchers are not able to achieve consensus regarding usability definition. The distinct lack of information regarding

the way to select a set of usability factors or metrics leads to the need for an integrated model incorporating different points of view on usability and generating uniform definition from it. In order that both developers and experts can utilize it to measure usability of different types of software systems, apply it in all development phases, an integrated model have to be considerably generic (Sanjay, et al. 2012)

According to our preliminary research, the more difficulties in e-learning interface were communication menu in the perspective of Usability and User benefit. Choice menu and self-assessment were in the second and third place of difficulties the respondents faced during e-learning process. It also found that the example solutions and login page were considered easy to use. Based on three categories, user expectations (content presentation, examples solutions, exercise presentation, and self-assessment) were the most required by the respondents, followed by media elements (choice menu and interactive media) and communicativeness (login page and communication).

User benefit, User Learning style, and Usability, User Knowledge and Media Element can benefited the respondents the most. Meanwhile, Expectation, Communicativeness, and Motivation are among the lowest factors which the respondents can achieve in their point of view. User Learning Style has significant correlated to User Motivation and Knowledge. Usability has significant correlated to User Benefit especially in Communicativeness, User Expectation, and Media-element. Also User Benefit has correlated to Usability in Operability, Effectiveness, Robustness, and User Satisfaction.

Various problems happen in design and evaluation of the user interface to suit the needs of e-learning users. Thus, in this research would be necessary measurements and appropriate samples that is suitable with the needs of e-learning user interface evaluation model. Based on the problem statements mentioned above, it can be concluded that the issues which were examined in this research are “Disintegrated theories discussing e-learning interface usability evaluation and user technology acceptance separately caused gaps in understanding e-learning comprehensively”.

1.3 Research Questions

Different systems generally have different characteristics. Neither will all attributes always be applicable for different systems. For the same operational definition and measurement, there are several different standards or models to describe. Overall, these problem set up the following research questions.

1. What criteria have an effect on e-learning user interface acceptance?
2. How to develop the Integrated User Interface Acceptance Model for e-learning System based on the user interface acceptance based on user learning style, usability function and user benefits to success e-learning interface.
3. How to measure evaluate user interface acceptance the model?
4. How to evaluate the model?

1.4 Research Objectives

The aim of this research is to develop a model for evaluating e-learning user interface acceptance. In order to achieve that, the objectives of research are:

1. To identify user difficulties and user interface requirement
2. To develop an integrated user interface acceptance model for e-learning based on user learning style, usability and user benefits.
3. To measure the attributes that support the integration of user interface acceptance model.
4. To evaluate the significant, reliability and validity of the model.

1.5 Scope of Research

To aim the research objectives, we limited the scope of this study to be concerned with integrated user interface acceptance model for e-learning system in the following points.

1. User e-learning interface acceptance which is measured by three categories; user's style, usability, user benefit.
2. There are fifteen hypothesis; three independent variables, twelve dependent variables and thirty-six criteria.
3. Respondents are students from two universities in Malaysia and Indonesia
4. E-learning software which will be used in this research is Moodle v1.9
5. Statistics software which will be used in this research; SEM, LISREL, PRELIS and SIMPLIS.

1.6 Term and Definition

1.6.1 User's Style

User's learning style describes the way a learner perceives, responds, and interacts within a learning environment. It also measures individual differences (Yang et al, 2009). The learning style evolves as a result of the individual's physiological characteristics. The style is affected by psychological development, social circumstances and educational experience. The preference of learning session, study patterns (alone, pair or in groups), learning approach, as well as gender and ethnicity influence greatly in dealing, with the selection of the network learning time, presentation of the learning resource and the learning process. User's learning style in this research is defined by three attributes (Sferianto et al, 2011), i.e. learning style, motivation and knowledge ability.

1.6.2 Usability

Usability evaluation initially began in early research on human-information processing theory and Human-Computer Interaction. Usability evaluation is the application of theories of computer and information technology and social science research addressed to the challenge of designing tools that are usable and useful to humans (Brad et al., 2005). Generally, it is a comparative measure of software

product in capability to enables a certain number of users to accomplish specified goals in a specified context of use. Usability in this research is defined by six quality attributes (Alonso et al., 2010) such as; know-ability, operability, efficiency, robustness, safety and subjective satisfaction.

1.6.3 User Benefit

User benefit refers to the value that user has before and after they use the e-learning interface (Lee, 2010) User benefit in this research is defined by three attributes, such as; communicativeness, media elements and user expectation. In this research, in particular, we are going to find out whether the three criteria whose are chosen in this research have a significant correlation with the user acceptance. It is also important to know how far the user benefit can influence the user interface acceptance.

1.6.4 User Interface Acceptance

User interface acceptance refers to TAM models which are developed from a psychological theory, which describes the behaviour of computer users that are based on beliefs, attitudes, desires and relationships user behaviour Su-Houn et al, (2005). These models aim to explain the main factors of user behaviour on user acceptance of technology. This model places the attitudinal factors of individual user behavior with variables: ease of use, utility, use, behavior to keep using, the real conditions of use of the system. User interface acceptance in this research is defined by three criteria; user's style, usability and user benefit.

1.7 Thesis Organization

This thesis comprises seven chapters:

Chapter 1 is about introductory chapter covering the background of the study, research problem, research questions, research objectives, research hypotheses, scope of research, operational definition of variables, and thesis organization.

Chapter 2 is about literature review covering introduction, definition of e-learning, definition of user interface, user acceptance model, model of technology acceptance, e-learning interface evaluation models, usability, usability attributes, user's learning style, user benefit, interface quality model, human computer interaction standard, user interface quality model, interface software standards, structural equation model, latent constructs. It also covers structural model and error, manifest variables, model of measurement, measurement error, general structure equation model and limited regarding SEM.

Chapter 3 is about research methodology covering model design, first phase of research; information gathering, user need identification, model hypothesis, envisioning and evaluation, research question design, user's style, user interface usability, user benefits, research location, research sample, data collection method, requirement specification, second phase of research; data preparation, determine data type, creating covariance matrix and correlation matrix, screening data, normalizing data, model assessment, modification, model fit for UIA and third phase of research

Chapter 4 is about Preliminary research covering first phase of research; information gathering, user need identification, model hypothesis, envisioning and evaluation, research question design, user's style, user interface usability, user benefits, research location, research sample, data collection method, user difficulties, user requirement specification.

Chapter 5 is about the second phase of research to proposed user interface acceptance model covering introduction, the first UIA model estimation, estimation maximum likelihood, UIA model measurement, the first UIA model assessment, the result of the first user interface model assessment, LISREL measurement equation result for the first UIA, structural equation result for the first UIA, goodness of fit statistics result for the first UIA, UIA model modification, the second UIA model measurement, the result of the second user interface model assessment, LISREL estimate measurement equation result for UIA model fit, structural equation result for the second UIA model fit, goodness of fit statistics result for UIA model fit, GOF statistics on the indicator assessment; chi-square, root mean square residual and standardized RMSEA, root mean square error of approximation (RMSEA), goodness of fit indices and adjusted goodness of fit index, adjusted goodness of fit index, expected cross validation index, Akaike's information criterion (AIC) and CAIC fit index relative fit indices, comparative fit index, normed fit index, non-normed fit index, and model result discussion

Chapter 6 is about model testing and implementation, covering introduction, user interface acceptance model prototype, UIA model testing, UIA evaluation model by using MANOVA analyses, UIA contribution using profile plot analysis, and result discussion.

Chapter 7 is about research conclusion and recommendation

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