MOBILE LEARNING ACCEPTANCE FRAMEWORK AMONG MALAYSIAN FORMAL PART-TIME LEARNERS

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2021

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THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY
UNIVERSITY OF MALAYA
KUALA LUMPUR

2021

UNIVERSITY OF MALAYA

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Matric No: **I7016986/4**

Name of Degree: **DOCTOR OF PHILOSOPHY**

Title of Project Paper/Research Report/Dissertation/Thesis ("this Work"): **MOBILE LEARNING ACCEPTANCE FRAMEWORK AMONG MALAYSIAN FORMAL PART-TIME LEARNERS**

Field of Study: **MOBILE LEARNING**

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MOBILE LEARNING ACCEPTANCE FRAMEWORK AMONG MALAYSIAN FORMAL PART-TIME LEARNERS

ABSTRACT

The performance of adult learners has become a significant challenge in education due to the difficulties in their ability to manage their time while maintaining focus. This also contributes to the problem of balancing the demands imposed through learning and other personal life pressures and obligations. This particular group of learners, including formal part-time learners, are mostly adults who need to manage multiple commitments, including family matters, social life, careers, health, finance in addition to learning. In the digital world, every aspect of education involves some form of technology. Mobile technology has quickly evolved to become a 'pocket device' in providing 24/7 learning practices without the restrictions of time nor place. Thus, mobile learning (m-Learning) constitutes any form of learning activities through mobile devices with convenient learning experiences. However, limited empirical studies have investigated the behaviour of adult learners that represent the characteristics associated with formal part-time learners in measuring the acceptance level of this technology. Therefore, this study aims to analyse the role of andragogy theory using adult learner principles in determining m-Learning technology acceptance among formal part-time learners. The categorisation of formal part-time learners was undertaken using specific attributes via Structural Model Measurement (SMM) that enabled the researcher to discover the unique predictive values of self-directed learning, prior experience, learning readiness, and the orientation to learn in the context of formal part-time learners' acceptance, in addition to the assimilation of the Unified Theory of Acceptance and Use of Technology (UTAUT) variables. The hypotheses were developed, followed by developing a survey questionnaire that was distributed to and completed by 394 formal part-time learners in Malaysia. The reflective

SMM was then analysed using SmartPLS (v 3.2.7), where the results indicated that the reliability and validity were satisfactorily achieved. All six attributes fulfilled the threshold, whereas the hypothesis regarding the variables of prior experience and orientation to learning was not accepted. Accordingly, a guideline was developed and recommended to enhance formal part-time learner's intention to accept m-Learning based on the proposed framework. It is anticipated that the findings of this study will add to the body of knowledge in this field by providing further insights and understanding on the possibility of formal part-time learners' attributes that influence their acceptance of m-Learning in promoting a better learning environment. The results also offer further direction in determining the success rate of formal part-time learners with respect to the distance learning process. Finally, it is anticipated that the proposed framework will address all the requirements needed by the adult learners.

Keywords**:** Mobile learning, adult learner, formal part-time learner, andragogy, Unified Theory of Acceptance and Use of Technology (UTAUT).

KERANGKA PENERIMAAN PEMBELAJARAN MUDAH ALIH DIKALANGAN PELAJAR FORMAL SEPARUH MASA MALAYSIA

ABSTRAK

Prestasi pelajar dewasa merupakan satu cabaran utama dalam pendidikan disebabkan oleh kesukaran mereka untuk menguruskan masa dan juga mengekalkan fokus. Ini juga menyumbang kepada masalah untuk menyeimbangkan keperluan di antara pelajaran serta tekanan dan tanggungjawab kehidupan peribadi yang lain. Kumpulan pelajar tertentu ini termasuk pelajar formal separuh masa yang kebanyakannya adalah orang dewasa yang perlu menguruskan pelbagai komitmen, termasuk urusan keluarga, kehidupan sosial, kerjaya, kesihatan, kewangan selain pembelajaran. Dalam dunia digital, setiap aspek pendidikan melibatkan sesuatu bentuk teknologi. Teknologi mudah alih telah berkembang dengan cepat menjadi 'peranti poket' dalam menyediakan amalan pembelajaran 24/7 tanpa sekatan masa dan tempat. Oleh itu, pembelajaran mudah alih (m-Pembelajaran) merupakan bentuk aktiviti pembelajaran melalui peranti mudah alih dengan pengalaman pembelajaran yang selesa. Walau bagaimanapun, kajian empirikal yang menyiasat tingkah laku pelajar dewasa yang mewakili ciri-ciri yang berkaitan dengan pelajar formal separuh masa untuk mengukur tahap penerimaan teknologi ini masih terhad. Oleh itu, kajian ini bertujuan untuk menganalisis peranan teori andragogi dengan menggunakan prinsip pembelajaran orang dewasa untuk menentukan penerimaan teknologi m-Pembelajaran di kalangan pelajar formal separuh masa. Pengkategorian pelajar formal separuh masa dilakukan dengan menggunakan atribut khusus melalui *Structural Model Measurement* (SMM) yang membolehkan penyelidik menemui nilai ramalan unik pembelajaran kendiri, pengalaman sebelumnya, kesediaan belajar, dan orientasi untuk belajar dalam konteks penerimaan pelajar formal separuh masa, selain asimilasi pemboleh ubah *Unified Theory of Acceptance and Use of Technology* (UTAUT). Hipotesis dibangunkan, diikuti dengan pembangunan soal selidik yang

diedarkan dan dilengkapkan oleh 394 pelajar formal separuh masa di Malaysia. SMM reflektif kemudian dianalisis dengan menggunakan SmartPLS (v 3.2.7), di mana hasilnya menunjukkan bahawa nilai kebolehpercayaan dan kesahan yang dicapai adalah memuaskan. Kesemua enam atribut memenuhi nilai ambang, manakala hipotesis mengenai pemboleh ubah Prior Experience dan Orientation to Learning tidak diterima. Dengan keputusan ini, garis panduan telah dibangunkan dan dicadangkan untuk meningkatkan niat pelajar formal separuh masa untuk menerima m-Pembelajaran berdasarkan kerangka yang dicadangkan. Adalah dijangkakan bahawa penemuan kajian ini akan menambah pengetahuan dalam bidang ini dengan memberikan pandangan dan pemahaman yang lebih lanjut mengenai kemungkinan atribut pelajar formal separuh masa yang mempengaruhi penerimaan mereka terhadap m-Pembelajaran dalam mempromosikan persekitaran pembelajaran yang lebih baik. Hasil dapatan juga mencadangkan langkah seterusnya dalam menentukan kadar kejayaan pelajar formal separuh masa berkenaan dengan proses pembelajaran jarak jauh. Akhirnya, kerangka yang dicadangkan diharapkan akan memenuhi semua keperluan para pelajar dewasa.

Kata Kunci: Pembelajaran mudah alih, pelajar dewasa, pelajar formal separuh masa, andragogi, *Unified Theory of Acceptance and Use of Technology* (UTAUT).

ACKNOWLEDGEMENTS

Praise is only for Allah, The All-Compassionate, The All-Merciful, who has given me this opportunity to complete my research and submit this thesis. I would like to pay gratitude to my beloved supervisor Prof. Dr. Abdullah Gani and Dr. Nor Liyana Mohd. Shuib, who has been a superb guide and mentor throughout my research at the University of Malaya. Also, many thanks to Dr Ellaheh who always supported me and was ready to teach me 24/7.

I am very much thankful to my beloved husband Mr. Borhanuddin Bin Abdul Manan, without his help and support it was almost impossible for me to do this research. I am thankful to my parents, my father Muhammad Sabri Bin Muhammad Piah, my mother Zawiah Binti Ibrahim and my mother in-law Tek Binti Kassim have been great inspiration for me in my study. I am thankful to my younger brothers Muhammad Firdaus, Muhammad Fairuz, Muhammad Faizal, Muhammad Faizul and all the families, their support and encouragement were essential for my Ph.D. I am also thankful to my children Ammar Luqman, Qistina Damia, Youssef Ayman and Ayesha Khadeeja as well, for their love. I dedicate this thesis to all of my family; without them I am nothing.

I am also thankful for my colleagues at Faculty of Computing and Multimedia (FCOM), Kolej Universiti Poly-Tech MARA; especially the Dean, Associate Professor Ts. Dr. Zahrah, Puan Jihadah Ahmad, Dr. Azman, and fellow friends. May Allah repay your support and encouragement to complete my PhD study.

In the end, I would like to thank The Center for Mobile Cloud Computing, Faculty of Computer Science and Information Technology, and The University of Malaya, for providing me research environment and facilities.

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LIST OF SYMBOLS AND ABBREVIATIONS

AVE	:	Average Variance Extracted
BI	:	Behavioural Intention
CR	:	Composite reliability
EE	:	Effort Expectancy
FC	:	Facilitating Condition
DOI	:	Diffusion of Innovation
DV	:	Dependent Variable
HEI	:	Higher Education Institution
IDT	:	Innovation Diffusion Theory
IIUM	:	International Islamic University Malaysia
IT	:	Information Technology
IV	:	Independent Variable
LMS	:	Learning Management System
LR	:	Learning Readiness
MOHE	:	Ministry of Higher Education
MM	:	Motivational Model
MPCU	:	Model of PC Utilisation
Ns	:	Not significant
N/A	:	Not Applicable
OL	:	Orientation to Learning
PCU	:	Personal Computer Utilisation
PDA	:	Personal digital assistance
PE	:	Performance Expectancy
PKP	:	Pusat Kembangan Pendidikan

PLS	:	Partial Least Square
PhD	:	Doctor of Philosophy
PrEx	:	Prior Experience
RO	:	Research Objective
RQ	:	Research Question
SCT	:	Social Cognitive Theory
SD	:	Self-directed
SEM	:	Structural Equation Modelling
SI	:	Social Influence
SPM	:	*Sijil Pelajaran Malaysia*
STPM	:	*Sijil Tinggi Pelajaran Malaysia*
SPSS	:	Statistical Package for Social Sciences
STDEV	:	Standard Deviation
T & L	:	Teaching and Learning
TAM	:	Theory Acceptance Model
TPB	:	Theory of Planned Behaviour
TRA	:	Theory of Reasoned Action
UB	:	Usage Behaviour
UTAUT	:	Unified Theory of Acceptance and Use of Technology

LIST OF APPENDICES

CHAPTER 1: INTRODUCTION

The fundamentals and background of this research are presented in this chapter, along with highlighting the issues associated with mobile learning (m-Learning) and the approach adopted (i.e., steps) in performing the study. Specifically, this chapter deals with m-Learning acceptance and the challenges in the context of formal part-time learners. A brief introduction is first presented on m-Learning, its acceptance, and importance. This chapter is organised into several sections: Research Background, Research Motivation, Statement of Problem, Statement of Objectives, Research Questions; and Layout of the Thesis.

1.1 Research Background

This section provides relevant background regarding formal part-time learners and m-Learning from the perspective of the educational environment and experiences of learners in the context of Malaysia. Formal part-time learners' and m-Learning needs, and importance are also discussed in addition to important aspects and features of the study.

In the context of Malaysia, the common perception of adult learners is that their age is mostly older compared to typical higher education learners, and have greater life and working experiences before returning to enrol in courses at higher educational institutions (Postan, 2014). With reference to *Kamus Dewan* 4th Edition (Bahasa, 2010), the definition of a learner is a person involved in the learning process in any institution. Whereas, as stated in Malaysian Law Akta 21 Akta Umur Dewasa (1971)(Pesuruhjaya Penyemak Undang-undang Malaysia, 2006) , Section 4, immature ages for all males and females is 18 years, and are considered as adults when their age reaches 18 years. Therefore, an adult

learner can signify a person who is 18 years of age and above and has decided to continue their study to enhance and recognise further skills through a life-long learning process.

On the other hand, regarding the terms and regulations to enrol as part-time learners in Malaysian higher education institutions (HEI), the person's age must be 21 and above. Since most adults need to entertain having multiple commitments and the need to leave their home and office to study and attend class, the time designated for study would be less; thus effective utilisation of time for learning is crucial (Al Zoubib & Jali, 2014). In addition to formal part-time learners, this group of learners are generally adults needing to balance the demands of their learning, career, with overall life pressures, which in most cases, leads to a dilemma in not managed, given the crucial amount of time needed for learning.

The term 'higher education institution' (HEI) refers to any higher institution that provides formal courses and has standard processes that need to be fulfilled by learners. They are mostly known as universities and colleges (Youde & Youde, 2018). These higher institutions provide various professional certificates and degrees in such fields as law, theology, language, computer, business, art, medicine, engineering and many others. They also promote knowledge and skills that are available in the region as their mainstream, and have become a key asset and powerhouse for economic development (Chatterton & Goddard, 2000). Thus, an HEI in the Malaysian context is any higher educational platform that provides formal and informal academic activities mostly to enrolled learners aged 18 years old and above in a bid to be awarded a certificate in recognition of their skills and knowledge (Kementerian Pengajian Tinggi, 2012). This certificate is immediately valuable as a supporting document to help them improve in their career, financial status and experience, and in obtaining new positions.

Nevertheless, the learning process from past and present experiences help to enhance the learner's awareness, understanding, competencies, and decision-making which can be applied to their personal life, social aspects and work (Crompton & Burke, 2018). Formal part-time learners tend to integrate knowledge with social activities to produce a consequential learning environment (Mahan & Stein, 2014). In other words, to maintain their success and quality of life, they must position themselves in an active position to learn. Kamişli & Özonur (2017) defined 'andragogy' as the point at which an individual achieves a self-concept of self-direction as an adult. This definition also matches with United Nations Educational, Scientific and Cultural Organisation (UNESCO) that emphasises lifelong skills in adult learning and education (UNESCO/UIL, 2016). The importance of lifelong learning skills is to assist formal part-time learners in improving their job performance, thereby enhancing their marketability since education nowadays has become an essential element for career success and life-long endeavours. As such, this becomes an important determiner in how to motivate and help formal part-time learners to adopt technology as learning tools (Al-adwan et al., 2018). Flexible programmes accommodate busy schedules, given the fact that personal obligations may hinder the learning process of individuals. Hence, as suggested by Elnasr et al. (2016), a suitable approach in encouraging learners to identify and explore their needs and readiness to learn must be well organised. While in contrast, ineffectual activities may lead to a meaningless and ineffectual learning process (Crompton & Burke, 2018).

As modern or contemporary learners, adults tend to utilise their mobile devices to keep in touch with their learning courses and peers, bringing together thought-leading practitioners to create an engaging virtual classroom for both educators and learners, referred to as responsive learning. m-Learning supports a responsive learning environment when helping to optimise the learner's digital learning experience. This learning environment fulfils the learner's learning requirements in providing the ability

to search and find information when needed, given the applications on these devices provide and offer important benefits to the user. However, mobile applications rely heavily on having access to the wireless internet technology and mobile devices such as personal digital assistants (PDAs), smartphones, and tablets, etc., Pads (A. Lu et al., 2017).

According to the Handphone Users Survey (HPUS) the Malaysian Communications and Multimedia Commission (MCMC) (2018), the findings from the report indicate the growth rate and use of mobile devices between 2017 and 2018. Figure 1.1 shows the demographics of handphone user differences (2017-2018).

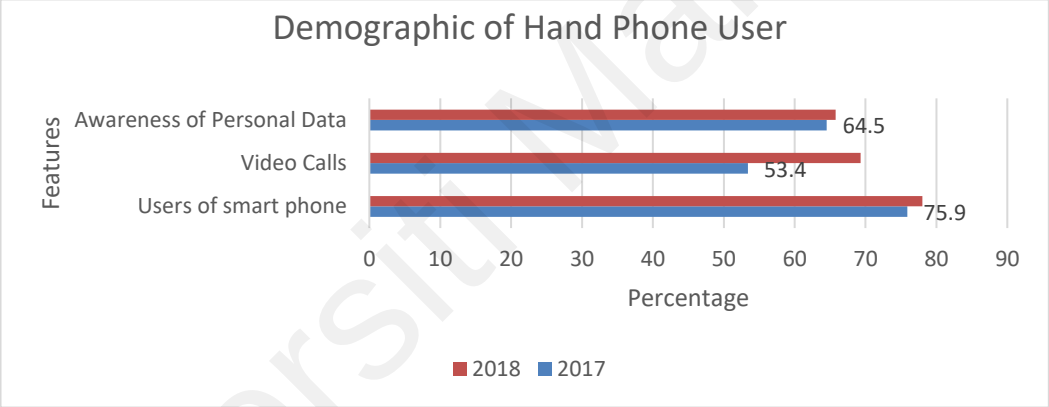

Figure 1.1: Demographics of handphone users

According to Chiu et al., (2016) and So (2016), applying m-Learning improves the learner's learning experience substantially. It is also shown that the significance between instructional principles and aspects of m-Learning need to be considered in order to integrate the theory and practice better (Zydney & Warner, 2016). It is also important to identify the attributes that lead to the successful use and application of m-Learning to achieve the objectives in meeting the needs and aspirations of learners (Bernacki et al.,

2019). As such, it implies having useful aspects to influence learners' intention by satisfying the various requirements and learning needs.

1.2 Research Motivation

The observation of adult learners' activities that reveal the emotions and motivations of the learning experience is presented and discussed in this section. The demands from the government and the number of enrolments for formal part-time learners in public universities in Malaysia are also discussed.

Many opportunities have been forthcoming by the Ministry of Higher Education (MOHE), particularly regarding m-Learning technology, given the growing demand in this area. However, the majority of m-Learning tends to be used by undergraduates and youth (Ur-Rehman et al., 2016). Therefore, to address this issue, three reasons have motivated the researcher to progress this research. First, formal part-time learners are considered the most productive age that sustains economic growth and is highly motivated towards achieving success in their social life, career and academic accomplishments (Kementerian Pendidikan Tinggi, 2017). Secondly, formal part-time learners are able to delicately balance their social life and learning (Al-Ali et al., 2016) when both time and place become a significant challenge for them to engage in the physical classroom (Gómez-Ramirez et al., 2019). Thirdly, aligning with the 10th Malaysia Plan (RMKe-10th) the plan aims to achieve a target of 60,000 professional holders in Malaysia by 2023.

Table 1.1: The Enrolment of part-time learners in Public Universities (UA), 2017

Learning Mode	ENROLMENT		
	Male	Female	Total
Flexible	**19**	**13**	**32**
31-35 Years old	0	3	3
36-40 Years old	2	3	5
41 Years old and above	17	7	24
Part-time	**25,314**	**30,060**	**55,374**
15-20 Years old	38	96	134
21-25 Years old	3,181	4,897	8,078
26-30 Years old	7,970	10,177	18,147
31-35 Years old	6,750	7,632	14,382
36-40 Years old	3,402	3,826	7,228
41 Years old and above	3,973	3,432	7,405

Source: MyMoheS System, Unit Pengurusan Data, BPPPD, KPM (PT)

The above table depicts the number of part-time learners enrolled in Malaysian public universities in 2017. The average age of those enrolled in these universities ranged between 26 and 30 years (18,147), between 31 and 35 years (14,382) from the total enrolled part-time learners (55,374). Most aged between these groups were formal part-time learners having a high level of commitment to developing their career, family environment, and social life. Many formal part-time learners have decided to further their study to enhance their formal education achievements, competencies and knowledge in respective institutions. Thus, furthering their study part-time can help them to sustain their finances and position in the workplace, while providing an opportunity to explore and achieve a further step in their education.

According to Ramirez et al. (2018), a learner's learning process keeps changing. Thus, the needs of newly-registered learners also differ, and it is important to consider the andragogical aspect. Therefore, this study focused on the educational attributes, where information was obtained from data on the attributes of formal part-time learners. These

attributes may provide valuable insights into their learning methods and how educators individualise their instruction to better suit those attributes. As mentioned earlier, m-Learning focuses on having suitable access to learning in a mobile manner; therefore, narrowing down to formal part-time learners. In the case of formal part-time learners' by creating content and delivery techniques, it needs to be appealing to them in line with their cognitive load and basic constructivism foundation since these learners have different requirements and andragogical demand. The environment should ensure that the content is well understood by formal part-time learners and retainable to be reproduced for future use. This is in parallel with the lifelong learning term coined by many academics.

On the other hand, Yang and Su (2017) suggest that more attributes could be utilised to explore which attributes can exert the most influence on learners towards m-Learning intention and usage. Since attributes change over time, Karimi (2016) recommended identifying more critically, embedding such features in the m-Learning environment. Accordingly, it was suggested that adult learning principles be considered as attributes that contribute to the adoption of m-Learning (Kamişli & Özonur, 2017). These attributes, which are referred to as the characteristics of learners, represent those typical features that identify them. Therefore, these four adult learning principles, which solely represent the unique characteristics of formal part-time learners, were the attributes that were measured in this study. This is because prior studies have tended to critically review the attributes that are deficient in the behaviour of adult learners' such as their learning style and playfulness (Karimi, 2016a), subjective norm (Yang & Su, 2017), the reaction to emerging technologies, understanding and competency (Susilo, 2014), social and individual antecedents (Mohammadi, 2015) and altruism, perceived learning benefits and online participation (Diep et al., 2016).

A study by the Internet Society (2019), which involved 256 respondents from countries in Southeast Asia, including Malaysia, showed that the respondents had the ability to use mobile services for education. This illustrates the potential growth of m-Learning in Malaysia. However, m-Learning research in Malaysia is still at the growing stage, and limited studies have been conducted on the effects of andragogy and m-Learning (Ur-Rehman et al., 2016).

According to Diep et al. (2016), formal part-time learner's acceptance towards m-Learning can be measured by predicting the relationship among attributes. Here, the combination of attributes and existing tools can be combined in maintaining performance (Bernacki et al., 2019). Given this innovation, m-Learning will undoubtedly evolve to become the most sought after technology in helping formal part-time learners to remain connected during their studies (Ooi & Tan, 2016).

1.3 Statement of Problem

This section describes the problem statement of the study, beginning by analysing the issue addressed in this research. It is important to understand that m-Learning among formal part-time learners is a systemic type of problem, caused by several relational and interrelated factors that difficult to distinguish individually.

As part-time learners, they need to allocate adequate time for learning in addition to travelling and moving from one place to another. This is because most formal part-time learners need to entertain multiple commitments and responsibilities. The learners' inability to effectively manage their time is due to being preoccupied with other priorities that consume most of their time which diverts their attention to learning. This can also lead to unproductive meetings with educators and peers. As a result, it creates a conflict

regarding the priorities between academic learning and domestic commitments, which may lead to learners dropping out of higher institutions.

The high fallout rate of learners in HEIs shows that most learners are incapable of coping with the institution's schedule, programme structure, class session(s) and assessments. Often, learners will withdraw from the programme when feeling demotivated or overcome by the structure and allocation of rewards. Also, if the programme structure is poorly designed and inflexible, the number of enrolled learners may also reduce.

Nevertheless, when dealing with modern mobile technology, learners should explore and maximise the functionality and use of technology; otherwise, they may perceive their learning environment, particularly with respect to the use and application of mobile technology unsupportive to their needs. This issue is contributed by the tendency of developers to create mobile applications for young adolescents and school students. Moreover, it is possible that learners feel less confident that m-Learning will improve their performance. As a result, the potential use of mobile technology as a learning tool may fail.

Some researchers such as Al-Saedi et al., (2020) and Moorthy et al., (2019) have suggested that mobile technology is helpful for learning. However, the lack of motivation may discourage users from learning and could feel that the content is of little personal meaning to them. Moreover, little value in the course and content may significantly demotivate them as well, thereby affecting their desire and drive to adopt mobile technology as a platform for learning.

Based on the discussion and issues mentioned above, it can be said that the problem due to the lack of efficient m-Learning usage has not been appropriately addressed. This

study focused on formal part-time learners in view of the fact that it is crucial for them to have the time to learn, while being able to fulfil their multiple commitments. Those who enrol in HEIs are mostly aged above 21 years, and many will continue to learn until their career commitments begin to slow down at the pensionable age of 56 years. Therefore, a theoretical framework was proposed to cover the learning needs of formal part-time learners. Thus, a standard m-Learning framework was developed for them based on a general design, which might not be suitable for young learners. Accordingly, this highlights a significant gap in the literature, leading to the following statement of this research and thesis.

Previous studies have shown the significant acceptance of m-Learning technology to help learners learn better. However, existing m-Learning framework solutions are limited in providing efficient m-Learning acceptance among formal part-time learners. Likewise, the attributes in the existing m-Learning frameworks are less considered regarding formal part-time learner's influential attributes toward m-Learning. As such, it shows that the synchronisation between m-Learning with formal part-time learner's study is deficient and undetermined. In addition, current m-Learning guidelines take less account of the attributes of adult learners, leading to unused mobile devices in promoting their learning activities.

1.4 Statement of Objectives

This section outlines the objectives, emphasising the 'acceptance' concepts of the formal part-time learners on the use of m-Learning as their primary learning tool. This research also develops and verifies the framework of acceptance for formal part-time students in the context of Malaysia. Therefore, the objectives of this research are:

1. To investigate the characteristics of formal part-time learners in Malaysia;
2. To identify the attributes influencing formal part-time learners' acceptance to m-Learning;
3. To develop the theoretical framework for m-Learning acceptance among formal part-time learners; and
4. To evaluate and validate the theoretical framework for m-Learning acceptance among formal part-time learners in Malaysia.

1.5 Research Questions

In meeting the objectives of this research, questions have been developed not only from the theory of mobile learning but also from the psychological theory of learning. Therefore, based on the research objectives above, five research questions are posed by the researcher:

1. What are the characteristics of formal part-time learners in Malaysia? (RO1);
2. What are the attributes influencing formal part-time learners for m-Learning acceptance? (RO2);
3. How to develop an m-Learning acceptance framework concerning formal part-time learners? (RO3);
4. How to assess and validate an m-Learning acceptance framework about formal part-time learners? (RO4); and
5. How to formulate and assess the m-Learning guidelines for learners from higher institutions? (RO4).

1.6 Layout of The Thesis

The structure of the thesis is next presented, along with a brief explanation, as illustrated in Figure 1.3 below. The thesis consists of six chapters. Chapter 2 follows the present chapter and discussion with the literature review that discusses the concept and related theory of m-Learning and the adult learners' principles as a key component. A detailed analysis of existing solutions based on the proposed thematic taxonomy to highlight the commonalities and differences in existing solutions is also presented. Lastly, this chapter highlights the issues in this domain of research that hinders the prospect of proposing optimal m-Learning solutions.

Chapter 3 presents the proposed framework of acceptance regarding m-Learning solutions, in addition to presenting the hypotheses and framework strategy for this research study. The framework is explained with the aid of diagrams, including the discussion surrounding the relationship of the framework. In evaluating the acceptance models, primary evaluation scales that include self-directed, prior experience, learning readiness and orientation to learning are discussed. From these attributes, a guideline is also proposed for learning activities among formal part-time learners.

Chapter 4 presents the evaluation process having adopted the cluster sampling technique for data collection. The research methodology is also outlined, including the evaluation to test the construct reliability and construct validity for each of the attributes and items, while the measurement model is used for validating the framework. This is followed by Chapter 5 that presents the results by validate the measurement model, in constructing the structural measurement model (SMM) by testing the hypotheses and resultant findings.

Chapter 6 for the discussion present the discussion in Malaysia and adult learners' context. The study concludes with Chapter 7, which discusses the objectives of the

research in retrospect of the work undertaken. This chapter also summarises the contributions and implications of the research, including its significance and limitations of the proposed solution. Areas for further study are also recommended.

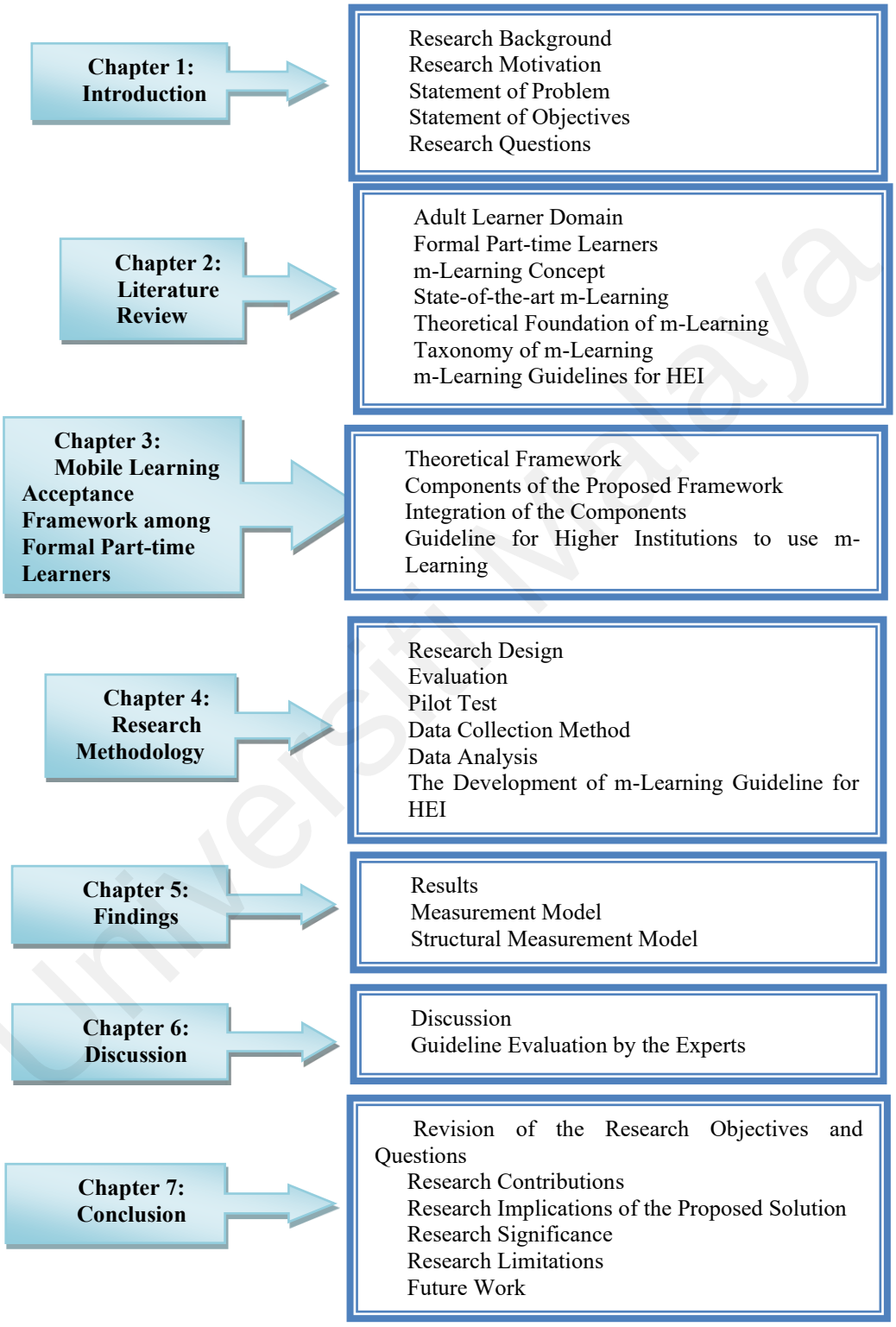

Figure 1.2: Thesis Structure

CHAPTER 2: LITERATURE REVIEW

This chapter performs a comprehensive literature review in the domain of adult learners, the definition of formal part-time learners and the introduction of m-Learning for formal part-time learners. The chapter also presents the challenges that hinder the proposition of proposing optimal m-Learning solutions for formal part-time learners. The following section then presents the concept of m-Learning, reviewing state-of-the-art m-Learning solutions, specifically for formal part-time learners. A theoretical foundation of m-Learning is discussed to identify the best theory to stimulate and inspire the engagement of learners. This is followed by examining the empirical studies in the context of the theories and the thematic taxonomy to classify existing m-Learning solutions based on a series of parameters. Lastly, a detailed analysis of m-Learning components is presented based on the proposed thematic taxonomy to highlight the commonalities and differences.

2.1 Adult Learner Domain Definition

This section explores the definition of adult learners adopted in various studies. The definition of adult learners is first presented, followed by exploring the various contexts of adult learners from prior studies.

Adult learners can be defined as those individuals as adolescents, advancing to adulthood and their involvement in adult learning processes and education (UNESCO/UIL, 2015). The Harvard Centre defines Gen X as those born between 1965 and 1984 and consequently aged between 35 and 53 years, which represents the common age of adults. Previous researchers agree that HEI learners within the age range of 18-24 years are known as young adults. They are able to make decisions, but are not yet ready

to shoulder the full responsibilities of an adult (Kementerian Pengajian Tinggi, 2012). Typically, those aged between 24 – 50 years are known as mature adults (Verasingam et al., 2020), while those above the age of 50 years are known as older adults (Khosravi et al., 2016). This is consistent with the studies conducted by Diep et al., (2016) and Molnár (2015), who suggested that the age range for adults is between 22 to 58 years. However, in Malaysia, the qualifying age for enrolment as a part-time learner in a public higher education institution (HEI) is around 21 years or above. Also, given that the retirement age in Malaysia is 56 years, formal part-time learners are typically classified as those adults aged between 21 and 55 years who are enrolled in any institution with a structured education programme.

Thus, this gives the impression that they are adults who have gained much in life, have a vast working experience, and are returning to universities and other educational institutions to enrol and participate in academic programmes (Bernacki et al., 2019). They pursue their education for many reasons such as to learn new skills, fulfil workplace demands, to become better-informed employees, and simply for the sake of gaining more knowledge (Verasingam et al., 2020).

In some case, adult learners are seeking qualifications in recognising their skills and used as a stepping stone in their life achievements and positions at work. Moreover, the intention is to enhance and define skills throughout a life-long learning process. All learning processes are typically achieved from past and present life experiences, which are intended to improve learner's awareness, understanding, competencies, and decision-making abilities which can be applied in personal, social, and employment contexts (Youde & Youde, 2018).

Furthermore, adults tend to integrate their learnings with their social activities, to produce a consequential learning environment (Reed et al., 2014). In other words, to

retain success and quality of life, adults must place themselves in an active position of learning, known as 'andragogy'. It is also claimed that this approach is the point at which individuals achieve a degree of self-concept and self-direction as adults (Keppel, 2019). This is in accordance with emphasising life-long skills in adult learning and education (UNESCO/UIL, 2016).

Table 2.1 below depicts the context of adult learners from previous studies, in which most adult learners are engaged in formal learning programmes. Only those studies by Abu Bakar et al., (2015) and Kilicay-Ergin & Laplante (2013) have focused on part-time learners. Linked with multiple commitments and age factors, all of these contexts are present in the andragogy theory.

Table 2.1: Adult learner contexts

Source	**Adult learner context study**
(Abu Bakar et al., 2015	Public service personnel and private company employees.
(Pembridge & Paretti, 2013)	Capstone design students, a course often structured to simulate professional work experience.
(Kilicay-Ergin & Laplante, 2013)	Working professional in designing an asynchronous online course.
(Al-Ali et al., 2016)	Enhance the reading experience of adult learners by incorporating Augmented Reality (AR) technology.
(Dable et al., 2012)	Towards senior faculty members by changing adult education strategies (andragogy).
(Shuib et al., 2018)	68 undergraduates from various study fields who were undertaking English language courses in Malaysia university
(Hashim et al., 2015)	Undergraduate and postgraduate degrees from a university in the United States (US).
(Reed et al., 2014)	Paediatric trainees in medical education.
(Slavkovic & Savic, 2015)	Adults aged 60-75 participating in life-long education.
(Dromantiene & Zemaitaityte, 2014)	European adult learners in a formal education system.

However, limited opportunities in gaining sufficient study-time can lead to a preference for m-Learning. Although "lack of" commitment does not often reflect their experience, and instead mirrors the standards in traditional classrooms (Hooshangi, 2015). With regards to having a high expectation of learning, formal part-time learners wish to be taught things that will be useful and expect an immediate result by seeking courses that are relevant and not wasteful. By having an organised approach, this may encourage adults to identify and explore their needs and preparedness to learn. Institutions can help them to achieve this aspect by strategizing m-Learning, thereby enabling them to learn at their own pace and convenience.

2.1.1 Adult Learning Theory

This section discusses the adult learning theory proposed by M. Knowles (1973), namely andragogy, in which four principles are reviewed that characterise formal part-time learner behaviour. These principles are chosen since they are fundamental in determining behaviour.

2.1.1.1 Andragogy

The andragogy theory is presented in this section. First developed by M. Knowles (1973), it defines the practices of teaching adults and has been proven to be a helpful learning approach that promotes m-Learning (Demchenko et al., 2015; Khan et al., 2019).

Being removed from the formal classroom environment for a certain period of time, the pedagogical approach has nowadays become quite irrelevant, especially when applying it to teaching and learning processes since it presents a series of problems (Kamişli & Özonur, 2017; Sălăvăstru, 2014). One of the problems concerns the difference

between pedagogical and andragogic approaches, moving from teacher-oriented to student-oriented, respectively (Nygren et al., 2019). Formal part-time learner experiences result in taking action, especially when the content is seen to be relevant to their livelihood. Thus, they require assistance to help them manage commitments; otherwise, they will fail, which will later disrupt the learning of others. In eliciting a better understanding, this study focuses on the four principles of adult learners adopted from the work of Knowles.

2.1.1.2 Adult Learning Principles

Formal part-time learners tend to learn more independently from their own experiences. This self-directed learning experience is known as 'andragogy'. Andragogy is defined as the art and science of helping adults to learn (Kamişli & Özonur, 2017; Siriwongs, 2015). The process and rationale of self-directed learning facilitate the application of appropriate, well-planned, and effective teaching and learning (Nygren et al., 2019; Siriwongs, 2015). Knowles (1986) believed that instructors must pay attention to the actual interests of learners instead of focusing on what they, as instructors, believe to be important.

Consequently, the assumptions presented by Knowles (1979) surrounding the four principles, namely Self-direction (SD), Prior Experience (PrEx), Learning Readiness (LR) and Orientation to Learning (OL), were not solely derived from past research. Adult learners are uniquely different when it comes to the effects of learning (Karimi, 2016a), and therefore, it is important to produce coherent and reliable accounts of the proliferation of m-Learning in the setting of formal part-time learners given their limitations and constraints. For instance, most m-Learning applications do not suit the relationship

between the learning objectives and the attributes of formal part-time learners in terms of their learning management and preferences.

Nevertheless, the majority of the studies that were found in the literature focused mainly on determining the methods and approaches with regard to the content and technical presentation (Ur-Rehman et al., 2016). Even though the study of 'acceptance' has been tested and evaluated in many situations, it still needs to be refined owing to different technologies (including m-Learning) and the need for different approaches within different contexts or environments (Ramirez et al., 2018).

2.2 Formal Part-time Learners

Nowadays, technology provides various benefits to make life easier, and the emergence of mobile technology has been extremely useful for educational purposes. In particular, the application of mobile technology has been applied to extend from the more common use and application of communications to become a meaningful learning environment known as m-Learning. M-Learning activities are made possible by reconstructing learning intentions through interactive presentations and knowledge exchange. Additionally, the rapid expansion of m-Learning had led to education and IT companies providing a variety of m-Learning products. However, at present, m-Learning on focuses on secondary and primary education, rather than tertiary education (Ur-Rehman et al., 2016). Also, despite the comprehensive study of m-Learning, it is evident that the use of m-Learning in the context of formal part-time learners is rarely discussed (Viberg et al., 2021). Indeed, consideration for formal part-time learners should not be compromised because they have a variety of commitments and responsibilities, especially after enrolling as a student later in life.

According to the statistics portal (Statistica, 2017), the working-age in Southeast Asian Nations begins at around 15 years, and the number of working people increases year-on-year. In Malaysia, for instance, according to the statistics of working people from Statistik Tenaga Buruh in 2020 (Utama & Buruh, 2020), the number dramatically increased (1.3%) compared to March 2019 (15, 035). However, despite this statistic, adults that between the age range 21 - 57 are still considered as the most productive age that leads to economic growth and development.

In the context of learners, data are drawn from the statistics of graduating students in Malaysia. Based on the figures presented by the Ministry of Education Malaysia in 2017, the number of Malaysian graduates (between the ages of 15 and 40) had increased. Table 2.2 below illustrates the distribution of graduates according to their age and educational level.

Table 2.2: Distribution of graduates by age and educational level in Malaysia in 2017

Education Level	Number of Students	18 and below	19 - 20	21 - 25	26 - 30	31 - 35	36 - 40	41 and above
		(%)						
PhD.	5,000	0.02	0.1	0.4	17.3	28.4	21	32.8
Master	24,066	0.004	0.01	17.5	38.6	21.3	12.1	10.5
Postgraduate Diploma	637	-	-	30.1	44.9	13.2	6.3	5.5
First Degree	136,644	0.01	0.3	84.2	7.7	2.9	1.7	3.1
Advance Diploma	353	-	12.2	39.9	34	9.6	4	0.3
Diploma	120,648	0.1	41.4	55.9	1.4	0.7	0.3	0.3
Certificate	11,547	4.3	70.5	21.6	1.5	0.5	0.4	1.2
Professional	679	0.3	34.9	36.4	16.3	5.7	2.4	4
Postgraduate Certificate	56	-	-	3.6	14.3	30.4	26.8	25
Total	299,630	0.2	19.6	63.4	7.7	3.8	2.3	3

Source: (Kementerian_Pendidikan_Tinggi, 2017)

The statistics presented in the above table indicates the same age group of working people and graduate students. This is because this age group is the most productive age for working, and also having the highest motivation to study and gain certification. On

the other hand, according to the terms and regulations for enrolment as part-time learners in higher education institutions (HEI) in Malaysia, a person must be 21 years of age and above, while 56 years is the maximum age for formal part-time learning as this is the age at which working learners retire and have less responsibilities and commitments.

Formal and informal learning approaches are slightly different in terms of their implementation, activities and strategies. Therefore, when designing m-Learning, researchers need to offer clearer definitions of formal and informal concepts, where they need to omit certain design aspects for the learners themselves. The formal learning approach is apparently curriculum-based, and assessments and qualifications are driven by activities within the class (Viberg et al., 2021).

Consequently, formal learning is typically connected to educational systems that are promoted and designed directly and indirectly by the institution in accordance with its policies, with varying degrees of centralisation, and with a focus on updating specialized knowledge (Nygren et al., 2019; Rodriguez-Gomez et al., 2020). Unlike informal learning, attendance is compulsory for learners, where they are required to be present in the classroom setting and to be evaluated (Nygren et al., 2019). The classroom setting is designed, organized and restricted according to the HEI context. This classroom setting is intentional and is geared towards achieving a diploma or certificate.

Part-time learners enrol in HEIs that conduct formal learning, where attendance is compulsory, the learning is steered by the curriculum, and is highly orchestrated by educators (Nygren et al., 2019). Additionally, educators and the HEI managements benefit from the wide variety of activities that are provided to learners during their period of learning, such as experiments, their own practices, learning by doing, receiving feedback, coaching and network professional support.

In conclusion, formal part-time learners can be defined as registered part-time students aged between 21 and 56 years, who also probably have families and careers. Additionally, their learning practices are goal oriented, and they have a crucial time to manage their studies because of the need to maintain a balance between their various commitments, and to meet their many deadlines in a short period of time.

2.2.1 Formal Part-time Learners' Learning Platform

Nowadays, even though formal part-time learners are recognised as digital natives, using conventional styles of learning are still predominantly preferred. Unlike younger learners, using printed materials is more convenient for formal part-time learners, since it enables them to highlight points, read easily, or take notes for further explanation (Al-Ali et al., 2016). As such, formal part-time learners tend to limit themselves in the application of m-Learning by denying its advantages. Likewise, commitments to domestic and work responsibilities and limited time management skills result in formal part-time learners refusing to explore m-Learning technology. This leads to a diminishing decline in their participation in the learning process that later causes them to fail in completing learning tasks. Unfortunately, when these opportunities are overlooked, formal part-time learners often cease from continuing their studies resulting in a high dropout rate in HEIs (Kopeinik et al., 2014; Youde & Youde, 2018). This also causes a reduction in highly skilled and knowledgeable professional adult workers. Indirectly, the economy also faces a challenge and is impacted by this high dropout rate due to the need in hiring professionals from outside the organisation, waste of fees for learning materials, and fewer contributions from local professionals to sustain the economy.

2.3 Formal part-time Learner Challenges

In this section, the challenges faced by formal part-time learners are presented, which include time, content, and collaboration. The cause is also elaborated for each challenge, based on the considerations of formal part-time learners.

Table 2.3: Formal part-time learner challenges

	Time	**Content**	**Collaboration**
Challenges	Formal part-time learners need some flexibility during learning processes given they have commitments and multiple responsibilities (Youde & Youde, 2018)	Not many studies have considered adult learners as well as formal part-time learner needs and behaviour (Hashim et al., 2015; Kamişli & Özonur, 2017)	Learners need a concern by practitioners to exploring the model's suitability for them with completing demands who require flexibility of study (Bernacki et al., 2019)
Cause	Some online learning functions did not emphasise suitable activities that could trigger learner participation (Pimmer et al., 2016) The needs of education for new learners are different and andragogical model are highly considered (Ramirez et al., 2018)	Techno-assisted solution for adult illiterate are not available in the first place (Ur-Rehman et al., 2016) when most m-Learning applications are developed for formal undergraduates and for children	Formal part-time learners do not utilise mobile technology in their learning (So, 2016) Lack of adequate competencies required for participating in m-Learning activities (Diep et al., 2016)

Time becomes a challenge among formal part-time learners due to multiple responsibilities and commitments. Thus, time management skills are needed to manage learning activities and to prioritise personal responsibilities and commitments (Nygren et al., 2019). However, one of the challenges associated with time is constrained by formal classroom schedules. Formal part-time learners tend to miss classes, leading to a limited or lack of interest in fulfilling their studies (Angelaki & Mavroidis, 2013). When revising their schedule to incorporate social commitments, leaners need to combine the pressures of in-depth or intense study and finding the time to spend with their family. Once ways to improve time management have been identified, they can begin to adjust their day-to-day routines and behavioural patterns to reduce any time-related stress in their lives.

In terms of *learning content,* previous learning technologies such as e-learning and digital learning should reshape the focus on mobile or mobility discussions and solutions, by improving availability, accessibility, sharing of subject material, and providing real-time feedback (Rahimi et al., 2014). However, it is equally important to identify the needs of mobile applications that suit or are compatible with formal part-time learners by reducing the level of complexity; otherwise, it may discourage them from using the application.

Next, collaboration provides a suitable alternative for advanced teaching and learning solutions. This is interpreted as the accessibility of the course, communication within the system, constant contact, accessibility of tasks, tests, and completion of exams. However, not all formal part-time learners are technology literate and struggle with applying technology; although this depends on the readiness of the learner. For example, they do not perceive m-Learning technology as complex and difficult; if this is not the case, then it might discourage learners from using such systems (Hashim et al., 2015). As a result, this will influence their cognitive ability to receive academic content, given their preconceived needs and demands present a problem with their limited cognitive capacities (Hagen & Park, 2016).

However, the literature fails to demonstrate appropriate studies to solving cognitive load issues such as time, commitment, and requirements among formal part-time learners, especially from the aspect of instructional design. Learning can only be effectively adopted when the learners can identify and understand their needs and practice perfecting their skills.

2.4 Understanding of the m-Learning Concept

This section presents the concept and m-Learning fundamentals. Numerous studies regarding the concept and definition of m-Learning processes have been reviewed, in which the concept is divided into three mobility types: technology, learner, and learning. The three forms of mobility are defined as a means of explaining the importance of its role, in addition to the learner and learning activities being mediated by modern mobile technology, using wireless internet connections.

Technology Mobility refers to any mobile devices used to acquire knowledge without time nor place restrictions. With the assistance and support of modern infrastructures such as cloud computing, storage technology, networks, and big data, further mobility access can be gained first-hand, thus expanding the concept by using a variety of learning activities. Todoranova et al., (2020) and Curum and Khedo (2015) highlighted the limitations of using m-Learning technology (such as device battery life, screen, data entry methods, network connectivity, memory, and bandwidth) concerning the mobility of technology. This can be addressed by matching only the related functions of m-Learning that match with the needs of formal part-time learners, to reduce physical and wastage of using mobile devices. The use of mobile technology in education can be exploited by integrating the strengths of mobile technology with the curriculum.

Learner mobility refers to the ability to access and attain benefits from the learning process, irrespective of time and place, and is typically perceived those formal part-time learners have difficulty attending classrooms in-person. Factors contributing to this include factors such as not being geographically located nor viable for travelling and family and work commitments, which create barriers to accessing learning.

Learning is a process of cooperation, harmonisation, and cross-border information exchanges in education. Today, the retention rate for learner mobility has become a new

challenge in HEIs and teaching culture. Therefore, formal part-time learners must adapt to learning how to utilise technology rather than simply using it to communicate and gather information. Applying theory to this cause is proposed to integrate adult learner participation and learning performance, which will result in better achievements in learning outcomes.

2.4.1 m-Learning Current Usage and Features Outline

In this section, the current use and m-Learning features are presented. Nowadays, many m-Learning applications developed by software vendors are offered to users that include technology companies, academics, practitioners, educators, and learners. As such, this provides learners with many choices depending on their requirements. Some applications provide one-way communication such as for citation and word processing while other applications offer two-way communication such used for social networking (i.e., WhatsApp, Facebook, etc.), Google classroom and learning management systems (LMS).

Table 2.4 presents an analysis of the current usage and features of m-Learning, illustrating that these applications offer a number of similar design features that include flexibility, completion and retention functionality, collaborative support, and mobile technology capabilities. The LMS and game-based learning provide all the advantages of m-Learning, whereas citation and word processor applications only have two similar features.

Table 2.4: m-Learning current usage and features

m-Learning Usage	Flexible	Completion and Retention	Collaborative Support	Mobile Technology Capability	Authors
Word Processor	-	X	X	-	(Y.-T. Sung et al., 2016)
Social Networking	X	-	X	X	(Khosravi et al., 2016)
Google Classroom	X	-	X	X	(Carpenter & Linton, 2016)
LMS	X	X	X	X	(Shin & Kang, 2015)
Game-Based Learning	X	X	X	X	(Papadakis & Kalogiannakis, 2017; Yassine et al., 2018)

To improve the performance of m-Learning, many features have been suggested by researchers, as indicated in Table 2.5 below. Most researchers suggest having a collaborative medium, followed by a searching function. As mobile devices have been shown to be beneficial to adult learners in acquiring knowledge and collaboration (Crompton & Burke, 2018), they also offer opportunities during m-Learning activities to empower formal part-time learners by developing their self-sufficiency (Al-Emran et al., 2016).

Table 2.5: Suggested features of m-Learning

Suggested Features	**Sources**
Layout navigation that accompanies key information, instructions and feedback	(Papadakis & Kalogiannakis, 2017)
Searches, expression, communication, create records and give and receive feedback.	(Y.-T. Sung et al., 2016)
Tool must be easy to use, reliable, short enough and able to use as more than a general guideline	(Papadakis et al., 2020)
Acting as a remote control, displaying and analysing information, interfacing to social networks to monitor "things" that can be tweeted or posted for learning activities and tasks informally.	(Khaddage et al., 2016)
Tracked and recorded to deliver insightful information on learner's mobile learning progress	(Moorthy et al., 2019)
Search window, group history, search suggestions, web annotation tool, auto-summary, and discussion room/forum.	(Su et al., 2016)
Implementation of mobile-assisted language learning	(Shuib et al., 2018)

Table 2.5 continued

Searching, sharing, and organising.	(Gómez et al., 2016)
Easy to use and useful to allows them to acquire, apply, and protect their knowledge efficiently	(Al-Emran et al., 2020)
Blogs, forums, and chat rooms	(Su et al., 2016)

2.4.2 m-Learning in Developing Countries

Education in developing countries has improved significantly over the years. In line with the evolution of mobile technology, the integration of this technology with education must be well-defined. In developing countries, the governments have mostly taken full responsibility for promoting the use of technology in the field of education. A study by Todoranova et al., (2020) from the University of Varna, Bulgaria, highlighted the role of the government as well as HEIs in providing initiatives. Also, in Taiwan (Chao, 2019), the government has been promoting technology-based learning to cultivate literacy in information technology (IT) and to improve the competitiveness of their students internationally. To support this goal, learners are exposed to IT education from the elementary stage of their education. The findings by Chao (2019) also showed that a variance of 47.9% in the BI towards m-Learning was contributed by m-Learning usage behaviour. According to the findings by Crompton & Burke (2018) in their m-Learning research, more m-Learning is apparently being undertaken in specific geographical regions, with Asia accounting for 50% of it. The study also highlighted that a pedagogical approach is being used to achieve the goals of m-Learning in enhancing the learning of learners.

The majority of learners in developing countries have responded positively to m-Learning, where this approach is a step ahead in improving the knowledge of different learners (Karthikeyan et al., 2016). According to Todoranova et al. (2020), the success of m-Learning is influenced by the expectations of learners. Therefore, HEIs must promote

an adequate digital learning environment because the social communication and learning styles of learners differ slightly from those of the previous generation. This expectation is influenced by the fact that they own mobile devices with high-speed Internet access. Thus, they can retrieve multiple resources without any compromise. With these mobile capabilities, learners can prepare and train themselves to accomplish learning tasks. It was confirmed through an evaluation of HEIs in developing countries that it takes time to develop mobile technology applications that meet the learning needs of formal part-time learners (Moorthy et al., 2019).

2.4.3 m-Learning in Higher Education Institutions in Malaysia

Lately, educators across the globe have been reconsidering how learners can be educated in the learning environment of the 21st century. As instructors struggle with new methods of interacting with learners away from former classrooms and lecture halls, it is time to see how this phenomenon can determine the future evolution of learning.

Mobile technology offers learners several approaches for interacting with classmates and educators. It provides new means of engagement, along with access to a broad range of communal and informational resources (Khosravi et al., 2016). The world is currently in search of learning environments, where learning is not excessively reliant on inflexible approaches and objectives. Online tools can be used in a variety of teaching environments, including informal and formal learning spaces, to meet the demand. The approach is especially useful when students are not present, and mobile technology can be employed either for personal use or for engaging with others in m-Learning (Bernacki et al., 2019).

Mobile learning started to emerge between the years 2003 to 2006, when there was a rapid growth of research into mobile learning. Malaysia is now in its 4th wave, where

most of the domains are concerned about mobile-assisted language learning and special education. Educators, coders, and higher institutions play a pivotal role in ensuring the success of technology-based learning. The abilities and experiences of individuals and institutions can facilitate this success. Considering that the majority of formal part-time learners are above the age of 18 years, they are, therefore, referred to as adults (Pesuruhjaya Penyemak Undang-undang Malaysia, 2006).

Modern learners are typically known as digital natives. A few studies recently covered the development of mobile learning guidelines. Table 1 below shows m-Learning issues in higher education institutions from previous studies. These issues may become obstacles for learners to continue using m-Learning as their learning tool.

Consequently, learning attributes must be emphasised in the development of m-Learning guidelines so as to ensure the successful adoption of m-Learning. These issues can be effectively resolved through m-Learning as this approach offers numerous training benefits, solutions, and good learning experiences. Researchers must analyse the technologies involved in order to render more rigorous conclusions, while accounting for the individual character and unique context of each and every learner (Khosravi et al., 2016). Table 2.6 below shows the issues that were identified by previous researchers regarding the HEI environment.

Table 2.6: Suggested features of m-Learning

Issue	Source
Less attention to those behaviours that positively influence the learner's intention	(Diep et al., 2016)
Limitations with regard to the learning structure of the m-Learning guide	(Ramirez et al., 2018)
Learners lack confidence that they have the required skills to learn more	(Bernacki et al., 2019)
Insecurity in using mobile technology	(Shuib et al., 2018)
Learner's learning needs keep changing because of the demand of the industry, job differences, and company profiles as well as the skills required	(Ramirez et al., 2018)

Table 2.6 continued

The success or failure of m-Learning implementation depends on the readiness of learners	(Moorthy et al., 2019)

2.5 State-of-the-Art of m-Learning

This section of the study examines state-of-the-art m-Learning that provides advantages to formal part-time learners through using mobile devices specifically to respond to a variety of m-Learning activities. For formal part-time learners to engage with m-Learning activities, this section focuses on conducting a detailed analysis of the role and impact of m-Learning among formal part-time learners. The main contribution of this study is to explore the strengths of m-Learning for supporting the decision-makers of regional institutions in designing the required m-Learning infrastructure that connects with adult learners.

2.5.1 Functions of m-Learning

The function of m-Learning in providing a better solution for the learners is covered in this section. Mobile technology companies openly compete to provide sophisticated features, functionality and services to mobile users. Even though they aim to provide an effective and reliable mobile environment, this section discusses the features that can be utilised in the learning environment, which include collaborative functions, searching skills, and organising learning activities.

Since m-Learning offers an interactive virtual learning environment, it also refers to what is called the 'flipped' classroom (Gutl et al., 2015), formal and informal learning (Karimi, 2016b; Postan, 2014; Stanton & Ophoff, 2013), and hybrid learning (Kilicay-Ergin & Laplante, 2013). It also resides in the same category since m-Learning offers a

learning opportunity from different contexts of learning among people and technologies. Moreover, it is fast becoming a solution for achieving interactive m-Learning among formal part-time learners, facilitating the mastering of collaborative working skills, and achieving learning outcomes (Gan et al., 2015; Viberg et al., 2021).

Nevertheless, there are many opportunities offered by m-Learning technologies such as learning collaborative skills (M. Sung, 2015; Weyns et al., 2015), searching skills (Su et al., 2016; Y.-T. Sung et al., 2016), and organising learning activities (Hernandez et al., 2014; Shin & Kang, 2015; M. Sung, 2015). However, these skills are reliant on learner preferences given that formal part-time learners tend to either work in groups or individually. If formal part-time learner prefers to work in a group, collaborative and social interaction skills are helpful because they present an opportunity that may suit with group work such as enabling synchronised interactions, posting, sharing with group members, and allowing for immediate feedback. Compared to an individual learning style, the preference is more towards searching and 'blogging' (a form of communication), since this offers asynchronous communication and self-efficacy.

In supporting formal part-time learners to learn more effectively, m-Learning applications need to offer many optional functions. As a self-directed person, formal part-time learners tend to manage their learning process independently. Therefore, by establishing and offering formal part-time learner requirements, this is helpful for task management, while at the same time offering a better learning platform with transparent experiences (Y.-T. Sung et al., 2016).

2.5.2 Effectiveness

The effectiveness of m-Learning is presented in this section which helps formal part-time learners to learn optimally. This flexibility may help the formal part-time learner to address and overcome learning barriers by allowing them to use m-Learning at anytime and anywhere consistently. Likewise, having the advantage of owning a mobile device, formal part-time learners can acquire or gain a good understanding of mobile technology, which means that they are accessible and contactable 24/7 and able to respond promptly (Reychav et al., 2016). Mobile technology also provides broader access (no geographic boundaries), is cheaper, easy to use, and has excellent data processing capabilities. As demonstrated by (Chauhan, 2016), in his analysis, technology has a moderate effect on learning effectiveness. This is because it has become the quickest tool to change the way humans think and act (So, 2016). Despite this, though, the content and delivery processes should be appropriately reviewed to avoid any mismatch with learners (Shorfuzzaman & Alhussein, 2016).

Furthermore, it provides them with options and alternatives that can influence society, communities and as humans by providing knowledge and engaging information (Pilar et al., 2013). Therefore, this suggests that m-Learning can outperform other platforms as a flexible tool, given it is fast and informative. Also, effective use of this technology as a tool suit learning by attracting active participation from learners.

Regarding this degree of flexibility, it surpasses the application of e-learning in terms of its economic viability, convenience, and ability to achieve the practice of life-long learning (Berg et al., 2015; Samaroo et al., 2013). As such, these opportunities, in combination, build a good rapport. In achieving meaningful learning effectiveness, prior studies have articulated that by integrating technology and pedagogy, it becomes a potent learning tool, also, by offering good, if not reasonable interaction time, the gaps between

educators and learners can be reduced (Molnár, 2015) and hence lead to higher learning effectiveness.

However, empirical studies on m-Learning in formal part-time learner settings are limited and non-transformatory in nature because technology has predominantly dominated the learning approach (Pimmer et al., 2016). This is because many attributes influence the effectiveness of the learning experience. For example, (Chauhan, 2016) outlines some of the perspectives on effectiveness that include the domain subject, application types, intervention duration, and learning environment.

2.5.3 m-Learning as a Tool

Recent studies establish m-Learning as one of the proposed tools that can be employed in this domain (Al-Emran et al., 2016) since it offers flexibility in use and is proven to have the ability to improve learner efficiency. However, if learners fail to explore its uniqueness, this will invariably result in failure to achieve the objective, and thus increasing the dropout rate in HEIs. Tools that can be used for m-Learning purposes include smartphones, personal digital assistants (PDAs), mobile phones, tablets and the internet (for universal connection).

Notwithstanding, m-Learning tools are used to mediate the learning goals of the learner by providing specific software tools that can be used to develop software applications. The opportunity of accessing learning tools at any time and from anywhere has increased significantly over the years. In addition, m-Learning tools help in gaining the confidence of learners by designing applications that are both effective and easy to use. By implementing m-Learning tools during the learning process, this could contribute to improving the academic performance of learners as well (Altomonte et al., 2016).

Since m-Learning can be utilised on any mobile device, computer and digital literacy are needed to avoid learning barriers (Chauhan, 2016; Muresan, 2014) otherwise, it is difficult to achieve the desired learning outcomes intended because the benefits of m-Learning are compromised. Conversely, if formal part-time learners fail to master m-Learning tools and functions, the teacher or lecturer may have good reason to worry about the bewilderment of learners to take advantage of m-Learning (Frohberg et al., 2009). Therefore, it is important to ensure that the layout of interactive tools is intuitive and engaging. This will help to facilitate the take-up of formal part-time learners in adopting m-Learning, and attract a large user-base that can increase knowledge sharing, peer-learning, and collaboration (Altomonte et al., 2016).

2.6 Theoretical Foundation of m-Learning

This section presents a comparison of theoretical foundation theories from previous studies. The purpose of this comparison is to identify the most suitable theory to stimulate and guide further development of the m-Learning model.

Understanding the function and intent of the theory is significant in formulating and explaining specific behavioural contexts (Venkatesh et al., 2003). Although mobile technology had quickly evolved over the last few years, understanding the attributes that lead to the adoption of m-Learning by formal part-time learners limited (Viberg et al., 2021). Therefore, identifying theories can help in offering a general explanation of the m-Learning phenomena by describing, explaining, and predicting related behaviour is important.

Table 2.7 presents papers that incorporate certain keywords, in which impact and pedagogy received the most attention. As a result of this finding, an extensive review of

formal part-time learner experiences is recommended, the aim is to prove (using distinct approaches) that since the application of m-Learning, formal part-time learner experiences have improved.

Table 2.7: Frequency of areas of research focus for m-Learning from 2013-2016

Area of Research Focus	Sources	Frequency
Impact	(Chauhan, 2016; Navarro et al., 2016; Rahimi et al., 2014; Stanton & Ophoff, 2013; Y.-T. Sung et al., 2016; Zydney & Warner, 2016)	6
Constructivism	(Ehrlick, 2014)	1
Pedagogy	(Castillo et al., 2013; Khaddage et al., 2016; Peng et al., 2009; Pilar et al., 2013; Wang et al., 2014b)	5
Technical	(Moldovan et al., 2014; Nawi et al., 2014)	2
Instructional Design	(Pimmer et al., 2016)	1

Zydney and Warner (2016) proposed that instructional principles and features during m-Learning presentations should be considered when integrating the theory along with practice. Poletti (2015) mentioned that it is important to identify critical success attributes to achieve learning objectives, and how effectively these can be used in meeting learning needs. This is because some studies less focused on formal part-time learner behaviour prefer to discuss the attributes other than adult learner principles, such as altruism and social capital (Diep et al., 2016), subjective norms (Yang & Su, 2017) reactions to emerging technologies, understanding and competency (Susilo, 2014), social and individual antecedents (Mohammadi, 2015), and altruism, perceived learning benefits, and online participation (Diep et al., 2016).

Gaining m-Learning acceptance in the presence of formal part-time learners, first, the principle of adult learning must be considered. This principle reveals the main element of formal part-time learner behaviour regarding intentions and activities, with one goal; to propose a better learning experience.

Figure 2.1 below displays the theoretical foundation theory that is often cited by researchers based on aspects of pedagogy. For example, Khaddage et al., (2016) mentioned that pedagogy skills are important requirements in m-Learning technology. On the other hand, So (2016) stated that the use of pedagogy skills helps to enhance learner performance. It has been stated that integrating technology and pedagogy becomes a powerful mechanism for improving learning processes (Chauhan, 2016). Therefore, this constitutes an essential step in connecting learning to techniques and practices that can be applied and utilised, making learning meaningful.

The next most proven theoretical foundation is the 'Unified Theory of Acceptance and Use of Technology' (UTAUT) which was initially developed measure user intentions in using information technology (IT) (Venkatesh et al., 2003). According to Karimi (2016b), it is important to underscore the adoption of m-Learning that accounts for learner behaviour. This statement was also supported by Diep et al., (2016) in determining the ability of learners to accept the use of m-Learning, and is based on understanding formal part-time learner rationale for m-Learning participation and discovering their unique behaviour. Consequently, it is considered that UTAUT ought to be used in presenting the acceptance of m-Learning, and as a guideline for evaluating the level of acceptance of m-Learning among formal part-time learners.

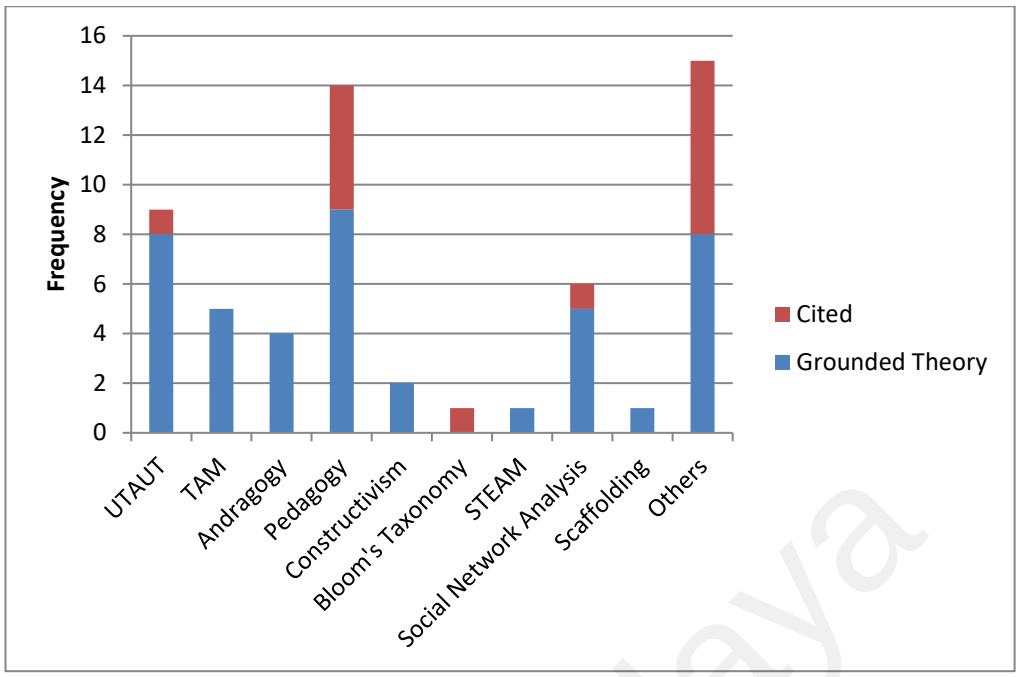

Figure 2.1: The theoretical foundation of m-Learning studies from 2013-2015

Some theories have also been used in a limited capacity in the literature to devise the design of mobile applications (included in the "others" column of Figure 1). For example, Yang and Su, (2017) employed the Theory of Planned Behaviour (TPB) and the Theory Acceptance Model (TAM) to study individual behaviour when using IT products. However, these theories were given less focus by researchers as they are combined and evaluated during the development of UTAUT.

Table 2.8 shows previous studies into the evaluation of models for the acceptance of mobile technology and its use in multiple environments. The 'purpose' column shows the activity that was focused on in the study, while the 'factor' column lists the reasons why those researchers used a particular model in their research to examine the usage of mobile technology.

This table reveals that even though UTAUT was established in 2003, it is still relevant for measuring the behavioural intention of users, where many studies showed that there

was a significant relationship between the four attributes (PE, EE, SI, FC) in different contexts of mobile technology. It was able to explain a variance of up to 80% in the intention of mobile technology users to use this technology. Some mobile technology acceptance models have been studied and the findings are summarized in Table 2.8.

Table 2.8: Mobile Technology Acceptance Models

Purpose	Model	Factor	Sample	Result	Source
Mobile payment	UTAUT	Provide better understanding of the variance in the Behavioural Intention to use mobile technology	436 m-payment users	PE, SI, EE indicated as the best predictors of m-payment user's intention	(Al-Saedi et al., 2020)
Internet Banking	UTAUT	Previous studies showed all 4 attributes had a significant influence on the user's intention to adopt technology	Customers of commercial banks in Pakistan	PE, EE, SI and FC conditions explained R^2 of 80.2% variance in Internet user's intention to adopt Internet banking	(Rahi et al., 2019)
Mobile Learning	Technology Readiness Index (TRI)	To investigate mobile learning readiness	68 undergraduates undertaking English language course in the university	Significant positive correlation between positive constructs (optimism and innovativeness)	(Madhumathi & Ganapathy, 2015)
Mobile Learning	UTAUT2	Its superiority over existing frameworks	358 accounting students of public universities in Malaysia	PE, EE, FC showed non-support of results toward BI	(Moorthy, Yee, Ting, & Kumaran, 2019)
Mobile Health	UTAUT	Derived by comprehensive examination of various models and can explain as much as 70% of the variance in intention	300 participants aged 60 years and above from the capital city of Bangladesh	PE, EE, SI had a significant impact on user behaviour	(Hoque & Sorwar, 2017)
Mobile Learning	UTAUT	Can be used to identify factors that influence the acceptance	150 higher education institutions	All 4 attributes showed a positive relationship	(Zainol, Yahaya, Yahaya, & Zain, 2017)
Mobile Learning	TAM	Limited explanatory power in studying the acceptance of different technologies	416 Information Technology undergraduate students in Universiti Malaysia, Pahang	Knowledge acquisition, application, and protection had a positive impact on the perceived ease of use and usefulness	(Al-Emran et al., 2020)

Therefore, from the result of this comparison, it is suggested to integrate UTAUT with andragogy for further study, as a means of examining learners from this perspective rather from the perspective of a pedagogy that focuses on teacher-directed instructions. Also, since andragogy refers to formal part-time learners, it offers further insight into learning experiences and opportunities in future (Hashim et al., 2015).

2.6.1 m-Learning Acceptance Measurement

This section presents the various definitions of 'acceptance' and theoretical framework. Most of the findings from previous literature suggest a positive relationship between intention to use and actual use. Venkatesh et al.'s (2003) defined acceptance as accepting and using technology to improve productivity. Since the use and application of technology have increased significantly over the years, explaining user acceptance needs to be well understood to facilitate optimisation.

Two theories of acceptance that are frequently used are TAM and UTAUT. The TAM is considered an acceptance theory that promotes usefulness and ease of use as important determinants of acceptance. Here, usefulness refers to the perception of individuals that technology forms part of their well-being, and helping them to achieve optimum job performance (Chiu et al., 2016), whereas, ease of use enables learners to use technology effortlessly (So, 2016). The UTAUT is a combination of eight prominent models that emphasise technology adoption namely, the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975), The Technology Acceptance Model (TAM) (Davis, 1989), the Theory of Planned Behaviour (TPB) (Ajzen, 2011), the combined TAM and TPB (C-AM-TPB) (Taylor & Todd, 1995), the Motivational Model (MM) (Davis et al., 1992), the Model of PC Utilisation (MPCU) (Thompson et al., 1994), the Innovation Diffusion Theory (IDT) (Rogers, 1995) and the Social Cognitive Theory (SCT) (Bandura, 1989). Devised with

four core determinants and four moderators, the UTAUT has surpassed the eight individual models in investigating m-Learning user behavioural patterns.

The UTAUT is more accustomed to (and confident in) the coordination of group work that leads to the acceptance of m-Learning (Diep et al., 2016). From the perception of adult learners, the UTAUT is preferable, given its flexibility in extending the acceptance theory. These attributes must also be comprehensively reviewed, as they are important constructs for explaining the acceptance of mobile learning (Shin & Kang, 2015).

2.6.2 Unified Theory of Acceptance and Use of Technology (UTAUT)

This section evaluates the theoretical framework developed to describe, predict, and understand the current phenomena surrounding m-Learning acceptance. The Theory of Acceptance in this research is signified as the UTAUT model.

Recent studies have presented a favourable result regarding learner's acceptance and the use of mobile technology (Cheung et al., 2011), where learners agreed that mobile technology had helped them in their learning. These findings resulted from testing against various attributes to reflect the influence of technology usage (Abatan & Maharaj, 2015). Since acceptance can be perceived as an individual act based on perceptions, it is important to identify formal part-time learners' perceptions that influence their behaviour in order for the benefits afforded through using such tools can be utilised by others (Howard et al., 2017). In this respect, UTAUT has become one of the most widely adopted models for investigating the acceptance of technology and explaining the various attributes that influence user acceptance. Initially developed by Venkatesh et al.'s (2003), the model explains the extent of behavioural intention in using proposed technologies by assessing learners' technology acceptance and their ability to use the technology.

Furthermore, to assess the level of acceptance, various models have been integrated to examine learner acceptance and the intention to adopt new technology (Karimi, 2016b). Additionally, four main attributes have been shown to be direct determinants of behavioural intention which include performance expectancy (PE), effort expectancy (EE), and social influence (SI), while facilitating conditions (FC) is a direct determinant the behaviour to use technology. Some studies suggest that this model may not support the intention to use m-Learning due to many other factors, and should, therefore, be tested by modifying or extending to include other relevant determinants (Karimi, 2016b).

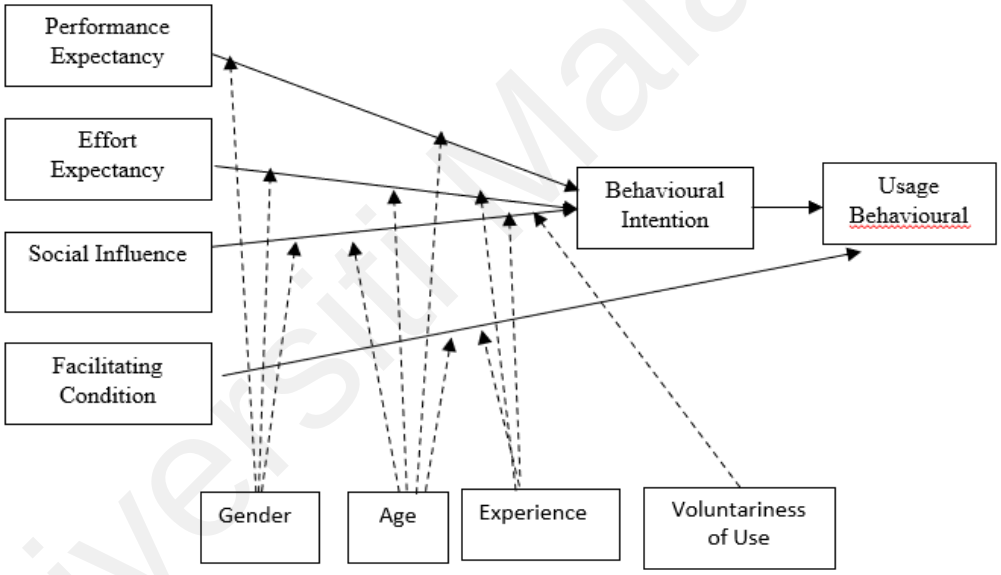

Figure 2.2: The UTAUT Model

The four main attributes mentioned above and illustrated in the figure, are noted as independent variables that positively influence the dependent attributes, namely, behavioural intention and usage behaviour (in other words, the behaviour or intention to use). Moreover, four moderators: gender, age, experience, and volunteers of use indirectly influence the dependent variables via the four main attributes, while behavioural intention is seen as a critical mediator of technology use (Venkatesh et al., 2003).

According to Khosravi et al. (2016), different technologies and context require different possibilities and the way or method of engagement. Knowles (1973), proposed four principles in representing adult learner behaviour that includes self-directed (SD), prior experience (PrEx), learning readiness (LR) and orientation to learn (OL) in addition to representing the andragogy theory that models adult learner's learning behaviour. Therefore, these principles can be integrated and adjusted with the acceptance model and tested in determining their learning preferences.

2.7 Taxonomy of Mobile Learning

This section presents the taxonomy of m-Learning, including the features, and evaluation that focuses on the critical elements is based on certain directions for this research. Figure 2.2 below illustrates the structure and classification of m-Learning based on the taxonomy. As a first step in the design of the theoretical framework, the taxonomy of the parts of m-Learning in an adult learning environment was defined based on the identified keywords. This taxonomy formed the foundation of the m-Learning acceptance framework, that would include the relevant formal part-time learner's characteristics (Silverman, 2013).

To come up with this taxonomy, 200 keywords from recent articles on the emergence of m-Learning were collected and listed. The data sources included papers published in major journals and conferences. The electronic database sources used in this study included those that were relevant to the aims of this research. For this study, a search was conducted of the following digital libraries: IEEE, ACM, Springer Link, Science Direct, Taylor and Francis, and Wiley Interscience. Then, five classifications (Behavioural Intention, Technological Support, Educational Content, Learner Coordination, and Instructional Design) were created based on these 200 keywords, which represented the

same meaning and features that were discussed in the articles. The six categories of m-Learning parts were classified into five categories as follows:

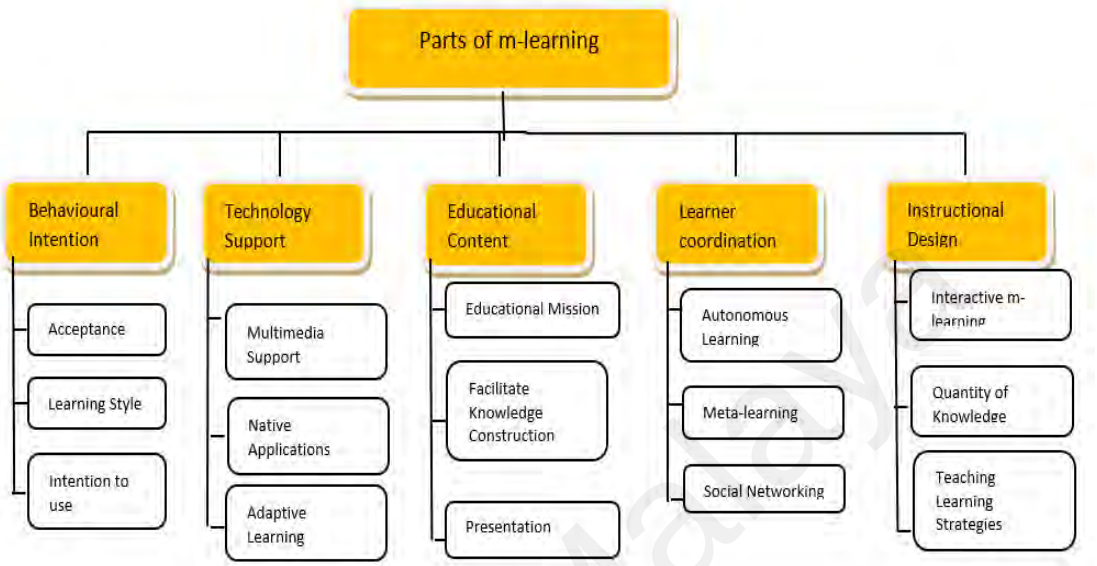

Figure 2.3 Thematic taxonomy of m-Learning

In reference to Figure 2.2, the *Behavioural intention* parameter reflects the formal part-time learner's plan to use m-Learning based on certain behaviours, namely, acceptance, learning style, and intention to use (Al-Emran et al., 2016; Bogart & Wichadee, 2015; Chiu et al., 2016; Dromantiene & Zemaitaityte, 2014; Kabakçi Yurdakul et al., 2014; Milošević et al., 2015; Ouedraogo, 2017; Reychav et al., 2016; Shin & Kang, 2015; Susilo, 2014). *Technology support* signifies the scope of mobile device services in which m-Learning operates and functions, including multimedia support, native applications, and adaptive learning (Antonczak et al., 2016; Bacca et al., 2015; Lo et al., 2016). *Educational content* signifies the availability of the educational material that allows for the gathering and exploration of data by learners (Kakouris, 2015; J. Lu et al., 2015; Navarro et al., 2016; Viberg et al., 2021; Yang & Su, 2017). *Learner coordination* determines the approach in organising different elements of the learning materials to

make them useful, including autonomous learning, meta-learning, and the social environment dimensions (Boticki et al., 2013; Diep et al., 2016; Stanton & Ophoff, 2013). Lastly, *Instructional Design* explains how to prepare a meaningful learning environment by involving interactive m-Learning, managing the volume of knowledge to be delivered, and applying teaching and learning strategies (Reed et al., 2014; Y.-T. Sung et al., 2016).

2.7.1 Behavioural Intention

Behavioural intention reflects the possibilities of using m-Learning based on certain behaviour, whereas acceptance can be defined as exploring user behavioural patterns at the adoption stage, and the continual use of technology (Navarro et al., 2016). Since acceptance can be described as an individual act based on personalisation, it is important to identify learning styles to enable the benefits afforded by using the tools to be optimised, thereby reducing any form of loss and wastage.

On the other hand, intention is the individual's decision on what to use, and whether to accept m-Learning as a learning tool (Al-Emran et al., 2016). Moreover, intention can be used to measure formal part-time learner acceptance of m-Learning. Therefore, the focus placed on acceptance models is important, in order to develop and propose attributes that influence the intention to use m-Learning in line with its innovativeness, and the needs of m-Learners (Ma et al., 2016), unless the operation and execution of effective m-Learning are disrupted, effective implementation cannot be achieved (Howard et al., 2017).

Figure 2.3 below illustrates the extent of m-Learning of formal part-time learners. In the first column, learning behaviour refers to the effort and persistence of formal part-time learners in carrying out their learning activities, categorised as SD, PrEx, LR, and

orientation to learning. The definition column expands on each aspect, while the features column indicates the characteristics of behaviour. The activities column proposes tasks that may be carried out according to adult learner behaviour.

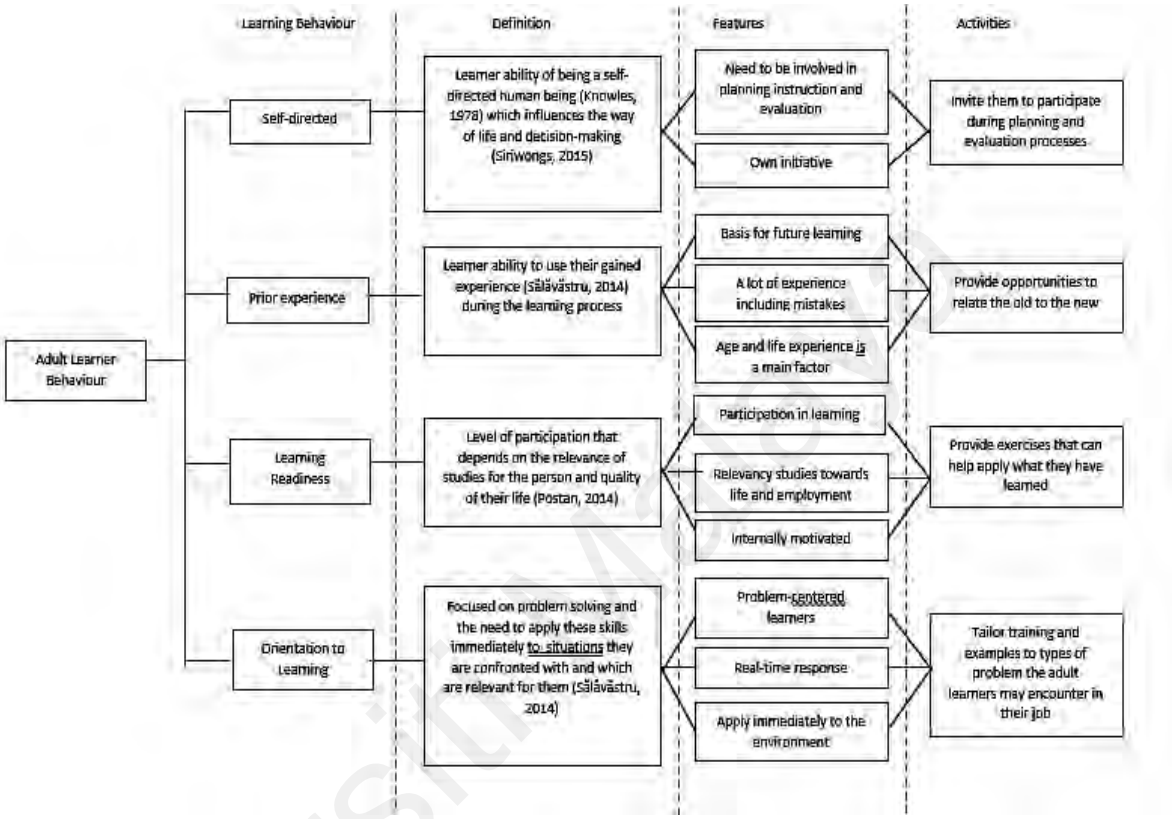

Figure 2.4: m-Learning by formal part-time learners

Therefore, it is important, if not necessary, to understand the needs of participants to ensure the system is capable of efficiently obtaining knowledge (Molnár, 2015). By understanding the patterns of usage, it may help to identify which activities are suitable for integration during the learning process.

2.7.2 Technology Support

Modern infrastructure using cloud-based mobile technologies has made a significant contribution to the rapid growth of m-Learning applications. As such, weaknesses in the classroom environment (i.e., classroom sessions) can be addressed in satisfying the requirements of formal part-time learners (Mohammadi, 2015), and helping learners to understand information through interactive media and production.

This interactive production assists in delivering various multimedia formats reflecting high-quality, quick, and cost-effective presentations via multiple sources, discussion, and collaboration (Hegyesi et al., 2014). Importantly, the association between words and pictures can increase one's memory in learning since audio-visual material is easier to retain. This is because people learn more by using all of their senses. However, Al-Ali et al., (2016) mentioned that there is a challenge in maintaining a balance between the entertainment aspect of learning and the educational content of learning information. Navarro et al., (2016) suggest that the optimum length for multimedia presentations should be between two and five minutes given audio-visual material is much easier to learn and remember.

Native applications are software applications that are stored inside mobile devices and are system-specific. For example, any form of social media is supported by having its own application, such as Facebook, according to the programme developed (Chilivumbo, 2015). More than half of the m-Learning tools constitute native applications (Navarro et al., 2016), which need to be downloaded from various online platforms and installed on the device. Some applications are free, while others need to be purchased. However, the advantages of mobile hardware, and personalisation through downloading and installing these native applications can be compromised (Castillo et al., 2013). According to these

findings, it is therefore important to revise the singular native theory that emphasises native model efficiency (Reychav et al., 2016).

Adaptive learning can be described as an exercise where mobile devices are used as a medium in the learning environment by considering human needs and can be organised and adapted to different learners having different learning backgrounds and disciplines (Liu & Huang, 2015). Particularly in the case of formal part-time learners, using adaptive learning is the best way to help manage their busy lifestyle and learning (Kopeinik et al., 2014). Also, by having the capacity to undertake many learning types and methods, it extends the learning features of the device, allowing for wider communication amongst learners.

2.7.3 Educational Content

This section presents the practices and guidance for learners, also enabling educators to design their teaching materials more effectively. Three tools are suggested to assist formal part-time learners in acquiring information in a variety of ways, such as: i) adding shortcuts to the web-browser for quicker searching, ii) accessing mail servers for collaboration and sharing of information and iii) adding contact addresses for easy access to colleagues (Agarwal et al., 2013).

Additionally, educators can assist formal part-time learners in completing their educational mission and intentions by utilising content through inquiring, integrating, constructing, and applying it to real exercises and scenarios (Reed et al., 2014). Thus, the capability for repetitive learning content is needed to maximise learning competencies (Reed et al., 2014). Likewise, facilitating knowledge construction can be managed by doing, saying, writing, presenting, and producing. However, this should be undertaken

repeatedly to obtain a clear idea of the objectives and to help with memory retention. In terms of presentation, m-Learning can be viewed as extending the structure of e-learning, using less text but accompanied by supported by certain functions such as videos, pictures, and documents during the transfer of knowledge.

Therefore, many methods in delivering content can be used, including textual, images, animation and speech. Importantly, nowadays, mobile literacy and accessibility are catered for in software applications, specifically developed to retrieve information in a short time. If this is not achieved, the content will become obsolete due to awkward input methods (Papadakis & Kalogiannakis, 2017).

2.7.4 Learner Coordination

Learner coordination refers to the centredness of formal part-time learners and for those directly involved in managing their learning experience. This approach is an ongoing process (life-long learning process) that is synchronous with adult learning (Mackintosh-Franklin, 2016). Here, formal part-time learners have the authority and the added responsibility for any accomplishments and results as a result of their actions to improve their learning ability. In line with autonomous learning, the aim is to allow learners to have full responsibility for their learning process.

Indirectly, this practice supports their aptitude or skills, which is Self-directed (SD) upon which time, constructivism develops when learners begin to explore and build their knowledge. To maintain active participation, learners must also sustain their discipline and increase skills in self-management (A. Lu et al., 2017). For instance, SD and autonomous learning become a principal concept of humanity that consummates the theory of andragogy (Muresan, 2014). *Meta-learning* refers to the consciousness of

formal part-time learners towards their learning process and the way it should be managed (Biggs, 1987; Tabuenca et al., 2015). This consciousness is closely related to how they understand their learning motives and how to control and deploy it towards the selected approach.

Nevertheless, significant relationships between personal factors, situational contexts, approaches to learning, and the quality of outcomes have significantly influenced the concept of meta-learning (Biggs, 1987). The capability of learners (in becoming the mediator) demonstrates that this correlation has resulted in their model of learning. Moreover, identifying introspective activities, which are triggered by learner reflections, could enhance the level of motivation and acquired knowledge (Tabuenca et al., 2015). As such, learners remain engaged and enthused as the activities have allowed them to express their views.

However, combining the use of mobile devices and the meta-learning platform is required to allow formal part-time learners to be actively involved in activities through the proper channels (Tabuenca et al., 2015). *Social network* refers to the interactions with peers having similar interests through using mobile devices, which has become a popular phenomenon amongst researchers because it has evolved and become an important component in m-Learning applications (Mohammadi, 2015). Further, it is capable of supporting collaborative learning to ensure any negotiations and interactions are effectively utilised, rather than merely focusing on performance. In line with a study by (Diep et al., 2016), the majority of higher degree holders are involved in many social networking groups. However, they refuse to participate in m-Learning activities, causing them to lose interest in their contribution.

2.7.5 Instructional Design

Instructional design is the practice of preparing a valuable learning experience by a professional. The learning experience is designed according to the requirements of specific knowledge acquisition, skills, and interactions using suitable learning theory. Here, the determination of learning goals and suitable activities is affected by the fast growth of the web 2.0 host, and therefore, needs to be well suited to m-Learning. The section presents a discussion on interactive m-Learning, the quality of education and teaching and learning strategy.

Interactive m-Learning provides effective communication for formal part-time learners with respect to SD and informal learning experiences (Karimi, 2016b). Here, instructional design provides the methods of ensuring formal part-time learners remain engaged (Diep et al., 2016) by using multiple options of learning styles, such as audio, visual, and any interactive means (Stanton & Ophoff, 2013). Institutions can support interactive m-Learning through diverse access to educational involvement by implementing this learning style through the aid of m-Learning technology.

Likewise, the quality of education can be evaluated by several dimensions that consist of information, systems, and services (Mohammadi, 2015). Studies have shown that lessons delivered simultaneously may lead to cognitive overload (Curum & Khedo, 2015), while the over-delivery text could distract the learning process by reducing lesson content and focus (Kometani et al., 2014). Accordingly, only related, and useful information is allowed to be employed during learning sessions. Hence, personalised content can help formal part-time learners to engage during the learning process actively with a small amount of knowledge (Typhina, 2015).

Teaching and learning strategies have also presented opportunities to formal part-time learners seeking information in various ways regarding their preferences and learning

styles. These can be used efficiently for some activities such as question and answer sessions, cooperation, game-based learning, decision-making, and problem-solving in specific learning situations (Karimi, 2016b; Y.-T. Sung et al., 2016).

2.8 m-Learning Guidelines for Higher Education Institution

Mobile technology provides learners with a variety of ways of communicating with lecturers and classmates and offers new ways of interacting with others and providing access to a wide range of information and community resources (Khosravi et al., 2016). Nowadays, society needs a practical and effective learning environment given Industrial Revolution 4.0 (IR4) which focuses heavily on interconnectivity, automation, machine learning, and real-time data sharing and where the versatility of learning is independent of its aims. Such tools may be used in and around various environmental settings, including formal and informal learning spaces, and to help satisfy this demand, either for individual use or to engage others in learning (Bernacki et al., 2019).

Accordingly, institutions have a significant responsibility to introduce m-Learning applications in the teaching and learning process, thus enabling students to access learning materials anywhere and at any time (Kumar et al., 2020). Moreover, HEIs can gain several advantages through this experience by supporting the m-Learning environment. Not only does it promote the need for of high-tech skills among learners, but is also capable of promoting the institution having a competitive distance learning environment from a global perspective, making this course or programme an ideal option for a great learning experience.

Nowadays, learners are known as digital natives, and consequently, m-Learning guidelines should be prepared to ensure the successful use of m-Learning. Previous

studies have shown limited capacity in this respect in preparing guidelines that focus on integrating m-Learning acceptance and the part played by the learners (Ramirez et al., 2018). In addition, learners often realise that they are unsure whether they possess the skills needed to learn during complex situations and tasks (Bernacki et al., 2019). However, m-Learning can address these problems since it offers numerous features, solutions, and experiences. Researchers should also analyse mobile technology in proposing more precise conclusions, considering the unique contextual and individual characteristics of the learner (Khosravi et al., 2016).

According to Nosseir and Fathy (2020), the use of m-Learning by higher institution learners remains limited, and therefore, institutions need to search for strategies to increase its usage, thereby ensuring successful learning activities through m-Learning. Some of these features that track behavioural elements having little impact on the learning process are the use of mobile devices as the instruments of m-Learning. The processing of multi-channel learning event data will allow researchers to collect information that refines the premises surrounding the psychological learning theory (Bernacki et al., 2019). Also, the use of andragogy theory should be considered, enabling HEIs to facilitate a successful m-Learning experience that satisfies the needs of learners.

Notably, the andragogical viewpoint would be established as an adult learning theory that supports the m-Learning guideline and method for higher institution learners. Hence, it is crucial to consider the acceptance of m-Learning and the theory of adult learners, given the study is centred on the higher institution group. By recognising this fact, it will further remove mistakes or oversights and instead, concentrate on the learners' key measures of m-Learning acceptance (Kumar et al., 2020).

2.9 Summary

In this chapter, formal part-time learners and m-Learning issues were discussed in detail. This chapter discusses on the acceptance of m-Learning among formal part-time learners can be viewed as a branch of behavioural intention to accept m-Learning. The literature review examined state-of-the-art m-Learning practices, in which a thematic taxonomy of m-Learning was developed. A continuing issue for many scholars of information systems is identifying the attributes that influence the acceptance of m-Learning among formal part-time learners. Previous studies have indicated that the UTAUT provides a better understanding of the variance in the behavioural intention towards the use of m-Learning. In turn, there is a lack of consideration with regard to the aspect of adult learners as well as the attributes of formal part-time learners in HEIs in Malaysia in defining acceptance as a part of m-Learning. The comparative analysis is undertaken of state-of-the-art m-Learning solutions, including the use of m-Learning, in light of the proposed thematic taxonomy. Research issues and the challenges in the field of m-Learning are highlighted, surrounding the attributes that influence formal part-time learners in order to gain acceptance of m-Learning via empirical analysis.

As a result, this literature review focused on the intention attributes of formal part-time learners of m-Learning in the Malaysian context. By identifying the attributes, m-Learning practitioners may be provided with some insights into how to help HEI learners become absolutely literate by incorporating adult learning principles into the m-Learning environment.

CHAPTER 3: M-LEARNING ACCEPTANCE FRAMEWORK AMONG FORMAL PART-TIME LEARNERS

This chapter presents the proposed acceptance framework known as the m-Learning Acceptance Framework for Formal Part-time Learners. The adoption of this framework signifies the acceptance of m-Learning based on several theories and the model of Acceptance and Principles of Adult Learning. The attributes of the acceptance model are presented, namely, performance expectancy, effort expectancy, social influence, facilitating condition, behavioural intention to use m-Learning, and m-Learning usage behaviour, self-direction, prior experience, learning readiness and orientation to learning. The proposed framework and its hypotheses are also discussed in this chapter. The overview of the m-Learning acceptance framework provides a general idea about the framework with the underpinning adult learning principles derived from adult learning theories. The components and integration of the m-Learning acceptance framework for formal part-time learners are explained in detail.

3.1 Integration of the Components

This section describes the components and their respective function and how these components related to each other with respect to m-Learning. Later discussed in this chapter will be the function of these components in the proposed framework, followed by assessing the relationships between the components in order to meet the objectives of this study.

3.1.1 Assessment of the Research Hypotheses for the Attributes of m-Learning Acceptance

Research hypotheses form the foundation in this study to determine the relationship between the acceptance of m-Learning among formal part-time learners in answering research questions three and four, as stated in Chapter 1. Thirteen hypotheses were constructed in explaining m-Learning acceptance through its particular relationship and whether it influences m-Learning acceptance. The development of hypotheses was referred to the theories and literature analysis. Therefore, the hypotheses are listed as below:

H1: Self-directed has a positive influence on performance expectancy

H2: Self-directed has a positive influence on effort expectancy

H3: Prior experience has a positive influence on performance expectancy

H4: Learning readiness has a positive influence on performance expectancy

H5: Orientation to learning has a positive influence on performance expectancy

H6: Self-directed has a positive influence on behavioural intention

H7: Prior experience has a positive influence on behavioural intention

H8: Learning readiness has a positive influence on behavioural intention

H9: Performance expectancy has a positive influence on behavioural intention

H10: Effort expectancy has a positive influence on behavioural intention

H11: Social influence has a positive influence on behavioural intention

H12: Facilitating Condition has a positive influence on behavioural intention

H13: Behavioural Intention has a positive influence on Usage Behaviour

In this section, the results of testing the hypotheses are presented. All hypotheses were developed with reference to the literature review undertaken in Chapter 2 and the theory. The research hypotheses for analysis and structural measurement are presented next:

H1: Self-directed has a positive influence on performance expectancy

As mentioned in this study, m-Learning is a tool that encourages formal part-time learners to accomplish their tasks and improve their academic and personal performance at work or in life (Karimi, 2016; Siriwongs, 2015; Fisher, King, & Tague, 2001). Various resources are available nowadays to help in learning that influences a person's way of life and decision-making processes, which underlines the role of SD learning (Siriwongs, 2015). Even though adults have the freedom to manage their own time and studies, the assistance of educators remains relevant (Siriwongs, 2015) in assisting learners to gain the benefits in their job performance and studies. Therefore, m-Learning as a tool will help to keep learners' active and encourage them to participate in further studies, understand a wider range of materials, and experience instructional elements during learning sessions (Reed et al., 2014).

H2: Self-directed has a positive influence on effort expectancy

Formal part-time learners can be involved in any learning activity and evaluate their performance (Hagen & Park, 2016). This is described as positioning their beliefs towards EE when learners feel comfortable in applying m-Learning technology to assist them in peer-collaborative purposes. It is a resource for identifying and planning their needs, as well as to give and receive help from their peers. As adults shift from a self-concept to one of SD, their learning style is determined using m-Learning since the learning process is easier to manage (Hegyesi et al., 2014).

H3: Prior experience has a positive influence on performance expectancy

Experience is one of the main attributes that integrate technology with teaching and learning by creating an opportunity for self-reflection (Susilo, 2014; Hagen & Park, 2016). In this context, prior experiences are described as formal part-time learners' beliefs towards PE when their experiences form the basis for future learning (Shorfuzzaman & Alhussein, 2016; Yang & Su, 2017). Moreover, learners' find new technology useful and, in many respects, improves their performance, enabling them to solve problems or real-life situations. Therefore, through m-Learning, learners and lecturers can share their different views and work together to achieve results by assimilating both views.

H4: Learning readiness has a positive influence on performance expectancy

Learning readiness (LR) has a positive impact on PE in determining formal part-time learners' readiness to adopt m-Learning (Shorfuzzaman & Alhussein, 2016). It can be described as their beliefs toward PE when their readiness is progressively orientated towards the development processes of social roles. Thus, m-Learning that is supportive allows learners to have opinions, overcome obstacles, make choices, and utilise previous knowledge in decision-making or achieve goals (Venkatesh et al., 2003). Accordingly, the examination of formal part-time learners' readiness is important to enhance their overall performance (Shorfuzzaman & Alhussein, 2016).

H5: Orientation to learning has a positive influence on performance expectancy

Learning abilities are continuously developed according to one's orientation of learning, since it may motivate them with having a problem-centred outlook and help in

seeking solutions. Formal part-time learners prefer an active learning landscape in which m-Learning provides a suitable platform, which can take the shape of a problem to be solved or questions or a paradox requiring a solution (Sălăvăstru, 2014). In this context, formal part-time learners believe learning is positioned progressively towards their social role and developmental processes, where they learn to perform tasks or enhance their situation to the extent of looking for performance-centred OL (Knowles, 1980).

H6: Self-directed has a positive influence on behavioural intention

Self-directed (SD) is described as the beliefs towards BI when m-Learning facilitates SD and formal learning activities. Since learners use m-Learning as their virtual learning platform and to access online information, it helps them to complete their tasks (Karimi, 2016b). Moreover, the technology allows them to explore their learning modules from any level, achieved at their own pace and convenience (Noor et al., 2014).

H7: Prior experience has a positive influence on behavioural intention

For adult learners, experiences become the basis for connecting past resources with current knowledge. As a digital native, m-Learning can be used as a platform to express ideas and sharing, especially when mobile devices are used which enhances the BI of learners in utilising m-Learning which results in positive experiences (Yang & Su, 2017). This approach enables adult learners to view the potential advantages of using m-Learning in terms of compatibility and effective usage (Chiu et al., 2016).

H8: Learning readiness has a positive influence on behavioural intention

Shorfuzzaman and Alhussein (2016) stated that the main factor influencing learner's readiness is the extent to which m-Learning is easy to use or otherwise. Andragogy's education goal is to allow freedom for learners to identify their needs and interest. Therefore, one must identify whether formal part-time learners' readiness is significantly contributing to m-Learning utilisation (Hagen & Park, 2016; A. Lu et al., 2017).

H9: Performance expectancy has a positive influence on behavioural intention

The majority of previous studies and findings have shown a strong relationship between PE and BI (Diep et al., 2016; Lawrence, 2016; Shorfuzzaman & Alhussein, 2016; Venkatesh et al., 2003). Therefore, the application of PE in the context of m-Learning will promote a positive atmosphere due to ready access and convenience (Milošević et al., 2015). The mission is to create an iteration exercise by using m-Learning by considering the requirements of a practical and informational society. However, previous studies have also shown that there is limited research in the scope of formal part-time learners compared to online member engagement in the setting of virtual, higher education or professional landscapes for interpretation purposes (Diep et al., 2016; Howard et al., 2017).

H10: Effort expectancy has a positive influence on behavioural intention

Effort expectancy (EE) has been shown to be a valid predictor of BI in many studies (Liu & Huang, 2015; So, 2015; Chaka & Govender, 2017; Howard, Restrepo, & Chang, 2017). However, this result contrasts with other studies (Karimi, 2016b; Milošević et al., 2015; Ouedraogo, 2017). Regardless, learners perceive the need to exert extra effort in mastering their m-Learning skills and showcase their growth. Since EE results in a significant effort for learners in their participation, and combined tasks as compensation, it is anticipated as one of the main determinants for BI in adopting m-Learning as a learning tool.

H11: Social influence has a positive influence on behavioural intention

Positive opinions and feedback are influenced by effective communication and the use and delivery of m-Learning, thereby influencing the rate of intention to use m-Learning. This particular social factor becomes the focal internalisation and reference for a group and individuals and is considered by many to be beneficial (Venkatesh, Morris, Davis, & Davis, 2003). Venkatesh (2003), revealed that SI directly impacts BI on which learning present in the m-Learning environment is dependent on. As it positively affects BI, it appears to be an important attribute for learners' behavioural intent to adopt m-Learning.

H12: Facilitating Condition has a positive influence on behavioural intention

Many of the findings from previous studies have indicated that facilitating conditions (FC) positively influence usage intention (Ma, Chan, & Chen, 2016; Lawrence, 2016; Liu & Huang, 2015). However, this contradicts Shorfuzzaman and Alhussein's (2016)

findings, whereby facilitating conditions are found not to exhibit any considerable influence towards intention. Therefore, this attribute is recommended given its influence towards BI as being more subjective on formal part-time learners' participation when considering m-Learning design activities.

H13: Behavioural Intention has a positive influence on Usage Behaviour

Intention predicts the actual usage of m-Learning (Mohammadi, 2015). Most studies have shown BI to have a positive influence towards the use of technology (Hashim et al., 2015; Radovan & Kristl, 2017; Venkatesh et al., 2003). Moreover, in the context of m-Learning, behaviour is highlighted as a key element influencing m-Learning implementation by learners (Mohammadi, 2015). This is due to behaviour at the forefront of one's intention to accept before making further decisions about whether to use it or not.

3.1.2 Assessment of Research Hypotheses for Mediator Variables

The validity of the research hypotheses for the variables in this section was used in measuring the mediator(s) that may come in conflict by two interrelated variables. The mediator variable explains the complete intervention between independent variables and dependent variables. Twelve mediator hypotheses for analysis and structural measurement are presented in this section:

Ha_1: Self-directed -> Performance Expectancy -> Behavioural Intention

The ability of formal part-time learners to direct their own learning is an important aspect of m-Learning (Karimi, 2016). This is due to formal part-time learner's characteristics when formal part-time learners tend to draw the canvas of their own learning environment to keep them comfortable. Lawrence (2016), adopted PE in measuring SD learning, which showed the significant value of SD attributes. Whereas, Karimi (2016) revealed that SD learning activities could be supported by identifying self-requirements, believing that the use of m-Learning may support and influence SD learning activities. Thus, the intention to accept and use m-Learning can be increased. This is because applying m-Learning as a learning tool can encourage formal part-time learners to learn new aspects in designing and constructing their learning environment (Siriwongs, 2015). Therefore, resulting in reducing many of the obstacles in the learning experience by allowing more SD learning approaches and increasing the beliefs of formal part-time learners to use m-Learning.

Ha_2: Self-directed -> Effort Expectancy -> Behavioural Intention

Effort expectancy (EE) is when learners believe the ease in using m-Learning can help formal part-time learners to learn better. Mobile devices have become quite popular nowadays in managing many aspects of human life, including learning. Thus, m-Learning can facilitate SD learning since it embraces a considerable amount of learning (Karimi, 2016). Indeed, in SD learning, formal part-time learners become increasingly proactive and independent of the learning structure (Kilicay-Ergin & Laplante, 2013). To ensure the compatibility of m-Learning facilitates SD learning activities, Diep et al., (2016) suggest for a latter type, mobile interaction is an important aspect of SD learning activities

in addition to allowing for learning accordingly to the style and pace of formal part-time learning.

$Hb_{1:}$ Prior Experience -> Performance Expectancy -> Behavioural Intention

In the current research, the role of PE as a mediator between prior experience and BI is depicted as shown above. According to Venkatesh et al. (2003), past experiences are potential adopters regarding certain attributes in determining consistency and are also considered to increase the compatibility values on perceived m-Learning acceptance and usage. This is because learners who have prior experience with m-Learning functions and activities may take less time and become more satisfied in completing a task (Brown et al., 2010). Compared to learners with fewer skills in managing m-Learning to meet certain performance targets, they will encounter operational problems as well as delays in time and performance (Chiu et al., 2016). Therefore, to overcome this operational issue, PE will help to increase the learner's intention when formal part-time learners feel determined to complete the task, in feeling satisfied using prior experiences associated with m-Learning.

$Hc_{1:}$ Learning Readiness -> Performance Expectancy -> Behavioural Intention

Performance Expectancy (PE) mediates the learning readiness with behavioural intention when formal part-time learners believe that m-Learning can help them achieve their learning activities, thus supporting readiness to learn. However, it is important to understand how learning readiness may impact formal part-time learners to learn by using m-Learning (Hagen & Park, 2016). At the same time, it may also impact the ability of

learners to maintain a certain pace in learning activities (Fisher & Tague, 2001). As such PE attributes need to be applied as a mediator because it can be used to determine the efficacy of m-Learning technology thereby affecting learning readiness (Shorfuzzaman & Alhussein, 2016). Since the availability of mobile devices does not guarantee their effectiveness to help in the learning process, learning readiness for m-Learning must first be assessed with respect to mobile devices (Cheon et al., 2012).

$Hd_{1:}$ Orientation to Learning -> Performance Expectancy -> Behavioural Intention

Performance expectancy (PE) is a mediator to influence the use of m-Learning and will help formal part-time learners to complete the orientation to the learning attribute. With their belief towards m-Learning, formal part-time learners begin to learn how to perform certain tasks, solve problems or improve their personal life, as performance-centred OL (Knowles, 1980). As such, the process of supporting formal part-time learner's presents a different orientation to learning and impacts on the learning outcome. Here, OL becomes a primary determinant for formal part-time learners to learn professionally, and their belief in m-Learning, thereby helping to achieve OL tasks through increased influence and BI towards m-Learning. Orientation to learning also contributes to facilitating formal part-time learners in decision-making activities (Opfer et al., 2011). Therefore, PE will lead to the orientation to learn by producing a more positive result to use m-Learning (Cárdenas-Robledo & Peña-Ayala, 2018).

Ha_3: Self-directed -> Behavioural Intention -> Usage Behaviour

Formal part-time learners who have the intention to use m-Learning will increase the influence of the SD attribute to continue using m-Learning. Here, formal part-time learners use mobile devices for self-paced learning through SD learning (Y.-T. Sung et al., 2016). Since having less time in managing their studies, formal part-time learners prefer a SD learning environment and tend to find more learning opportunities through positive interaction with their peers (Diep et al., 2016). Having a certain level of intention may also enable formal part-time learners to be more engaged with their study, particularly in adopting m-Learning as their method of learning. This is mainly due to the m-Learning environment and concept which promotes SD learning practices as well as allowing more time to think and reflect (Karimi, 2016). Therefore, it is recommended to extend the research of individual attributes that rely on SD learning.

Hb_2: Prior Experience -> Behavioural Intention -> Usage Behaviour

This mediator relationship depicts the roles related to BI to increase the prior experience factor to influence formal part-time learners in using m-Learning. Literacy surrounding mobile devices will often vary among formal part-time learners, some having experience while others have little to no experience of the functions associated with these devices (Strandell-Laine et al., 2015). Even though formal part-time learners in this study owned mobile devices, some neglected to explore many of the other functions for the purpose of learning. Instead, they frequently used mobile devices for communication and to search the internet rather than to explore other benefits.

Venkatesh et al., (2003) captured this user experience to increase the use of m-Learning when formal part-time learners used their past experiences to make a decision.

When formal part-time learners have acquired a good experience of m-Learning, this will trigger their intention to use m-Learning, thereby increasing the potential use of m-Learning. However, this idea depends on formal part-time learners' experiences since it varies and may reflect and present differed actions and intentions (Yang & Su, 2017). Previous studies considered the role of prior experience when BI affected the effectiveness of UB (Chiu et al., 2016). Therefore, implementing learning from the orientation of formal part-time learner's experiences is necessary. Likewise, if the use of mobile devices is poorly handled, this may present barriers from the formal part-time learner's perspective (Lawrence, 2016). Therefore, it is necessary to address the aspect of prior experience and BI factors to maintain or increase the continued use of m-Learning.

$Hc_{2:}$ Learning Readiness -> Behavioural Intention -> Usage Behaviour

Having the intention to use m-Learning can drive the readiness of formal part-time learners to use m-Learning. This is because identifying LR to adopt m-Learning is of prime importance to determine the success of m-Learning (Mohammadi, 2015). Moreover, before proposing m-Learning tools, institutions should be aware of the readiness of formal part-time learners towards m-Learning capabilities to enhance their learning performance (Cheon et al., 2012). This is because a high intention to use m-Learning will trigger the readiness of formal part-time learners to keep using m-Learning as their exercise of learning. However, readiness itself needs to be guided since it exists as a continuing or ongoing process present in each individual.

$He_{1:}$ Performance Expectancy -> Behavioural Intention -> Usage Behaviour

Behavioural intention (BI) mediates the relationship between PE and UB by promoting the intention to accept m-Learning. According to Brown et al. (2010), BI mediates the

effects of PE on m-Learning usage. Since PE also facilitates the adoption and use of m-Learning by formal part-time learners, in-turn, it helps them to become quite proficient in the process of learning. Therefore, BI as a mediator can increase PE along with UB. This also creates a sense that the continued uses of m-Learning will enhance the usefulness and productivity of the formal part-time learner's learning performance and experience (Ooi & Tan, 2016).

As such, formal part-time learners would acknowledge that m-Learning will benefit them in many ways during the learning process (Shorfuzzaman & Alhussein, 2016). In this case, BI becomes a mediator since m-Learning features demand constant and meaningful learning and evaluation of performance in providing a personalised learning environment, along with real-time feedback (Cárdenas-Robledo & Peña-Ayala, 2018). Accordingly, it is important to have BI to increase the influence factor of PE since simply distributing m-Learning does not automatically improve performance (Lawrence, 2016).

Hf_1: Effort Expectancy -> Behavioural Intention -> Usage Behaviour

Effort Expectancy (EE) in the UTAUT model shows a significant influence on BI in accepting and adopting the technology. In previous studies measuring the influence of EE on BI, the results suggest that EE correlates positively with BI (Lawrence, 2016). Moreover, BI becomes a mediator towards EE and UB by influencing the significance and value of EE in using m-Learning. This is due to EE also reflected with Ease of Use in TAM among the construct's definition. Therefore, the use of m-Learning should be relatively straightforward and easy for formal part-time learners since they are already using mobile devices, which is consistent with the UTAUT model (Karimi, 2016). Having a high intention to accept m-Learning will trigger mobile-based learners to continue to

use m-Learning. However, opposingly, a study by Ooi and Tan (2016) and Mohammadi (2015) suggests that BI does not mediate Ease of Use and intention. Also, compared to a study by Brown et al. (2010), BI mediates the effects of EE. Even though most previous studies show that EE has a positive influence with BI, a study from Karimi (2016) shows quite the opposite, where EE on m-Learning adoption is not significant.

Nevertheless, Karimi (2016) believes that formal part-time learners are more willing to use m-Learning if they can perceive the usefulness of m-Learning. Also, having a certain level of technology literacy regarding the use of mobile devices and their functionality should help formal part-time learners to utilise m-Learning functions by exploring services and efficiently sharing materials. Formal part-time learners who have appropriate skills are action-orientated are more likely to exert greater effort in mobile learning (Mohammadi, 2015). Thus, the measurement of BI as a mediator between EE and UB must be evaluated as a means to support the validity of the UTAUT model within the formal part-time learner's educational context.

$Hg_{1:}$ Social Influence -> Behavioural Intention -> Usage Behaviour

Regarding the UTAUT model, social influence (SI) has a strong effect on the learner's BI to accept and adopt m-Learning. This result in line with the research conducted in previous studies in the education field (Howard et al., 2017; Shorfuzzaman & Alhussein, 2016). This is because positive communication and effective delivery by related variables may influence the peers to use m-Learning. Also, being influenced by friends and teachers, the use of this innovative mobile technology will encourage formal part-time learners to accept and consistently use m-Learning (Shorfuzzaman & Alhussein, 2016). Brown et al., (2010) proposed that BI mediates the effects of SI, while Shorfuzzaman, et

al., (2016) suggest BI should be assessed on the degree of how it influences the SI towards m-Learning.

Hh_1: Facilitating Condition -> Behavioural Intention -> Usage Behaviour

Facilitating Condition (FC) is one of the important determinants for technology acceptance in the UTAUT model. This is also mentioned in an ecological study of adults (Ma et al., 2016). In UTAUT, FC has no direct influence on BI but has a direct influence on actual UB. This is because FC does not display a considerable influence on learner's intention as it is directly determined by UB. This is similar to a study by Ma et al. (2016), in which they suggested that BI does not mediate the effects of FC. However, in this study, the role of BI as a mediator between FC and UB is indicated since it had a notable effect on formal part-time learner's intention to accept and use m-Learning (Shorfuzzaman & Alhussein, 2016). Therefore, the test in accepting m-Learning infrastructure should be investigated by measuring BI as a mediator and usage of m-Learning. Indeed, formal part-time learners will be inspired and motivated to use m-Learning if institutions provide adequate m-Learning infrastructure and resources such as training facilities (Liu & Huang, 2015). As recommended by Diep et al. (2016), evaluating BI as a mediator between FC and UB may also consider another attribute from the perspective of FC.

3.2 Theoretical Framework

The theoretical framework used for developing the 'm-Learning Acceptance Framework for Formal Part-time Learners' is presented in this section. In order to achieve

objectives three and four of this study, the researcher presents the components and attributes that underpin the development of the framework.

3.2.1 m-Learning Acceptance Framework among Formal Part-time Learners

As shown in Figure 4.1 below, the components of the framework are organised according to a horizontal design. The formal part-time learner's component is shown on the left, and the UTAUT component is shown on the right. Both components were derived from the UTAUT and andragogy theory, as the UTAUT component includes six attributes (Venkatesh et al., 2003) and formal part-time learners include four attributes (Knowles, 1973).

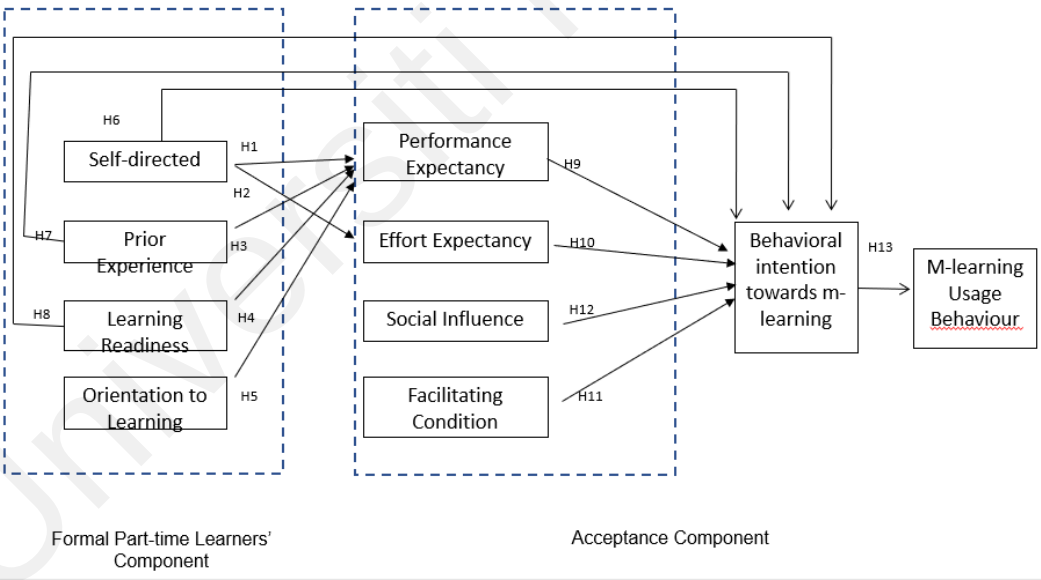

Figure 3.1: m-Learning acceptance framework among formal part-time learners

According to Al-Emran et al. (2016), the attitude of learners towards m-Learning technology is an important factor in determining whether or not they are ready and prepared to use m-Learning. This can be accomplished by emphasizing the acceptance of

m-Learning, which is the ability of learners to consider using m-Learning (Diep et al., 2016).

To more responsible regarding the interest of formal part-time learners' and associated profile, Muresan (2014) and Anderson and Dron (2012) suggest considering the principles of andragogy. Knowles (1973), suggested four assumptions that serve as a guideline for action, namely, 1) Self-directed 2) Prior Experience 3) Learning Readiness, and 4) Orientation to Learning. These unique characteristics of adult learners can be used for selecting proper and suitable m-Learning and training by formal part-time learners. Some researchers also refer to these principles in representing adult education programmes (Muresan, 2014; Schultz, 2012). The extent of this research, the use of the principles of adult learners, underscore the design of the m-Learning acceptance framework and surrounding learning environments. Accordingly, the researcher believes that the framework could be used for planning, developing, implementing, and evaluating m-Learning acceptance within the context of formal part-time learners.

3.3 Components of The Proposed Framework

This section explains the components that consist in the proposed framework. As refer to the objective number 2: To identify the attributes influencing formal part-time learners to accept m-Learning, two components were integrated with formulating the research framework namely the acceptance component and formal part-time learner's component. The acceptance component based on the UTAUT model measures m-Learning acceptance and adoption, while the four principles of adult learners are used to measure the attributes that influence formal part-time learners to accept and adopt m-Learning.

3.3.1 Acceptance Component

The acceptance component forms a larger part of the acceptance model, referred to as the level of learners' attention to accept and use m-Learning as a learning tool. This level of acceptance is represented by the behavioural intention attributes, while m-Learning usage behaviour shows m-Learning usage by formal part-time learners. In this acceptance component, four attributes are present as the independent variable (IV); Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Condition towards the dependent variable (DV) which is Behavioural intention (BI) and Usage Behaviour (UB). Referring to the UTAUT developed by Venkatesh et al. (2003), all four IV attributes in the acceptance component show a significant relationship of acceptance. Since this research aims to identify which attributes in the acceptance component strongly influence formal part-time learner's intention to use m-Learning, employing all four attributes to measure the level of m-Learning acceptance is highly considered.

3.3.1.1 Acceptance Attributes

In this subsection, four attributes as the main determinants of BI to use m-Learning is explained. These four attributes from the UTAUT model have been examined and tested in many acceptance studies in addition to showing significant result towards the intention to use the proposed technology.

(a) ***Performance Expectancy (PE)***

Performance Expectancy (PE) comprises the measures of perceived usefulness from the TAM model and a combination of TAM-TPB, extrinsic motivation in the Multimedia model, job-fit from the Personal Computer Utilisation Model (PCU), relative advantage

from the Diffusion of Innovation Theory (DOI), and expectations from the Social Cognitive Theory (SCT). These measures are theorised, as revealed in the literature review to affect BI. Performance expectancy (PE) is defined as the extent to which learners believe that using the m-Learning system will help them to improve their academic performance (Venkatesh et al., 2003). A study by Venkatesh et al., (2003) showed that PE is an excellent predictor and provides significant findings in the models of intention and that gender and age moderate this influence.

(b) ***Effort Expectancy (EE)***

Effort expectancy (EE) can be described as the extent of ease of use of m-Learning. In other words, EE is the degree of ease associated with the use of the m-Learning system (Venkatesh et al., 2003). Related constructs from other models include the perceived ease of use in TAM and TAM2 model, and the complexity from the DOI and MPCU model. Venkatesh et al., (2003) concluded that EE was a significant predictor of intention to use the system and is established as a mandatory setting in technology acceptance. The moderators of the relation, in this case, were gender, age, and experience.

(c) ***Social Influence (SI)***

Social influence (SI) is defined as the degree to which learner's perceive that other important people believe that learners should use the m-Learning system (Venkatesh et al., 2003). The SI construct reacts similarly to the subjective norms from TRA, TAM2 and a combination of TAM-TPB (DTPB), Social factors from the MPCU model and image from the DOI model. Previous studies of these models show that each of the constructs is significant from a voluntary context and are significant in the mandatory

setting of technology acceptance. Previous literature has also mentioned that this mandatory attribute is affected by this compliance, and becomes important at the initial stage of implementation, or when rewards and punishments are given. Likewise, gender, age, the voluntariness of use and experience moderate this influence.

(d) Facilitating Condition (FC)

Facilitating condition (FC) is defined as the extent to which learners believe that an institution and technical infrastructure exist to support the use of the m-Learning system (Venkatesh et al., 2003). However, FC has been omitted in this study, since this attribute is focused on environment settings for technology acceptance. Moreover, from this definition, three attributes from different models are comparable with the FC attribute, namely the construct of perceived behavioural control in DTPB and TAM-TPB models, FC from MPCU and its compatibility from the DOI model. This comparative study also reveals that the influence between the learner's behaviour and the attributes remain the same. However, it also becomes necessary, especially at the beginning of the learning process, and less relevant after implementation of 1-2 months. A study by Venkatesh et al., (2003) showed that FC was not a significant predictor of BI in order to use the system since the effect is captured by EE. Though, the study did show that FC influenced actual usage and that age and experience moderated this influence.

(e) Behavioural Intention Towards m-Learning (BI)

Behavioural intention (BI) is the intent of the learners to use the m-Learning system. BI is considered the predictor of usage, as all intention models investigated by Venkatesh et al., (2003) indicate that BI will have a significant influence on usage.

(f) ***m-Learning Usage Behaviour (UB)***

The m-Learning UB can be described as the actual usage of the m-Learning system and is considered as a key dependent variable.

3.3.2 Formal Part-time Learner's Component

Formal part-time learner's component is part of a larger theory of adult learners that applies adult learner principles as the learning behavioural attributes. In this component, four attributes are measured as the independent variables (IV), namely Self-Directed (SD), Performance Expectancy (PE), Learning Readiness (LR) and Orientation to Learning (OL). Knowles (1973), suggested that all four principles represent adult learner's behaviour in addition to formal part-time learner's learning attributes. Since this research aimed to measure formal part-time learner's intention to accept and use m-Learning, employing the four principles as a part of acceptance framework and measuring its acceptance was considered.

3.3.2.1 Formal Part-time Learner's Attributes

In this subsection, the four attributes that represent formal part-time learners' attributes are the main determinants towards BI to use m-Learning. These four attributes from the four principles of adult learners are derived from adult learning theory (Andragogy) in determining the characteristics of formal part-time learners' preference and behaviour towards the learning environment.

(a) ***Self-directed (SD)***

Knowles defines self-directed (SD), as the learner's initiative with or without the assistance from others in determining their learning requirements, strategies in implementing learning goals, identifying resources, and evaluating results. Concerning the adult learning theory, this is used to explain the competencies of learners in their ability to become a SD individual (Knowles, 1980). As such, this will influence the individual's way of life, decision-making (Siriwongs, P., 2015), and their willingness to participate in any planning for the instruction and evaluation process of learning.

(b) ***Prior Experience (PrEx)***

PrEx, as defined by Fisher et al. (2001), is where learners accumulate a growing reservoir of experiences that become a valuable resource in their future learning. Concerning the adult learning theory, this is grounded to explain the learner's ability to use the gained experience (Sălăvăstru, 2014) during their learning process. A study by (Hegyesi et al., 2014) found that adult learners tend to choose age and life experience as the most important features in learning. As such, past experiences often become the primary sources of reference during the learning process.

(c) ***Learning Readiness (LR)***

Learning readiness (LR) as defined by Fisher et al., (2001) relates to the readiness of learners and how likely a person will seek out knowledge and change their behaviour in order to improve their ability to learn and accomplish tasks. In terms of the adult learning theory, this explains adult learners, according to their level of participation which is dependent on the relevance of the studies for the person and the quality of his/her life

(Postan, 2014). This correlates to the extent to which the learner is ready to be involved, participate and contribute to the learning process. As such, their readiness to learn becomes closely related to any appointed task regarding their social responsibility (McFadden, 2013).

(d) ***Orientation to Learning (OL)***

Orientation learning (OL) is defined by Knowles, as the perspective of time that changes from one of postponing the application of knowledge to immediacy of the application, and accordingly his/her orientation towards learning that may shift from one of subject-centredness to one of problem centredness (Knowles, 1980). With respect to the adult learning theory, this is used to explain learners according to their focus on problem-solving and the need to apply it immediately to the given situations they are faced with and its relevance (Sălăvăstru, 2014). This helps learners in using their critical thinking skills to plan and manage the problem at hand and determine the best solution (Lai & Hwang, 2014).

3.3.3 Functions of the Components in the Framework

In this section, two components are further discussed, the Acceptance Component and Formal Part-time Learner's Component. The Acceptance Component (AC) incorporates six attributes adopted from the UTAUT model, namely, PE, EE, SI, FC, BI towards m-Learning and m-Learning UB. While for the Formal Part-time Learner's Component, four attributes were adopted from the four principles of Adult Learners are considered to be measured, namely, SD, PrEx, LR and OL.

3.3.3.1 Acceptance Component

(a) ***Performance Expectancy***

Table 3.1: Performance Expectancy function of improving learner's performance

	Function 1
Name	Improving learner's performance (m-Learning ability in assisting in gaining success).
Attribute	• Active. • Motivation (Howard et al., 2017; Karimi, 2016b)
Operation	• Immediate collaboration (Mohammadi, 2015). • Educators observe the learner's learning process. • Educate learners on how m-Learning will improve their task. (Howard et al., (2017).

The main function of PE is to improve formal part-time learner's performance and to assist them, mediated by m-Learning. This is because m-Learning is proven to increase learner's performance by providing information, managing information and organise it in a clear and precise manner. Two attributes that explain learner's performance include active participation (Karimi, 2016) and motivation (Howard et al., 2017).

To support an active learning environment, practitioners and institutions educate learners on how m-Learning will improve their task performance (Howard et al., 2017). Since mobile technology has rapidly grown along with various functions, it is contemplated to be used in completing tasks and assignments by encouraging formal part-time learners to participate, especially through collaboration either individually or in group discussion depending on the comfort of the learner.

While in the motivation attribute, m-Learning can trigger learners to use m-Learning since the device is always available, (i.e., in their pocket or bag). To keep the learners engaged with this technology for learning purposes, educators may participate in the discussion and observe the learner's contributions. Besides, rewards or incentives may also help to motivate formal part-time learners to continue to use m-Learning.

Table 3.2: Performance Expectancy function of system quality and portability

	Function 2
Name	System Quality and Portability
Attribute	• Reliability • Flexibility • Accessibility • Usefulness (Karimi, 2016; Mohammadi, 2015)
Operation	• Greater autonomy • Enriched collaboration • Access to wider information • Decision-making

System quality and portability support the meaning of portable/mobile devices as a learning tool that meets the learning requirement and learning objectives. This function can be measured by assessing the attributes as recommended by Karimi (2016) and Mohammadi (2015), which are reliability, flexibility, accessibility, and usefulness.

The reliability attribute promotes the use of m-Learning services to help learners complete their assignment(s) in a short time and along with adequate information. This can be achieved by enriching the level of collaboration among learners by discussing a particular topic in detail. As such, the outcome of the discussion can be more precise and less ambiguous since it considered from many points of view.

For the flexibility attribute, m-Learning promotes multiple services and features that can be used without the restriction of time and place. Flexibility can help to achieve learning objectives by providing greater autonomy for learners and assist them in designing a comfortable learning environment that meets their learning needs and satisfaction.

For the accessibility attribute, m-Learning enables learners to retrieve information without compromise and use the information to increase their performance. By using

suitable m-Learning features, learners can retrieve useful and up-to-date information related to their study.

The next attribute is usefulness, that defines the value and importance of information and how it contributes to the learner's learning needs. Since the internet provides a vast amount of information, it may also lead to ambiguous, inaccurate and too much information (i.e., overload) that opposes the learning process and outcomes. Therefore, effective decision-making may help learners to decide and select what information is relevant. Also, after having a discussion with their peers and group members, the decision-making is also readily made.

Table 3.3: Performance Expectancy function of time utilisation and productivity

	Function 3
Name	Time Utilisation & Productivity
Attribute	• Usefulness • Tailored to formal part-time's different and needs • Effectiveness (Karimi, 2016)
Operation	• Spontaneous communication & real-time information. • Exchange of image. • Capture video clips, visual learning style, diagram, graph. • Social mobile network (Mohammadi, 2015). • Rewarded (Howard et al., 2017)

Time Utilisation and Productivity may help formal part-time learners succeed via m-Learning. Past studies have shown that a positive result of the role of m-Learning facilitates learners to accomplish tasks. Time can be saved, and tasks can be completed within a given time. Three attributes that define this function include usefulness, tailored to learner's differences and needs, and effectiveness.

Usefulness is associated with the practicality of m-Learning in tailoring learners by providing a meaningful learning platform. The platform should promote easy to use applications, allowing for the exchange of knowledge. Besides, the information must

comprehensively focus on the subject matter at hand rather than be presented in a general manner. Thus, the discussion among peers may help to narrow the needed information.

The next attribute is tailoring the learner's differences and needs. Formal part-time learners have a unique learning style. During the process of completing a task, they prefer to have several options in learning such as allowing for video clip streaming and capturing, visual learning experience, illustrations, images and graph as well as preferring group discussions with the peers.

The third attribute is effectiveness when m-Learning is helpful to attain success in producing the desired result. This attribute can lead to achieving the amount of time allocated or used, and productivity through spontaneous and real-time communication. Time can also be utilised when social mobile group members help each other to achieve productivity outcomes by promoting a meaningful discussion group.

*(b) **Effort Expectancy***

Table 3.4: Effort Expectancy function of supplement the traditional classroom

	Function 1
Name	Supplement the Traditional Classroom
Attribute	• Peer-collaborative support • Content-based learning • Mobile mediated communication inside and outside of the classroom
Operation	• Mobile instant messaging • Micro-blogging • Social network chats (So, 2015)

Supplementing the traditional classroom is the main function of EE in m-Learning usage. Easy to use mobile devices has been proven in many studies that influence learners to accept m-Learning. Three attributes that define this supplementary function include

peer-collaborative support, content-based learning and mobile role to mediate communication inside and outside of the classroom.

To ensure good peer collaboration and support, m-Learning can provide a social network used as a 'chatting' medium involving a high volume of users. Including formal part-time learners in this type of forum, should be relatively easy for them to use mobile social platform for learning purposes. Likewise, the content-based learning attribute, in providing comprehensive content, can be applied in 'micro-blogging' for mobile devices. Less text is used, and only important information is captured. Besides, the mobile screen size is limited, so the provision of content via micro-blogging may help learners to narrow down the specific information.

To mediate the process of learning inside and outside of the classroom, the most preferred activity is by using instant messaging. Since the basic function of mobile communication is to provide instant communication, it has evolved nowadays to interactive instant messaging, which can be used to support learning with multiple designs and delivery.

Table 3.5: Effort Expectancy function of flexibility of interaction

	Function 2
Name	Flexibility of Interaction
Attribute	• Clear and understandable • Interactive • Virtual learning environment
Operation	• Online and offline accessibility • Many mobile function and operation in one platform • Visual learning style (Shorfuzzaman, 2016)

The flexibility of the interaction function can define the EE of m-Learning usage by offering choices in what, when, where, why and how they learn. The flexibility of interaction can be represented by three attributes, namely clear and understandable information, interactive and virtual learning environment.

To support the clear and understandable information attribute, suitable information must be identified to ensure formal part-time learners derive the right answers to their questions or queries. However, as some information may not be applicable to formal part-time learners, formal part-time learners' characteristics and learning behaviour are important to define their comfort zone in learning.

For the interactive attribute, practitioners and developers may often provide more than one choice of m-Learning features. These features can be an interactive image, text, document, location, video, and voice sharing, and so on. Accordingly, formal part-time learners can use these features that suit their needs in providing many different forms of presentation.

In promoting a virtual learning environment, online and offline accessibility should be applied in m-Learning. This is because m-Learning can still be utilised offline (no internet access) in a certain area.

Table 3.6: Effort Expectancy function of human-system interaction

	Function 3
Name	Human –system Interaction (Karimi, 2016)
Attribute	• Intuitiveness – known, understand without proof • Learner's characteristics and capability • Convenience (proceed without difficulty) – learners are more familiar with mobile technology
Operation	• User-friendly • Do not require rigorous instructions • Less text

The next function associated with EE is to provide human-system interaction (Karimi, 2016) when m-Learning adopts human behaviour type roles to perform tasks. For example, reminders, scheduler, organiser, and information exchange. Three attributes that represent this function include intuitiveness, learners' characteristics and capability, and convenience to use.

The intuitiveness attribute means the learner is already aware of and familiar with mobile technology. Therefore, mobile technology applications should be in a user-friendly mode or format, so that the learners can utilise m-Learning easily, quickly and avoid lengthy periods to respond.

For formal part-time learner activities based on mobile technology platforms, the design should be seen as a suitable activity. Popular mobile communication applications should be optimised for the purpose of learning because the learner as a busy person is seeking convenient applications, with less text but easy to remember and be applied in other subjects as well.

The third attribute is convenience in using the m-Learning application. This attribute brings the meaning of easy to use without difficulty. Therefore, thorough instructions on use and supporting documentation, especially for beginners, should be available to avoid confusion.

(c) Social Influence

Table 3.7: Social Influence function of utilising the learning technology participated

	Function 1
Name	Utilise the Learning Technology Participated
Attribute	• Experience • Directives by institution
Operation	• Academic community (Ouedraogo, 2017) • Teacher's participation and support (Milošević et al., 2015) • Online participation (Diep et al., 2016)

Regarding SI, the role of educators and peers is important to influence formal part-time learners to use and actively participate in m-Learning activities. Two attributes that define the utilisation of learning technology participated in include experiences and directives by the institution.

For the experience attribute, suitable activities that can be used to increase formal part-time learner's participation include the academic community and peer groups (Ouedraogo, 2017) in addition to the educator's participation in m-Learning discussion groups in demonstrating their support towards formal part-time learner's m-Learning usage.

While for institution directives to utilise the learning technology participated in, online groups should be used to increase participation by giving a reward or incentives. Life-long learning exercises, as well as optional questions that are closely related to their daily life, should be incorporated.

Table 3.8: Social influence function of social atmosphere

	Function 2
Name	Social Atmosphere (Shorfuzzaman, 2016).
Attribute	• Institution support. • Diverse capabilities. • Positive communication (Howard et al., 2017).
Operation	• Social interaction (Howard et al., 2017; Milošević et al., 2015) • Virtual classroom. • Discussion board, social network sites, blogs (Ooi, & Tan, 2016; Mohammadi, 2015).

Regarding SI, social atmospheres (Shorfuzzaman, 2016) also contribute to formal part-time learner's participation and the use of m-Learning. Three attributes that represent the function of the social atmosphere include institution support, diverse capabilities, and positive communication (Howard et al., 2017). Therefore, suitable facilities should be prepared by the institution to cater for virtual classrooms. A virtual classroom can be flexibly used every time and everywhere with respect to the capabilities of mobile devices, mobile content and layout of the learning presentation.

To increase the influence of the social atmosphere function, diverse capabilities of m-Learning can be suggested like social interaction (Howard et al., 2017; Milošević et al.,

2015) discussion boards, social websites, and blogs which can be combined in one platform influence learners.

*(d) **Facilitating Condition***

Table 3.9: The Facilitating Condition function of environment support

	Function 1
Name	Environment Support
Attribute	• Institution support (technical, infrastructure, facilities) • Economic condition • Quality of speed and access • Security risk (Ma et al., 2016)
Operation	• Provide a sense of safety • Sufficient learning opportunity • Resource & technology facilities, training

The most important function of FC is providing adequate learning facilities and infrastructure for the m-Learning environment. These facilities are provided and supported by institutions regarding the technical aspects (i.e., technology), training, and m-Learning platforms. Three attributes represent m-Learning environment support such as economic condition, quality of speed and access, and security risk (Ma et al., 2016).

Regarding the economic condition, there is a certain amount of investment needed in establishing and acquiring the m-Learning infrastructure. These expenses include preparing, applying, and maintaining m-Learning facilities and also to improve the performance of the service. It is also important to justify the expense to avoid any misuse and waste, thus leading to dissatisfaction in using the m-Learning facility.

For the quality of speed and access, the institution will need to provide sufficient and comprehensive learning opportunities. The institution can liaise and collaborate with a

mobile technology provider to negotiate prices for formal part-time learners in purchasing mobile devices, licenced software and data plans for learning purposes.

The third attribute is the security risk. Institutions must ensure the safety of m-Learning users and provide them with mobile security applications such as anti-virus software, firewalls, passwords, backup and having a group of well-trained staff available to assist formal part-time learners if they encounter any m-Learning difficulties.

Table 3.10: Facilitating Condition function of innovative teaching and learning

	Function 2
Name	Innovative Teaching and Learning
Attribute	• Achievable learning outcomes • Andragogical design • Incorporate mobile technology into learning
Operation	• Available equipment • Provision of professional development • Mobile technology used for exercise and T&L session

Under FC, institutions need to consider the technical and infrastructure aspects of influencing formal part-time learners to accept and use m-Learning. Innovative teaching and learning also support the facilitating condition. Three attributes for FC include achievable learning outcomes, andragogical design and incorporate mobile technology into the learning environment.

For achievable learning outcomes, institutions should provide adequate and suitable m-Learning equipment and centres to deal with mobile devices, servers, users, hosting, platforms, with well-trained staff, in managing security concerns. Educators and learners can refer to this particular unit or group on any aspect of m-Learning.

For andragogical design, this aspect is important to define since formal part-time learners as adults have a distinct learning style compared to a pedagogical approach. Therefore, m-Learning developers should consider formal part-time learner's

requirements to bridge the gap between the learners and the application of m-Learning. Also, while incorporating mobile technology into learning, the m-Learning developer must ensure that the technology is suitable for the purpose of learning rather than simply using it for communications and entertainment. Training educators and learners should be managed periodically.

(e) Behavioural Intention towards m-Learning

Table 3.11: Behavioural Intention function of acceptance and adoption

	Function 1
Name	Level of Acceptance and Adoption.
Attribute	• Voluntary to learners (Yang & Su, 2017). • Challenge of actualisation.
Operation	• Positive beliefs (Yang & Su, 2017). • Personal innovativeness and effort to apply mobile technology in learning (Mohammadi, 2016).

Behavioural intention (BI) was earlier defined as the probability of formal part-time learners to accept and use m-Learning and measures the level of acceptance and adoption as its primary function. Two attributes represent the function of BI, namely, voluntary to learners (Yang & Su, 2017) and the challenge of actualisation among formal part-time learners.

Regarding formal part-time learner's voluntariness, the level of acceptance can be defined through the learner's positive beliefs toward m-Learning (Yang & Su, 2017). This positive belief is important to increase the learner's acceptance, thus leading to the use m-Learning continuously. This positive belief can also be maintained through the support from the institution and peers and the degree to which the design of m-Learning fits with the formal part-time learner's needs.

For the challenge of the actualisation attribute, formal part-time learners need to understand and experience the barriers to m-Learning barriers so that they can optimise the benefits afforded through mobile technology as a learning tool. To address this need, it also depends on the innovation of each learner and the effort to apply mobile technology in learning (Mohammadi, 2016). Accordingly, this also demonstrates that the use of mobile technology should be adopted in the exercise of learning to maintain the security and safety (i.e., privacy) of formal part-time learners in terms of personal exposure, time, and cost.

Table 3.12: Behavioural Intention function of successful implementation

	Function 2
Name	Successful Implementation
Attribute	• Relevance • Usability (Karimi, 2016) • System quality
Operation	• Perform job function • Improved interaction among peers (Bogart & Wichadee, 2015) • Only provide reliable information

The second function of BI relates to successful implementation. This is when the formal part-time learner gains benefit from using m-Learning. When learners believe that m-Learning is successful, the use and adoption of m-Learning as a learning tool increases. Four attributes that measure the success of m-Learning implementation include relevance, satisfaction, usability, and system quality (Mohammadi, 2016; Karimi, 2016))

The relevance of m-Learning can be seen through the ability to perform a job function. The satisfaction in using m-Learning can be rated in how it improves interaction among peers (Bogart & Wichadee, 2015). Whereas, from the aspect of usability, m-Learning needs to demonstrate its user-friendliness in satisfying formal part-time learners. The attributes can be determined when formal part-time learners continuously use their mobile devices in each learning exercise.

In the system quality attribute, it shows the success of the m-Learning architecture and design in meeting the requirements of formal part-time learners. Therefore, influencing attributes should be investigated periodically and at each phase to resolve any issues between the m-Learning application and formal part-time learners.

(f) m-Learning Usage Behaviour

Table 3.13: Usage Behaviour function of private endeavour

	Function 1
Name	Private Endeavour (Lo et al., 2016)
Attribute	• Loyalty (Mohammadi, 2015). • Continue use to gain momentum. • Promotion and strategies (Ooi & Tan, 2016).
Operation	• Integrate m-Learning in daily use (Ooi & Tan, 2016). • Understanding actual information needs by looking at formal part-time learner's pattern.

Private endeavour is defined as the consistent use of m-Learning without the need to force or pressure learners (Lo et al., 2016). Here, three attributes are considered: loyalty (Mohammadi, 2015), continue to use to gain momentum and m-Learning promotion and strategies (Ooi & Tan, 2016).

Loyalty is when the learners have a strong desire or feeling to accept and use m-Learning. This support can be seen when formal part-time learners integrate m-Learning into their daily lives, and any learning matters (Ooi & Tan, 2016).

For continuous use to gain momentum, integrating and fixing the m-Learning with the patterns of formal part-time learners will aid them in effectively looking for information, as and when needed. Educators may also help to motivate formal part-time learners to explore the functionality of mobile devices in light of m-Learning and adapt these learnings into their learning environment.

While for promotion and strategies, this can be defined when formal part-time learners influence their friends by promoting the use of m-Learning as their learning tools. Here, learners can share the strengths and benefits of m-Learning to their friends and colleagues. Likewise, formal part-time learners can strategize in their learning process in allocating time for information searching, thereby reducing time to collect information and the process of m-Learning more efficiently. As such, learning outcomes can be achieved successfully.

Table 3.14: Usage Behaviour function in recognising m-Learning services

	Function 2
Name	Recognise m-Learning Services.
Attribute	• Institution's opportunity. • Multifunction/ multipurpose application.
Operation	• Utilise m-Learning functions to gain better knowledge and information (Lo et al., 2016) • Make observation and inspiration.

The next function of m-Learning is UB which is when formal part-time learners are able to recognise m-Learning services. Two attributes that measure the ability of formal part-time learners to recognise the m-Learning function include the opportunity presented from the institution and the multifunction of one m-Learning platform.

Regarding the institution opportunity, the benefits of the updated mobile technology function should be to alert and to observe. Institutions can promote a better learning environment towards formal part-time learners by ensuring m-Learning services can compensate and meet the learner's needs and learning objective.

While for the multifunction of mobile features in one m-Learning platform, this can be realised when m-Learning practitioners utilise m-Learning features in gaining a better experience through m-Learning. The combination of more than one function may help

the learner to acquire more knowledge, and offer more options in gathering information and meaningful knowledge and insights.

3.3.3.2 Formal Part-time Learner's Component

(a) ***Self-directed***

Table 3.15: Self-directed function of promotes life-long learning habits

	Function 1
Name	Promotes life-long Learning Habits
Attribute	• Motivation • Initiative - Choose what they learned and how • Confidence – individual differences (Kop, 2011)
Operation	• Learners formulate goals, procuring resources, implementing strategies (Hagen & Park, 2016). • Identify learning styles. • Good quality assessment-Learners can select, manage, and access own learning activities

The main function of SD learning is to promote life-long learning habits among formal part-time learners. Through this function, formal part-time learners have the opportunity to set their learning goals and strategies surrounding the learning process, design learning canvas and self-assessment of their learning performance. Three attributes that represent life-long learning habits include motivation, initiative, and confidence (Kop, 2011).

For the motivation attribute, institutions and educators should encourage the learners by preparing a suitable learning platform, provide reliable information and provide a practical and useful assessment programme. At this point, learner's motivation may be triggered when they receive full support from the institution, educators, and friends.

For the initiative attributes, the learners make a choice and choose what they want to achieve from their study and how to obtain the right information. To achieve this attribute, learners may formulate learning goals, processing resources and data, and finally

implement what they had planned and strategized (Hagen & Park, 2016). Moreover, they select to manage and access their learning activities that suit their learning style.

The last attribute is confidence in which learners believe that m-Learning can help them to design their learning canvas. Mutual trust between the learners and m-Learning can be achieved through identifying formal part-time learner's learning factors. Since formal part-time learners have a unique style of learning, practitioners can then provide choices of m-Learning that can assist in solving the problems experienced by learners.

Table 3.16: Self-directed function of foster technology skills

	Function 2
Name	Foster Technology Skills
Attribute	• Integration of modern technology • Retain and reply • Proactively carry out the learning process
Operation	• Learn new mobile technology skills • Blogs, wikis, social networks • Flexibility to select task and challenges to complete self-directed resources • Rewarded learners for exploring technology daily

The next function is to foster technology skills among formal part-time learners. Three attributes coexist in this function; namely, the integration of modern technology, retain and reply activities and proactively carrying out the learning process.

The first attribute is the integration of mobile technology in the learning process, which means that learners utilise any mobile function for learning. Formal part-time learners should be proficient in learning and applying new mobile technology skills and actively participate in learning and using these features and skills in their learning process. From an institutional perspective, educators and staff may conduct regular mobile application classes and introduce new m-Learning applications.

The second attribute is retaining the information and knowledge obtained and replying via blogs, wikis, and through other social network platforms (i.e., WhatsApp, Facebook,

Twitter). If learners are familiar with this attribute and function, it should be relatively easy for them to deal with this aspect of their learning.

The third attribute is proactively participating and carrying out the learning process. This attribute is achieved through the flexibility afforded through m-Learning in selecting the tasks and steps to address learning challenges and access SD resources. The learners may use any suitable m-Learning function that will provide suitable answers to their questions or concerns. Educators can also reward learners who actively participate during lessons and perform excellent presentations and input during discussions.

Table 3.17: Self-directed function of cognitive ability

	Function 3
Name	Cognitive Ability
Attribute	• Intentionally • Intelligence • Action (Hagen & Park, 2016)
Operation	• Anticipate the interaction process • Evaluate self-performance • Improve self-performance • Self-direction and decision-making

The third SD function is to control the cognitive ability of formal part-time learners. Three attributes that reflect cognitive ability are intention, intelligence and action (Hagen & Park, 2016).

In terms of intentionally, learners use m-Learning purposefully to promote their learning process, which can be achieved by allowing learners to self-direct their learning goals and determine the outcome of their study.

The second attribute is intelligence, which is when learning acquires the knowledge then applies it to real-life knowledge and skills. Learners should be able to foresee the process of interaction among peers and seek suitable responses. At this stage, structured

formal part-time learners measure their self-performance at the end of the experience and recognise any shortcomings during the learning process.

The third attribute is the action taken to enhance any less than satisfactory performance. The self-performance of learners can be improved through regular practice. This may be achieved by asking peers and educators about their input, suggestions, ideas, and the results of the assessment.

*(b) **Prior Experience***

Table 3.18: Prior Experience function of intrinsic belief

	Function 1
Name	Intrinsic Belief
Attribute	• Cognitive • Affective • Behavioural learning process (Hagen & Park, 2016)
Operation	• Role-play • Group discussion-peers create a topic to increase participation (Yang & Su, 2017) • Problem-Based Learning

The intrinsic belief function defines the inherent nature of a learner that affects their trust and confidence in m-Learning. Three attributes representing this function include cognitive ability, the ability to manage different mental activities associated with problem-based learning activities. An affective attribute describes the mood and feeling of the learner performed through an exercise involving role-play, while behavioural learning process practices acquire new information that can be demonstrated through behavioural changes. Through group discussion, when the motivation of the learner is triggered in their daily life through interesting and closely related issues, they will reflect on the matter in real-time.

Table 3.19: Prior Experience function of attitude formation

	Function 2
Name	Attitude Formation
Attribute	• Retain • Recall • Evaluate
Operation	• Engage with learning • Classroom management-demonstrates how to use what the learners learn • Personal and social learning

The role of attitude formation helps to convey a positive or negative view towards m-Learning, as learning instruments define both positive and negative aspects of this particular learning function. Three attributes are defined to characterise retention, recall, and evaluate the attitude function.

Retaining attributes are the possession of something learned or experienced in m-Learning and to continue using or applying it. Encouraging learners engaged in m-Learning will help them to explore, seek and use m-Learning in taking ownership of their learning as a successful outcome to learning development. To ensure their abilities are incorporated with m-Learning technology, the learner's pedagogical dimension must be understood and assessed.

In the recall attribute, past experience of m-Learning usage is integrated with the current learning as an additional means in establishing certain findings. Personal and social learning activities such as peer discussion, dynamic or static learning platforms and discussion groups may help learners to recall past experiences related to m-Learning skills. Thus, past experiences can be applied in current learning situations by reflecting upon the knowledge already acquired.

The next attribute is evaluation. This is when the learners are able to evaluate and make a decision based on the evaluation result. This result can help them to decide whether to proceed with m-Learning or to refuse using it. Therefore, to ensure a positive attitude

towards m-Learning, classroom activity may help to demonstrate how m-Learning provides benefits towards the learner's learning experience.

(c) Learning Readiness

Table 3.20: Learning Readiness function of possessing mobile technology skills

	Function 1
Name	Possess mobile technology skills (easy to use) -(Fisher et al., 2001; Shorfuzzaman & Alhussein, 2016)
Attribute	• Institution's Plan & Implementation • Abilities • Competencies (Hagen & Park, 2016).
Operation	• Meaningful information • Easy access • Learner's comfort level

The first function or requirement for LR is to possess mobile technology skills in order to use m-Learning. Three attributes that constitute this function include the institution's plan and implementation approach, learner's abilities, and learner's competencies to use m-Learning.

The institution's plan contributes to providing a better strategy before, during and following implementation. This attribute may lead to promoting a conducive learning environment for learners. The opposite, of not providing a comfortable learning environment, may have adverse consequences and therefore, the institution will need to improve this situation to attract and retain learners to use m-Learning.

For the abilities attribute, since mobile technology involves the daily use of the device, barriers towards the implementation of m-Learning implementation are low. As such, by adopting or using a new m-Learning approach may require less time to empower users since they are already familiar with mobile functions. It also becomes relatively easy to apply for the purpose of learning and helps learners in preparing themselves before the

learning process begins. Here, readiness to learn is high because the learners are continually engaging with their mobile device even though it's for communication and entertainment purposes.

The third attribute competency, which is the ability to complete a task. When learners are prepared to learn, they will try their best to master new mobile technology. However, to complete the process, meaningful information must be provided in order to save time in looking for specific information and gain a better understanding of a particular subject.

Table 3.21: Learner Readiness function of more focused-on learning opportunities

	Function 2
Name	More Focused on Learning Opportunities (Hagen & Park, 2016)
Attribute	• Transferable to different situation • Self-awareness • Creativity (Shorfuzzaman, 2016)
Operation	• Performance feedback • Identity interest and recognise learning needs • Flexibility learning • Flipped classroom

The next function related to LR is to maintain the focus of formal part-time learners on learning opportunities (Hagen & Park, 2016). Three attributes in this function include, transferable to a different situation, self-awareness and increase creativity among formal part-time learners (Shorfuzzaman, 2016).

Regarding transferable m-Learning to a different learning situation, the flexibility afforded through m-Learning will help to enhance LR among formal part-time learners. This is because the learning session can be conducted at the learner's own pace, without restrictions of time and place.

For self-awareness, the conscious mind towards the use of m-Learning can help to prepare learners to learn and complete tasks within a short time. The feedback from using m-Learning will help to increase formal part-time learner's self-awareness, which may

include updating themselves (i.e., their conscious mind) on a new m-Learning function so that it can be fixed into the learner's memory for future assignments that may be similar.

The last attribute is creativity. This is where formal part-time learners use their natural ability to undergo the m-Learning function resulting in useful output. The creativity of the learners can be increased by using m-Learning as their learning tool given it offers multiple solutions through interactive presentations and challenges. If learners can use m-Learning creatively, they will gain enjoyment by applying it in all learning matters.

*(d) **Orientation to Learning***

Table 3.22: Orientation to the Learning function in its immediate application of learned knowledge

	Function 1
Name	Immediate application of Learned Knowledge (Knowles, 1980) - seek knowledge for their own sake (Knowles, 1973) -Maximum effectiveness (Chauhan, 2016)
Attribute	• Apply knowledge and skills for effective life • Real situation • Demonstrating how to use what learners learn
Operation	• Address areas of the development task • Perform task • Solve problems – problem-centred • Learning community • Stimulus-response connection (Hagen & Park, 2016)

Orientation to the function of learning depends on the capability of the application to provide immediate answers to the knowledge acquired through learning (Knowles, 1980). In defining this function, three attributes are applied, namely, apply knowledge and skills for an effective life, real case situations and demonstrating how to use what the learners have learned.

In terms of applying knowledge and skills for an effective life, formal part-time learners can discuss or present their problem in a group discussion. Most formal part-time learners face similar problems but under different contexts. The information and knowledge exchange could consequently occur in real-time by applying a different perspective. However, this exercise relies on problem-centred activities to solve the problem to achieve the stated objectives. Hence, formal part-time learner's problem-solving skills may be enhanced through conducting research, integrating points from various aspects and applying knowledge and skills to develop a viable solution (Savery, 2006).

Concerning the real situation attribute, through a participative learning environment (i.e., community), the learning problem can be solved in a short time. Since the mobile device is portable, learners will regularly check their phone for messages or calls or for other reasons. As such, learners can respond to m-Learning issues anytime at their leisure. Instead of learning in one particular way, or via one-to-one communication, group discussions will provide opportunities for formal part-time learners to discuss and interact together, thereby saving time to find solutions.

Regarding the attribute, demonstrating how to utilise what formal part-time learners have learned, m-Learning provides an opportunity for learners to reflect, retrieve, and reuse the information. Therefore, m-Learning supports this powerful learning environment and activities by providing a variety of mobile features integrated into one platform. Likewise, training and workshops in using m-Learning should be conducted regularly and to encourage learners to utilise the technology. The encouragement may include stimulus responses from formal part-time learners towards establishing the connection among group members.

3.4 Guideline for Higher Institutions to Use m-Learning

The proposed guideline is intended to create an m-Learning environment higher education institution (HEIs) to meet the needs of learners for better learning (Wang et al., 2014a). This also offers sufficient and practical guidance to ensure higher institution learners are familiar or acquainted with the use of this technology. This is because the guideline incorporates and considers the attributes of higher institution learners and m-Learning acceptance attributes from a technical perspective. The m-Learning guideline also incorporates a small number of items to test the use of m-Learning among learners. However, the approach requires preparation for practitioners as well as higher institutions to assess m-Learning activities. These approaches were derived from the m-Learning acceptance framework revealed in this formal part-time learner studies.

3.4.1 Establishment of Items

After the guideline was established, it was then evaluated using two experts in academic and student affairs adopting a confirmatory approach. The feedback received from the experts was collected and compiled accordingly. Regarding the feedback received from the experts, this included firstly, restructuring the questionnaire items to ensure the questions could be easily understood by the practitioners. This is also supported by Paananen et al., (2020) in keeping the text short and concise, which helps to convey the right message. Second, grouping the objects by attributes and sub-attributes. Accordingly, the feedback received from the experts helped to support the objective of developing the guideline. An additional comment received was also to restructure the guideline to reduce the level of complexity through the selection of a subset of components, and testing the relatively straightforward assumption about learner's perceptions on m-Learning (Bernacki et al., 2019).

Table 4.23 presents the complete set of the guideline after being evaluated by the experts.

Table 3.23: m-Learning Guideline for higher institution learners

Contributing Attributes	Items
Performance Expectancy	***Usefulness*** o *Learners utilise mobile devices for learning purpose everywhere* o *Learners utilise mobile devices for learning purpose every time* o *An assignment can be finished by employing several ways of mobile device functions* ***Completion of Learning Activities*** o *Learners finish the assignment on time/before the dateline* o *Learners are always ready with the assignment to be presented* o *Learners prepare for the subject accordingly before the class starts* o *Learners are always ready with the ad-hoc test activities* ***Productivity*** o *Learners respond to the post in less than 3 hours* o *Learners can share their findings out of the box* o *Learners relate the solution from several perspectives and come out with concrete solutions* o *Learners are able to capture only important video clips/sounds for their learning purpose*
Effort Expectancy	***Interaction*** o *Using m-Learning enhances the learners' performance* o *Learners comprehend the instruction clearly* o *Learners are able to react upon the instructions by utilising the m-Learning function* o *Learners refer to educators' blog for further information* ***Adoption of mobile learning*** o *Learners take less time to learn new m-Learning function* o *Learners take less time to find new m-Learning information* o *Learners use social media applications as their alternative learning platform* ***Usage*** o *m-Learning offers easy navigation functions* o *Learners say they enjoy using mobile devices for learning purpose* o *Learners look for the info by using their mobile devices immediately after obtaining the instruction from the educators* o *Less text and more visual learning style are being used for information delivery*
Social Influence	***Peer Influence*** o *All learners reacted to the post by their peers* o *Each student is engaged with at least two learning communities* o *Educators take part and monitor the learning activities* ***Society Assessment*** o *Permitting virtual classrooms as part of the learning session* o *Allowing a combination of functions for executing the assignment/ result/ task*
Facilitating Condition	***Requirement*** o *Good internet access, learner's phone equipped to support learning needs* o *Conduct training of m-Learning usage regularly* ***Resources*** o *Offer up-to-date information on m-Learning application from time to time* o *Provide an alternative use of m-Learning delivery (sound, video, text, picture)* o *Both online and offline are functional to access resources* ***Knowledge*** o *Ensure a secure environment for learning purpose (No bullying, condemnation, underestimation)*

Table 3.23 continue

Behavioural Intention	***Recommendation*** o *m-Learning enhances interaction among peers* ***User Experience*** o *Learners have positive feedback on using m-Learning* o *Learners use m-Learning without force* o *m-Learning helps the learners to perform job functions* o *Appropriate and dependable information being applied for m-Learning* ***Frequency of Use*** o *Learners continue to use m-Learning although not being asked by educators to do so*
Use Behaviour	***Satisfaction*** o *m-Learning backs the learners' learning style and needs* o *Learners explore and espouse m-Learning usage from time to time* ***Self-confidence*** o *Learners use more than one m-Learning platform to enhance their social experience*
Self-directed	***Planning*** o *Learners implement strategies in the early stages of the semester* o *Learners have their own micro-blogging* ***Goals /Direction*** o *Learners formulate objectives and procure resources before the session starts* o *Educators discuss with the learners about designing their m-Learning canvas* ***Motivation*** o *Learners prepare their early plan of delivering assignments* o *Educators provide assignments which allow the learners to explore more through mobile technology*
Learning Readiness	***Preference*** o *Easy use of m-Learning functions to support learning activities* o *Conduct a flipped classroom for learning continuity* ***Application*** o *m-Learning comprises meaningful information on learning* o *Flexibility in m-Learning usage in terms of easy access, mode of delivery, assignment as well as the classroom session* ***Further Exploration*** o *A platform allowing the learners to give feedback after using m-Learning* o *Note the feedback and upgrade according to the comments regularly*

3.5 Summary

The acceptance framework of m-Learning among formal part-time learner by identifying the components and attributes concerned is proposed in this chapter. Thirteen research hypotheses are presented purposely to answer specific objectives three and four. Also presented and discussed in this chapter were the formulated hypotheses based on the theory and literature review. The research hypotheses for the mediator variables explained the intervention between the independent and dependent variables; thus, identifying the strengths of the intervention towards influencing m-Learning intention and adoption. The following phase then proposed the m-Learning acceptance framework for formal part-time learners by integrating the variables with the relationships and measured

accordingly. In addition, the m-Learning activities as outlined in the guideline for formal part-time learners were extracted from the proposed framework. The same attributes and components are referred to, ensuring that the guideline eloquently suits the learner's needs and effectiveness for their intended use.

CHAPTER 4: RESEARCH METHODOLOGY

This chapter presents the development of the instrument and data collection method for the evaluation of the m-Learning Adoption Framework for Formal Part-time Learners. It also provides details of the research methodology, and its design and implementation, and also reports on the data collection and evaluation tools that were used. In addition, the pilot test is presented. This chapter further presents the data collection technique, research instrument and measurement procedures.

4.1 Introduction

The research methodology and activities that were undertaken in this study are presented in this section, consisting of information requirements, instrument development, data collection, and data analysis. A systematic approach was followed while conducting the research and developing the instrument.

4.2 Research Methodology

This section presents the research design, which defines the steps that were undertaken in conducting this study. This study followed a positivist paradigm, and employed a quantitative research method to explain the behaviour of formal part-time learners. A survey was conducted using a questionnaire as the research instrument (Rahi et al., 2019; Road & Kingdom, 2015). This was in line with the aim of this study, which was to determine the behaviour of learners by developing and evaluating an acceptance framework for formal part-time learners in Malaysia.

A summary of the steps that were undertaken in conducting this research is shown in Figure 4.1 below. This research involved three phases: information requirements, data collection, and data analysis. The related tasks in each phase are also listed.

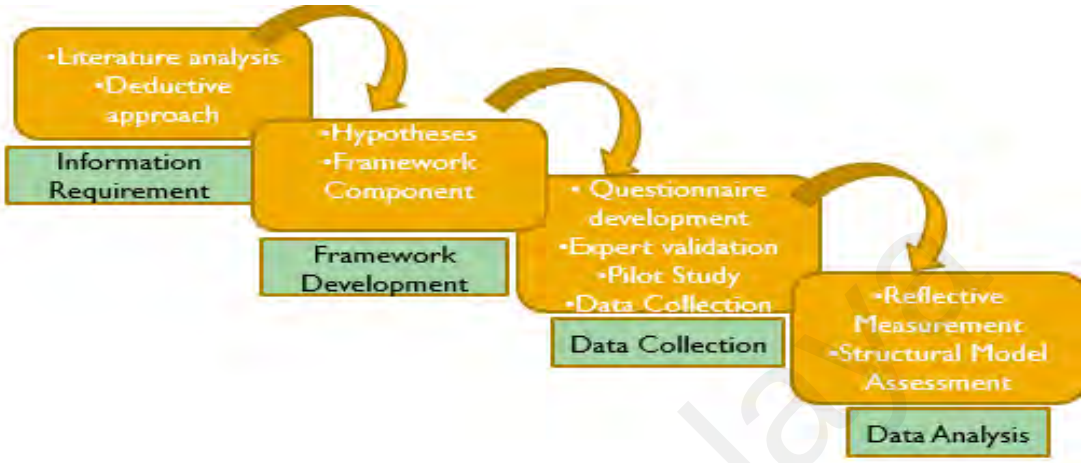

Figure 4.1: Steps to complete the research study

- **Information Requirements**

  In the initial phase of the research, the identified problem(s), and deficiencies in m-Learning are identified by performing a review of prior literature and analysis. The literature review is intended to understand state-of-the-art m-Learning solutions utilising scholarly digital libraries, namely Web of Science, Institute of Electrical and Electronics Engineers (IEEE) Xplore, Springer and Science Direct. Various aspects of m-Learning solutions among formal part-time learners are also investigated, such as the concept, theoretical foundation and m-Learning implementation solutions. The issues and challenges that affect existing m-Learning performance are also identified.

  Two activities were undertaken as part of the information requirement process, the literature analysis and deductive approach. The literature analysis studied the information related to m-Learning and formal part-time learner's

domain, while the interpretation reflects the meanings, exploring previous studies and discussion. Five databases were referenced in understanding and investigating the domains: Web of Science, IEEE, Scopus, Science Direct and Google Scholar. Keywords in searching for information using these references in the m-Learning domain included mobile learning, portable learning, and ubiquitous learning. Whereas, for the formal part-time learner's domain, the related keyword included adult learner, part-time learner, working student, tertiary learner and higher institution learner or students. The relevant articles discovered from these information sources were then rearranged listing the information obtained by Author, source, title, aim, problem, method, sample, findings, and future enhancement. As a result, the researcher decided to focus on the acceptance of m-Learning among formal part-time learners by highlighted the behaviour of such learners.

For the deductive study, developing hypotheses based on existing theory was undertaken, followed by designing a research strategy to test the hypotheses. Deductive approaches are often associated with quantitative research, thereby providing solid and repeatable conclusions. This begins with examining the various theories, acceptance theory and adult learning theory, and then testing the implications of such theories with the data. In other words, the theories transgress from a more general level to a more specific level. A deductive method can be described as an approach that people typically associate with scientific investigation. For instance, examining studies of other researchers and reading the existing theories of whatever phenomenon was being examined or researched before testing the hypotheses that emerge from those theories. Figure 4.2 outlines the steps in adopting a deductive approach to research.

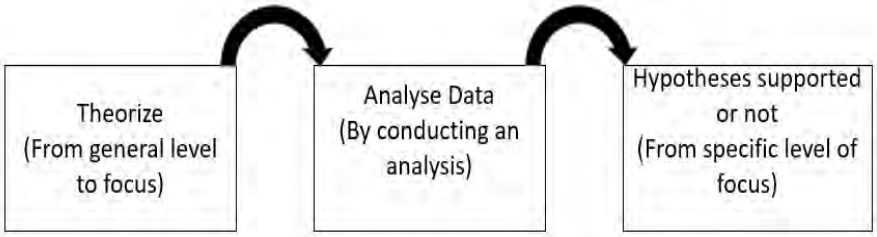

Figure 4.2: Steps involved in adopting a deductive approach

- **Framework Development**

  The development of the framework began once the hypotheses were confirmed using the deductive approach. The relationship between the attributes was created and the integrated components were shown. In this research, two components were identified and test together; Formal Part-time Learner's Component and Acceptance component. The attributes in each component are identified by using deductive approach.

- **Instrument Development and Data Collection**

  The questionnaire was developed as a multi-item measure using Likert-type scales, according to the confirmed attributes in the previous phase. The questionnaire was used mostly to seek the responses of the learners and to determine their behaviour (Sekaran, 2013). To collect the data, the questionnaire was disseminated to formal part-time learners. According to Fraenkel and Wallen (2007), a questionnaire can describe the characteristics of a population and provide an effective way of explaining people's ideas, thoughts and feelings. Results can be generated from the gathered data, and then, a generalisation of the population can be made using these results.

- **Data Analysis**

In the next step, the collected data were analysed using descriptive statistics and the inferential statistical method. Descriptive statistics can be described as the process of transforming raw data into valuable information to describe a set of attributes concerning the current phenomena or issues being studied (Sekaran, 2003). The statistics include frequencies, and measures of central tendency and dispersion, while inferential statistics infer the information of the population from the sample data by applying the following analyses: 1) the relationship between two variables; 2) differences in a variable among different subgroups, and 3) how several independent variables might explain the variance in a dependent variable (Sekaran, 2003).

In this research, the relationship between the endogenous variables, representing the behavioural intention and usage behaviour, and the exogenous variables, including performance expectancy, effort expectancy, social influence, facilitating condition, self-direction, prior experience, learning readiness and orientation to learning, was based on the framework designed via structural equation modelling (SEM). This research framework was designed from a comprehensive and critical study that was adapted from the theories and findings of previous researches.

SEM was employed in this systematic step to identify a suitable theory for the research guidelines in designing and specifying the model for this study. This was followed by identifying the criteria for the selection of representative samples for the data collection. The assumptions for the framework were then administered, followed by a comparison of the framework to the collected data. Once the framework had been standardised, the analysis that was performed was

discussed, and results were presented (Ramayah et al., 2018). Accordingly, the framework was used to test the relationship between the endogenous and exogenous variables for the selected research samples. Lastly, the m-Learning guidelines were developed based on the positive influence of the m-Learning attributes, which had been evaluated by experts.

4.3 Research Design

In this research, a single cross-sectional survey method was employed. This was because in this study, the data were gathered only once over a period of months to answer the research question (Sekaran, 2013). All the participating learners had experience of using mobile devices for personal learning. Neither the names of the respondents to the questionnaire nor those of the participating universities were mentioned in the study. All the subjects were informed about the research and all the participants who were included in the study provided their informed consent. All the respondents volunteered their participation and were given an assurance that their responses would remain anonymous, their confidentiality would be maintained, and their answers would be used only for research purposes. In fact, the research model was investigated based on the views expressed by the respondents at a point in time. This approach was employed, given theoretical and survey limitations, as samples from the population only need to be involved once for a specific duration period.

The information gained from the samples in this study was used to explain the situation of the current population and for future forecasting or prediction (Fraenkel & Wallen, 2007). Aside from that, employing a single cross-sectional survey method to this population was significant in comparing between the sub-groups, such as male and female. Data were collected from formal part-time learners between May to August of

2019 to study their concerns with regard to the use of m-Learning as their learning tool. The gathered data would be pertinent for finding answers to the research questions, and it was sufficient to collect the data at one point in time. The advantages of employing method are due to its affordability (i.e., low cost), high response rate compared to other methods, quick to gain results and can be used for analysis (Sekaran, 2003). Therefore, this method was used in this quantitative study given a large number of samples was needed, and a high response rate to achieve the objectives established for this research study.

4.3.1 Research Instrument

This section describes the steps undertaken in developing the research instrument, the questionnaire. The instrument was divided into three sections: Section A: Demographic questions; Section B: Acceptance Scale, and Section C: Formal part-time learner's scale.

The research instrument for Section B (Acceptance of Mobile Learning) was adapted from previous works (Al-Emran et al., 2020; Al-Saedi et al., 2020; Hoque & Sorwar, 2017) and consisted of 18 items. This measurement was adopted, given it focused specifically on the acceptance of the learners to adopt m-Learning as a medium of learning. Section C (Formal Part-time Learners' Behaviour) was adapted from (Cheon et al., 2012; Chiu et al., 2016; Fisher et al., 2001; Pintrich et al., 1991) consisting of 12 items. This research measurement was adopted since it focused specifically on part-time learners' attributes that generalised the principles of adult learners. All three sections were validated, restructured and redesigned for the specific purpose of determining the. However, several changes were made to the original items to ensure it suited the context of the study. As a result, 20 minor word changes were made, and no items were removed or added. The items in Sections B and C were measured using a 5-point Likert scale

ranging from “strongly disagree” (1) to “strongly agree” (5) as it is commonly used in acceptance study (Al-Emran et al., 2016, 2020; Al-Saedi et al., 2020; Diep et al., 2016; Hoque & Sorwar, 2017; Shorfuzzaman & Alhussein, 2016)

Ultimately, a questionnaire consisting of three sections was developed to respond to the research questions. The questionnaire was accompanied with a cover letter (including “informed consent”) that contained an appreciative note, seeking the participants’ cooperation in answering the questionnaire, instructions prior to completing the questionnaire and note about the confidentiality of respondents.

Regarding the nature and content of the questionnaire, Section A required demographic data provided by the respondents, namely, the learner’s background, career background and the respondent’s learning experience. Section B consisted of items that represented the variables under the acceptance of the mobile learning component, namely, Performance Expectancy, Effort Expectancy, Social Influences, Facilitating Condition, Behavioural Intention and Use Behaviour. Section C consisted of items that represented variables under the Formal Part-time Learning component scales that included, Self-directed, Prior Experience, Learning Readiness and Orientation to Learning. The last question was an open-ended question asking for the respondent’s feedback about the best approach or way of learning using a mobile device.

4.3.1.1 Demographic Question

The demographic questions were aimed at discovering the gender, occupation, programme, mode of study, field, year of study, working experience, age, marital status, and race. Questions closely relating to m-Learning usage and employment were also attached like engaging with m-Learning, m-Learning applications, mobile application

literacy, frequent use of mobile devices, readiness in using m-Learning and the main attributes that encouraged the respondents to pursue study. All of this information is important in identifying how significant those attributes relatively affect the acceptance and intention to use m-Learning and revise the relationship between independent variables.

4.3.1.2 Acceptance Scale

The following subsections, outline the six scales used to measure the acceptance level of m-Learning, that include performance expectancy scale, effort expectancy scale, social influence scale and facilitating condition scale.

(a) ***Performance Expectancy Scale***

Performance expectancy refers to the extent to which learners believe that using such technology will help them to gain benefits in their job performance. This is supported and justified in that performance expectancy has a positive influence on behavioural intention to use the technology (Venkatesh et al., 2003). Learners are convinced that employing m-Learning will assist them in gaining support in job performance. Even though they have the freedom to manage their time and study, the assistance from educators is still relevant and necessary in some cases (Al-Saedi et al., 2020) to assist them in gaining benefits regarding job performance. Therefore m-Learning as a tool can keep learners active, participate, comprehend material and experience all instructional elements during the learning session (Gartner & Krašna, 2015).

(b) Effort Expectancy Scale

Effort expectancy refers to the degree to which learners believe 'ease' is associated with the use of technology and is effortless to the user (Venkatesh et al., 2003). Moreover, their belief towards effort expectancy is when learners comfortably use the m-Learning technology to assist them and their peers, collaboratively and purposely as a resource for identifying and planning needs, and to give or receive help from their peers (Al-Saedi et al., 2020). This is because as adults transgress from self-concept to self-directed, their learning style becomes determined and look towards using m-Learning as a teaching and learning tool (Al-Emran et al., 2020). Empirical results have shown that an increasing level of effort expectancy will likewise increase the behaviour to use m-Learning. Furthermore, as a digital native, many learners feel quite comfortable using m-Learning technologies as they use mobile devices in carrying out activities like communication, planning, messaging, take a photo and checking the time.

(c) Social Influence Scale

Social influence can be described as the extent to which learners believe that individuals should use the new system (Venkatesh et al., 2003), and represents the extent to which adult learners perceive by looking at other important persons that they should use m-Learning. They also believe in social influences when learners use their experiences as the main resource for future use in learning (Al-Saedi et al., 2020). A study by (Al-Emran et al., 2020; Curum & Khedo, 2015) found that flexibility in m-Learning will help them gain experiences, and influence them to have a positive perception of this technology. This result differs from the findings of (Bere, 2013) that learners who had heard or were aware of bad experiences from people around them in using m-Learning would not participate in using this technology for m-Learning as a tool.

(d) ***Facilitating Condition Scale***

Facilitating conditions can be described as the technical structure that supports the necessary use of m-Learning. In other words, the organisation provided the infrastructure that assists in using such systems or technology (Venkatesh et al., 2003). Moreover, they believe in facilitating conditions as much as new developments in education which places the responsibility on the learners to take the initiative in the ownership of their learning, (Fisher & Tague, 2001; Siriwongs, P., 2015). As such, institutions will provide them with the Information and Communication Technology (ICT) infrastructure needed to support them in adopting and using the technology (Venkatesh et al., 2003), as they are typically viewed as a guide and resource in helping friends, especially when the learners become self-directed and take responsibility for meeting deadlines (Hoque & Sorwar, 2017). Therefore, to support facet, the institution should ensure the quality teaching is channelled through a virtual platform for life-long learning, supported by organised training and self-development (Hegyesi et al., 2014).

(e) ***Behavioural Intention towards m-Learning Scale***

Behavioural intention is seen as a critical mediator in the use of technology (Venkatesh et al., 2003). The prospect of adults using m-Learning is based on certain behaviour. As most adults have a mobile device; thus, this condition leads towards a high acceptance of m-Learning since it influences their behavioural intention to use it during their learning process. Acceptance itself can be defined as exploring the user's behavioural patterns (Al-Saedi et al., 2020) not only during the adoption phase, but also continuing to use the technology (Navarro et al., 2016). However, this means that the technology for learning and teaching should be tested and accepted by the learner at each phase of learning so that the efficiency of the process can be optimised. Not only evaluating the results and

performance but also considering the form of testing, including the learner's attitude and intention to use that, will eventually influence the actual use of the technology. Since acceptance is an individual act based on personalisation, rationally it is important to identify the learner's learning styles that influence their behaviour to realise the benefits that m-Learning can offer (Howard et al., 2017).

(f) ***m-Learning Usage Behaviour***

As mentioned earlier, the current study aimed to explore the adoption of m-Learning among formal part-time learners, given their behaviour and nature will influence the usage of m-Learning. In other words, a better understanding of the attributes that have a positive influence towards m-Learning usage behaviour may increase the possibility for learners' to continually use m-Learning (Lo et al., 2016). The study also adopts behavioural intention as a mediator for the learners' usage behaviour as the majority of past studies show an appropriate predictor of 'later usage' concerning m-Learning.

4.3.1.3 Formal Part-time Learner's Scale

This subsection presents the formal part-time learner's scale that consists of four principles adopted from the andragogy model that includes self-directed, prior experience, learning readiness and orientation to learning.

(a) ***Self-Directed Scale***

The current study intends to establish the use of m-Learning among formal part-time learners in order to facilitate their ability to learn effectively. Further, it is intended to be

used given it takes advantage of cloud-based technology that can be used to customise learning solutions. This also includes its flexibility in managing time and place as well. Also, self-directed, instruction using the technology should allow them to discover themselves. Most m-Learning solutions are not well designed and need improvement to attract users to participate in the learning process. As such providers of such solutions need to be highly motivated in recognising the advantages of m-Learning to inspire them to contribute more (Bere, 2014; El-Hussein & Cronje, 2010).

Within the domain of education, the independence of time and space provides a significant opportunity for learners to access information and engaging in virtual classrooms (Molnar & Szuts, 2014). However, in order for this to occur, the provision of a variety of access points and activities need to be in place to them to use and manage their learning.

(b) ***Prior Experience Scale***

Formal part-time learners tend to use their experience to represent a variety of subject matters. Therefore to create a good learning experience, we perceived that m-Learning should provide activities relating the past to the present in which the gap or void between academic and existing knowledge can be narrowed (Molnar & Szuts, 2014). Mobile technologies help to narrow this need by narrowing the gap and employing a combination of academia and knowledge and consequently used as tools to measure the relationship in reducing this gap (Karimi, 2016b). Interestingly, sounds, location, pictures, photos and documents can all be shared through m-Learning in delivering meaning, as well as educators and learners play an important role in adopting these tools (Karimi, 2016b). The basic notion from the perception of the class session is through providing more detail

on the subject matter via constructing their internal depiction, representation and meaning (Gartner & Krašna, 2015)

(c) Learning Readiness Scale

Identifying learner's readiness becomes most important. Proven by Shorfuzzaman & Alhussein (2016) in exploring UTAUT, they found that readiness among higher education learners was encouraging, further revealing that adults feel comfortable to participate in the learning process, especially since they consider the content is valuable and useful in respect to their job and social life. As such, these tools, such as m-Learning, should provide them to apply what they have learned in other aspects of their life. According to Knowles (1979), adults are less involved in active learning because of their biological growth and life stresses. However, as mentioned earlier, m-Learning effectively integrates the experience of m-Learning in their life and job situation.

(d) Orientation to Learning Scale

Formal part-time learners tend to solve problem-centred issues by applying them to their surrounding or associated environment. However, their problem-solving skills can be improved through a variety of m-Learning technologies and exercises (M. Sung, 2015), thereby enabling them to work to solve problems by considering the advantages of integrating both information and experience. Institutions nowadays attempt to implement mobile learning as part of their teaching medium, allowing flexibility and synchronisation in learning (Briz-Ponce et al., 2014).

4.4 Evaluation

This section outlines the procedures undertaken before distributing the questionnaire to formal part-time learners. The measurement procedure included language translation and the validity of the research instrument. The activities associated with the pilot test are also described later in this chapter, followed by data analysis, SEM software used to conduct a reflective measurement model and structural model including R^2, f^2 and Q^2 tests. The mediating effect for the research framework was measured to determine how the mediator mediated the relationship between the predictors. The last section discusses the development of the guideline and the validation of m-Learning in the context of higher educational institutions (HEIs) in Malaysia.

4.4.1 Research Instrument Validity

The validity of the research instrument is discussed in this section, to which all were already tested from the resources, as stated in Table 3.1. The table also shows items used for estimating the acceptance of m-Learning by formal part-time learners.

Table 4.1: Items used in estimating the acceptance of m-Learning by formal part-time learners

Items	Resource
Performance Expectancy ***PE1*** *I find mobile learning applications useful in my learning* ***PE2*** *Using mobile learning applications enables me to accomplish learning activities more quickly* ***PE3*** *Using mobile learning applications increases my learning productivity*	(Al-Saedi et al., 2020) and (Hoque & Sorwar, 2017)
Effort Expectancy ***EE1*** *My interaction with mobile learning applications would be clear and understandable* ***EE2*** *Learning how to use mobile learning applications would be easy for me* ***EE3*** *I would find mobile learning applications easy to use*	
Social Influence ***SI1*** *The people around me use mobile learning applications for learning purposes* ***SI2*** *My peers recommended that I should use mobile learning applications* ***SI3*** *Society has a high opinion for mobile learning applications in academic usage*	
Facilitating Condition ***FC1*** *My mobile device fulfils the minimum requirement of mobile learning applications* ***FC2*** *I have the resource necessary to use mobile learning applications* ***FC3*** *I have the knowledge necessary to use mobile learning applications*	
Behavioural Intention ***BI1*** *I would like to recommend mobile learning applications to other people* ***BI2*** *I tend to use mobile learning applications* ***BI3*** *I plan to use mobile learning applications frequently*	
Use Behaviour **UB1** *Mobile learning applications satisfies my educational needs* **UB2** *I am satisfied with performance of mobile learning applications* **UB3** Mobile learning applications give me self-confidence	(Al-Emran et al., 2020)
Self-directed ***SD1*** *I prefer to plan my own learning* ***SD2*** *I set goals for myself in order to direct my activities* ***SD3*** *Using mobile learning applications will lead to my exploration*	(Fisher, King, & Tague, 2001)
Prior Experience ***PrEx1*** *I took a short time to learn mobile technology use* ***PrEx2*** *I learn to explore ideas confidently with other people* ***PrEx3*** *It was easy to use m-Learning applications*	(Brown, Dennis, & Venkatesh, 2010)
Learning Readiness ***LR1*** *I would be in favour of utilising mobile learning applications in my coursework* ***LR2*** *I would believe that a mobile device could be a useful education tool in my coursework* ***LR3*** *I want to know more about mobile learning applications*	(Cheon, Lee, Crooks, & Song, 2012)
Orientation to Learning ***OL1*** *I try to apply ideas from the course in other courses* ***OL2*** *I prefer course material that really challenges me so that I can learn new thing* ***OL3*** *I pull together information from different sources such as lectures, readings and discussion*	(Opfer, Pedder, & Lavicza, 2011)

4.4.2 Measurement of the Language Translation Procedure

The purpose of this study was to establish the items for determining the language that would be well understood and delivered. A systematic approach was adopted in developing the scale.

First, a pre-test was performed involving five adult learners to confirm that the questionnaires had no semantic problems. Clarity surrounding the instrument involved the questions, length of the instrument, completeness of content and structure, which were found to be ambiguous and required adjustment based on feedback received from the five learners.

4.4.3 Instrument Expert Validation

The content validity of the instrument was established by consulting a group of experts who are a senior lecturer from four different higher education institutions in the field of m-Learning and adult learning. The experts were asked to comment, review, and refine the research instrument. From the review and subsequent discussions, several minor word changes were made, and no items were removed or added. Slight modifications were made to the wording, which resulted from the pre-test and content validity by the experts.

4.5 Research Population

The research population consisted of part-time learners enrolled in HEIs in Malaysia. The total of formal part-time learners, registered in institutions represented the population and of the research and for generalisation purposes as well. However, the population of interest was difficult to collect given its vast size, diversity which was scattered over a large geographic area; therefore, a smaller sample was selected (Fraenkel, 2007).

In initiating the data collection process, the population sample consisted of formal part-time learners registered in public institutions in Malaysia. The enrolled learning programmes covered a range of awards such as a Diploma, Bachelor's degree, Master's degree or PhD, and other formal learning programmes that were registered. A realistic population choice was needed to enable the researcher to use this as the basis for generalising the findings of the study (Jack R. Fraenkel et al., 2012).

4.5.1 Sampling Design

Sampling is used to collect information about a targeted population for estimating the characteristics of the population being studied. In other words, a sample is a subset of the population that represents the population itself. According to Sekaran (2003), random sampling is undertaken when the aim is to ensure that all the samples are not biased.

In establishing the sampling design, this section consists of two major subsections in designing the sampling framework. First, presenting a comprehensive review of the sampling technique. In this study, probability sampling was used, which is a cluster sampling technique. Secondly, identifying the required sample size.

4.5.1.1 Sampling Technique

There are two types of sampling methods, probability sampling and non-probability sampling. Probability sampling consists of four sampling techniques, namely, simple random, stratified, cluster and systematic, whereas non-probability sampling consists of five sampling techniques, namely convenience, snowball, self-selection, quota and purposive. Some researchers suggest a combination of snowball and purposive sampling techniques to outperform the sampling result.

Probability sampling is considered ideal because the probability of the sample represents the population. Here, statistical generalisation about the population becomes easy to measure. In some situation, regarding time or other factors, rather than generalisability becoming an issue, non-probability sampling is often used (Sekaran, 2003). The probability sampling technique that was used in this study was cluster sampling. Since this research sampling process involves formal part-time learners enrolled in public institutions, conducting a simple random sampling exercise was impractical given the difficulty to obtaining a list of registered formal part-time learners from the institutions in Malaysia and also given the confidentiality surrounding the data.

According to Fraenkel et al., 2012, the cluster sampling technique is suitably used when the researcher is unable to obtain a list of the population. Especially given the concern of the different attributes of the research population. Sekaran (2010) mentioned that if the study covered a relatively wide area, then there would be time and resource constraints. Therefore, cluster sampling was considered a suitable sampling technique.

In this research, the area under study was divided into five public universities in the Klang Valley, Malaysia which represented by university 1, University 2, University 3, University 4 and University 5. Each of the universities had their own Centre for Continuing Education, as a sole institution for adult learners to pursue their study. The selection of these five life-long learning centres was decided since the centre offered a part-time programme, and classes were conducted after office hours, during the weekend and online. Even as some students are unemployed, adhering to their many commitments was a key reason they chose to register for the weekend or after-hours classes.

Importantly, the centre's vision is to provide a 'centre of excellence' in the field of continuing education. The centre offers a flexible programme for working learners to attend a weekend or night class; however, to be eligible, the individual must be at least

21 years of age. The centre aims to enhance the individual's knowledge, skills, and competencies in terms of professional or self-development. The part-time programme is specially designed to enhance the skills and knowledge of the working community in advancing their careers and equips the learners with theories on didactics and practical skills to support their future careers.

University 1 was selected as a research area that offers programmes for part-time learners, such as an 'Executive Diploma' in various fields such like Management, Early Childhood Education, Counselling, Information Technology, Accounting Administration, Syariah and Usuluddin. All classes are conducted on Friday evening's and during the weekend at the centre. The deal has been made with the respective person and being follow up time to time by using phone. For University 2, its Centre for Continuing Education responsible as the centre for administering part-time programmes. The classes held at different faculties offering a part-time programme in the Faculty of Business and Management, Faculty of Economy, Faculty of Computer Science and Faculty of Accounting.

For University 3, the Centre for Continuing Education offers a part-time programme during the weekend conducted at the Faculty of Communication and Modern Language and the Faculty of Economy. The deal also has been made with their administration and being follow up time to time by using phone. In contrast, University 4 through the Centre for Continuing Education offers part-time programmes that include Bachelor of Education, Bachelor of Business Management and Master of Education programmes. Lastly, University 5 has been running a Diploma and Bachelor part-time programme in many fields such like a Bachelor of Accountancy, Bachelor in office system management and a Diploma in Halal Management. The sampling technique adopted for this study is summarised below:

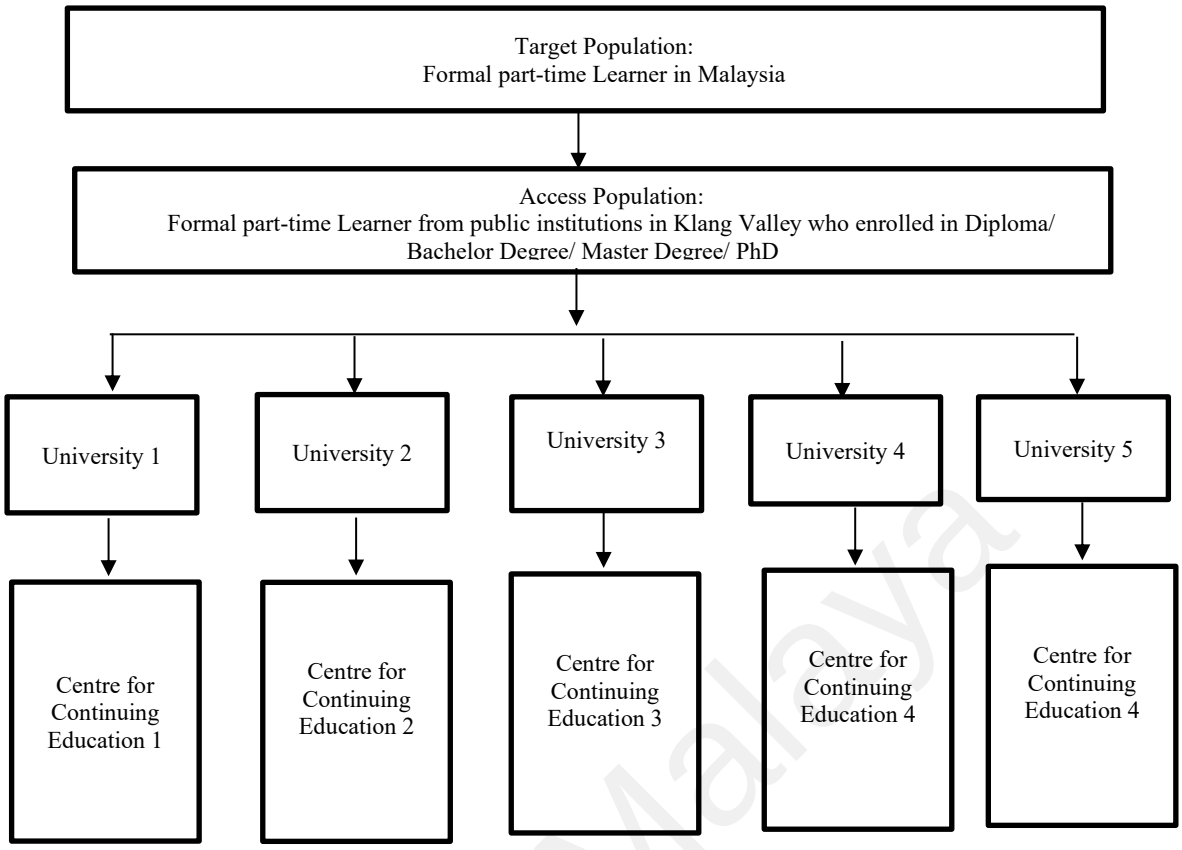

Figure 4.3: Cluster sampling

In this study, the Klang Valley area was the primary focus in order to be in a position to generalise the findings of the study. The population samples represented five universities, of which were divided into several segments, referred to as The Centres for Continuing Education, that conduct programmes for part-time learners ranging from 'certificate' courses to PhD degree programmes. The participants were recruited and characterised as formal part-time learners. Selecting this group of learners also lessened any form of bias.

Also, to ensure that respondents represented the targeted population, four criteria were established. Firstly, part-time learners must be registered in the formal education programme in public institutions in Malaysia. Additionally, they needed to have a matrix card that represented their unique identity number at the institution. Secondly, the

individual needed to be aged between 21 and 56 years, and thirdly, the individual needed to be studying part-time as this would also demonstrate a range of responsibilities relating to their present career, family, and other social commitments. Fourthly, the individual needed to be in a position to complete the questionnaire provided by the researcher within the period specified.

4.5.1.2 Sample Size

In selecting an appropriate sample size, many factors need to be considered. Generally, a large sample size will increase the accuracy of the statistical test(s). On the other hand, conducting research using a large sample size results in added costs and resources. Therefore, the researcher needed to identify a suitable method to identify the sample size for current research.

Many researchers in previous studies employed Structural Equation Modelling (SEM) to analyse research data. In this current study, several techniques were considered. According to Kline (2005), a complex model with many attributes needs a large sample size compared to parsimonious size. Further, for a path model, many researchers have suggested using a sample size equal to 200 or more (respondents). Sekaran (2010) suggested that the appropriate sample size should range between 30 and 500 respondents to be effective, whereas Hair (2010) suggest it should range between 200 and 500 respondents. Therefore, this study adopted the G*Power statistical tool to determine the sample size. G*Power is a free-to-use software that is commonly used to calculate statistical power in the social, behavioural and medical sciences. The program has the ability to calculate the power for a wide variety of statistical tests, including the t-test, F-test, and chi-square test, among others. Statistical power is influenced by four factors, namely, the level, difference between group means, variability among subjects, and

sample size. G*Power provides options for both numerical and graphical outputs. Table 4.2 shows the scope, the statistical background, and the handling of the correlation and regression power analysis procedures in G*Power 3.1.9.4

Table 4.2: Summary of the Correlation and Regression Test Problems by G*Power 3.1.9.4

Correlation Problems Referring to One Correlation	Comparison of a correlation, ρ with a constant ρ_0 (bivariate normal model) Comparison of a correlation, ρ with 0 (point biserial model) Comparison of a correlation, ρ with a constant, ρ_0 (tetrachoric correlation model)
Correlation Problems Referring to Two Correlations	Comparison of two dependent correlations, ρ_{jk} and ρ_{jh} (common index) Comparison of two dependent correlations, ρ_{jk} and ρ_{hm} (no common index) Comparison of two independent correlations, ρ_1 and ρ_2 (two samples)
Linear Regression Problems, One Predictor (Simple Linear Regression)	Comparison of a slope, *b* with a constant, b_0 Comparison of two independent intercepts, a_1 and a_2 (two samples) Comparison of two independent slopes, b_1 and b_2 (two samples)
Linear Regression Problems, Several Predictors (Multiple Linear Regression)	Deviation of a squared multiple correlation, ρ_2 from zero (*F*-test, fixed model) Deviation of a subset of linear regression coefficients from zero (*F*-test, fixed model) Deviation of a single linear regression coefficient, b_j from zero (*t*-test, fixed model) Deviation of a squared multiple correlation, ρ^2 from constant (random model)
Generalized Linear Regression Problems	Logistic regression Poisson regression

This research used linear regression to calculate the sample size and to predict the value of a variable based on the value of another variable (Erdfelder et al., 2009). The Behavioural Intention towards m-Learning was taken as the dependent variable, i.e., the variable that was to be predicted, while PE, EE, SI, FC, SD, PrEx, LR, OL were taken as the independent variables, i.e., the variables that would be used to predict the value of this dependent variable.

There are two types of linear regressions, namely, a simple linear regression and a multiple linear regression. A simple linear regression is used to establish the relationship between two variables using a straight line. It attempts to draw a line that comes closest to the data by finding the slope and intercept that define the line and minimize regression errors. Meanwhile, a multiple linear regression is used to establish two or more

explanatory variables that have a linear relationship with the dependent variable. Since this study consisted of eight independent variables that would be aligned to a single dependent variable, a multiple linear regression was used to calculate the sample size.

Figure 4.4 shows the result of the calculation for the sample size using G*Power 3.1.9.4. The details of the input parameters are shown in Figure 4.4. A single tail was used to concentrate the 0.05 probability. The entire 5% of the alpha level was concentrated in a single tail (in either the left or the right tail).

It was noted that the type of power analysis that was performed to determine the sample size was that of an 'a priori' analysis. From there, the number of tails, the value of the chosen significance level (α), and the powers, namely, 2, .05, and .9, respectively were stated. The only input that was requested was the effect size or the difference of the null and hypothetical means divided by the standard deviation.

From there, by pressing on the 'Calculate' button in the main window, the desired sample size was produced together with other statistics, which were, in descending order, the non-centrality parameter, δ, the critical point, t (the number of standard deviations from the null mean where an observation becomes statistically significant), the number of degrees of freedom, and the actual power of the test. In addition, a graphical representation of the test was shown, with the sampling distribution denoted by a dotted blue line, the population distribution represented by a solid red line, a red shaded area delineating the probability of a type 1 error, a blue area delineating the probability of a type 2 error, and a pair of green lines indicating the critical point, t. The new output parameters were shown using the 'Calculate' button.

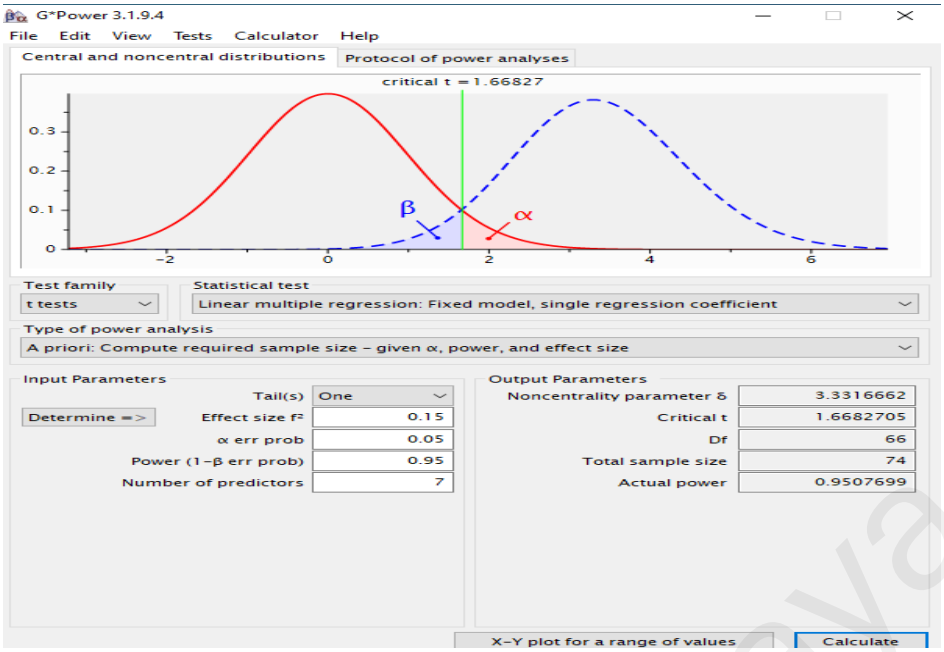

Figure 4.4: G*Power Statistical calculation

Finally, the minimum sample size was determined to be 59. Thus, no fewer than fifty-nine formal part-time learners had to participate in this survey in order to generate a statistically significant result with a power of 0.9.

In reference to the initial question and its outcome, it is important to note that the test took into account the effect size rather than the means themselves. As seen in the second half of the analysis, by adjusting the type of power analysis according to the given values and the unknown values, the requested output could be generated for an unknown effect size, significance level, and implied significance level with power, as well as the demonstrated ability to perform power and sample size calculations. In all cases, the unknown variable should be properly designated, followed by the entering of the given values as the input parameters.

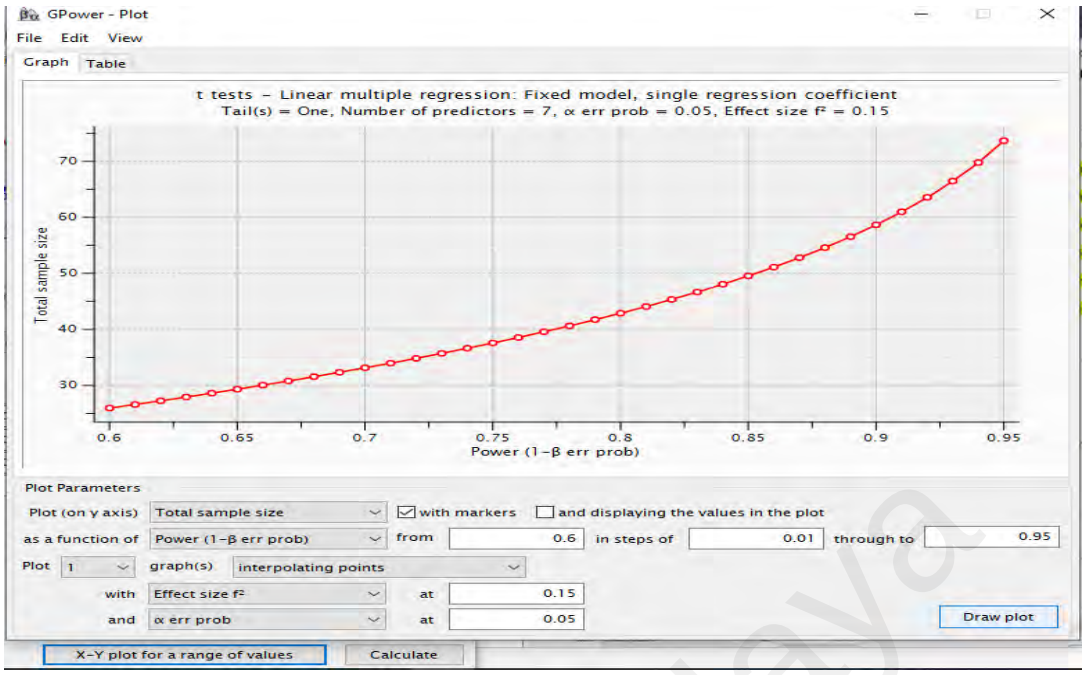

Figure 4.5: Output Parameters

4.6 Pilot Test

A pilot test was conducted to observe the validity, time taken to fill up the questions, common understanding, and interpretation of the questions by different target populations. The purpose of the pilot test was to refine the questionnaire so that the respondents would not encounter any problems in answering the questions, and also to ensure that there would be no problems in the recording of the data. According to Sekaran (2013), a pilot study aims to check item clarity, instructions, and the overall layout of the questionnaire and is often a smaller-sized study that assists in the planning and modification of the main study. Further, it is also intended to obtain feedback on the reliability and validity of the items, conformity of the items, answering format, interest of the questions and acceptable time for the questionnaire to be completed by the respondents.

In conducting the pilot study, a validated questionnaire based on a quantitative research design was distributed to 87 formal part-time learners enrolled at HEIs. The pilot study was conducted between February and April 2018. The number of respondents for the pilot test was determined by referring to the study by Johanson and Brooks (2010), where it was suggested that 30 representative participants from the population of interest are a reasonable minimum recommendation for a pilot study, where the purpose is a preliminary survey or scale development.

The pilot also uses samples having the same characteristics as the (real) samples that will be used in the main study, in terms of the setting and respondent's profile (such as the age, gender, etc.). A Cronbach alpha value over .70, with respect to the result, suggests acceptable reliability. Feedback from respondents also allowed the researcher to refine the instrument and items before proceeding with the main study and data collection.

4.7 Data Collection Method

A survey is a type of research methodology that looks closely and analyses the feedback of respondents. In this study, a survey was carried out in order to obtain information about m-Learning experiences in a predefined sample. The survey method was selected for the data collection in this study because of its ability to evoke a response from respondents and its high data collection capability, lower administration costs and guaranteed anonymity at a response rate of almost 100 percent. A questionnaire was used as the instrument in this survey method (Sekaran, 2013). The duration of the survey was open to respondents for close to four months. Formal part-time learners undertaking an undergraduate and postgraduate degree in public universities in Malaysia were invited to participate in the survey. Subsequently, a total of 429 formal part-time learners participated in the survey with 394 responses received and used for data analysis.

As mentioned earlier, the study was conducted at five different centres for formal part-time learners in public universities in Klang Valley, Malaysia. Despite the geographical differences, the five centres followed the guidelines and requisites on the specific competencies for formal part-time learners. The centres have the autonomy to organise and schedule formal part-time learning sessions. On average, the learners have between six to eight face-to-face meetings for each course organised bi-weekly in each semester. The learners are required to attend the classes and to participate in the learning activities such like conducting readings online, online discussions, self-assessments, and asynchronous online discussions either in preparation for face-to-face meetings or end-of-chapter evaluation. These activities are not graded in most courses. In answering the research questions, this allowed for a cross-sectional study to be undertaken, using the survey questionnaire, as the method of data collection.

Before data collection begin, email has been sent to the respective centre to ask for the permission to conduct the study and invite learners to participate in this survey. After obtaining permission (as attach in Appendix A), the learners were invited to complete the survey questionnaire. The approach adopted in this study would also improve the learner's ability to provide accurate answers and motivation to participate; hence minimising issues of common method bias (Lo et al., 2016; Soh et al., 2020).

In progressing the survey and data collection process, first, the questionnaire was presented transcribed into English and also back-translated into the participants' native language to ensure that the items could be clearly understood and interpreted by the respondent. The translators used the language and syntax that was appropriate to the learners' experiences. Second, before the participants started to complete the questionnaire, the researchers and in some cases, the instructors, introduced the study objectives, which emphasised the significance of the respondents' answers. More

importantly, anonymity was assured, and only those involved in the part-time programme in universities would have access to the questionnaire.

The questionnaire was distributed to the formal part-time learners in selected faculties, administered by the centres. In the introductory section of the questionnaire, the respondents were introduced to the concept of m-Learning before discussing the questionnaire. The participants were also informed about the voluntary nature of the survey, and that participants could withdraw at any time during the study due to inconveniences or other matters. After gaining permission (consent) from the respondents to participate in the survey, the questionnaire was distributed.

Data were collected and analysed from 429 undergraduate and postgraduate students enrolled in formal part-time programmes in public universities in Klang Valley. Thirty-five (35) survey questionnaires were removed as they failed to complete the questions. Therefore, 394 responses were used for the data analysis. During data collection, the respondents' details and information were not recorded and only specified individuals directly involved in the (e.g., coordinators, lecturers, class representatives) were allowed to access the data.

The following presents the data collection process, employing a cluster sampling technique. The data collection process started at University 2 in September 2018. The Head of The Centre provided their complete cooperation by providing part-time learners' class timetables and list of lecturers. Three of the lecturers provided positive feedback and inviting the researcher to disseminate the questionnaire amongst their students. The respondents were formal part-time learners from enrolled in the Bachelor of Business Administration and Bachelor of Economy programme. The class was conducted on Saturday and Sunday between 9 am and 5 pm. Eighty-five (85) respondents returned the questionnaire.

Next, was the Faculty of Modern Language and Linguistic, Faculty of Agriculture and Faculty of Business, University 3. The researcher obtained details of the part-time programmes from the university's website, and also information shared by the staff. The data collection process was undertaken towards the end of September 2018. In total, 93 respondents answered and returned the questionnaire.

While at University 4, the data collection process was undertaken in the Faculty of Education. Details of the programme were collected from the faculty website and through informal interviews and discussions with the students. In total, 78 questionnaires were completed and returned.

In University 1, the process to collect the data was at the Centre for Continuing Education during the weekend. All students were part-time learners who had enrolled in an Executive Diploma (Management, Accounting, Early childhood Education, Counselling, Shariah, Usuluddin and Information Technology). The researcher met the coordinators, followed by a brief phone call and email in asking their permission to collect the data. Following an interval of one week, they replied with positive feedback. As a result, 94 respondents returned the questionnaire to the researcher.

In University 5, the researcher contacted the Deputy Director of the Centre for Continuing Education to seek their permission and to determine the best approach to disseminate the questionnaire to their part-time learners. As a result, 79 respondents completed and returned the questionnaire to the researcher.

Overall, the data collection process lasted four months, between July 2018 and October 2018. Following the collection of data, any incomplete questionnaires were removed, in which 35 were rejected. The data were then entered into a Microsoft Excel worksheet and

IBM's "Statistical Package for the Social Sciences" (SPSS) for analysis. The table below presents a summary of the data collection process.

Table 4.3: Data collection approach

Higher institution	Numbers of respondent
University 1	94
University 2	85
University 3	93
University 4	78
University 5	79
Total	**429**

4.8 Data Filtering Process

The data filtering process was undertaken to ensure that the analysis was accurate and correct. First, the frequency of data for each attribute was calculated, and missing values were analysed using SPSS. This step was undertaken to ensure all data held answers.

4.9 Data Analysis

In this research study, data were analysed using descriptive and inference statistics to answer research questions. Descriptive statistics is defined as a technique in explaining the data and information by summarising the data set and information.

4.9.1 Structural Equation Modelling (SEM)

Structural Equation Modelling (SEM) is a statistical that integrates path analysis and factor analysis (T.Ramayah et al., 2018). SEM can also conduct other statistical functions such as a reliability test, calculating the significance of a relationship among the attributes and perform multi regression.

According to Byrne (2001), SEM is a popular methodology in non-experimental research and offers a technique to test any postulated integrating structural model and the structure from sample data. In this research, SEM analysis was used by using the Partial Least Square (PLS) programme version (v 3.2.7).

4.9.2 Reflective Measurement Model

This section presents the measurement model that was undertaken for the reliability and validity process, known as construct reliability and construct validity. Three tests were undertaken under construct reliability, namely, Cronbach alpha, composite reliability and factor loading. For construct validity, two types of validity were assessed: 1) Convergent validity 2) Discriminant validity.

Table 4.4: Construct reliability and construct validity tests

Measurement	Type of test	Purpose	Accepted value
Construct Reliability	Cronbach alpha	Measure of internal consistency on how closely related a set of items are as a group	More than 0.7 (Nunnally, 1994)
	Composite reliability	Internal consistency within-scale consistency of the responses to the items of the measurement	More than 0.7 (Nunnally, 1994)
	Factor loading	Per cent of variance in that indicator variable explained by the **factor**	Greater than 0.708 (Hair et al., 2017)
Construct Validity	Convergent validity	Degree to which two measures of constructs that theoretically should be related, are in fact related	AVE shows more than 0.5 (Hair et al., 2017)
	Discriminant Validity	Cross-loading is tested to indicate how strongly each item loads on the other (non-target) factors	the highest attribute over another (Hair et al., 2017)
		Fornall & Larcker is used to test the different traits	the highest attribute over another (Fornell & Larcker, 1981)

For the assessment of internal consistency, Cronbach's coefficient, and composite reliability (CR) were used. It is suggested that within each group of questions (Nunnally, 1994) that the value > = 0.7 would be considered as a priority, while the value > = 0.60 (Hair et al., 1998) would be considered acceptable.

Convergent Validity can be described as the degree to which indicators of a specific construct converge a high proportion of variance in common. As suggested by Hair et al. (2017), factor loading and the average variance extracted (AVE) are used to assess the convergent validity of reflective constructs, where a varimax rotation method is used to calculate the factor loading. It simplifies the loading of items by removing the middle ground and, more specifically, by identifying the factor upon which the data is loaded (Papadakis et al., 2020).

Discriminant validity is determined with an AVE greater than 0.70 and greater than the square of the correlations. Moreover, indicators should load more strongly on their own constructs than on other constructs in the framework, and the average variance shared between each construct and its measures should be greater than the variance shared between the construct and other constructs (Fornell & Larcker, 1981). Using cross-loading to assess discriminant validity, each indicator must load high compared to its cross-loading values to other latent variables in the SEM model.

4.9.3 Structural Model Measurement (SMM)

In this section, the structural model is measured by conducting four tests which include bootstrapping, coefficient of determination, effect size and blindfolding. The structural model measurement is required in order to analyse the structural relationship between the

measured variables and latent constructs by testing the hypotheses on the structural relationship.

4.9.3.1 Bootstrapping

Bootstrapping is the process of checking the level of significance for the path coefficient. The purpose of this measurement is to assess the significance and relevance of the structural model relationships. Since SmartPLS does not make an assumption about the distribution of data, the bootstrapping procedure must be considered; otherwise, the t-values will be inflated or deflated, which lead to a Type 1 error. In the bootstrapping procedure, a large number of subsamples (5000) are taken from the original sample with replacement to determine bootstrap standard errors, which in turn give approximately t-values for significance testing. Additionally, the bootstrapping result approximates the normality of data. The reason for this is that the character of PLS-SEM is distribution-free (Hair et al., 2012). As such, the standard errors used in the calculation of t-values are calculated from the bootstrapping procedure. The purpose is to avoid inflation and deflation of the standard errors due to non-normality issues.

The significance of the relationship is also important to assess the relevance of the significance of relationships. The significance of structural model path coefficients can be interpreted relative to one another. If one path coefficient is larger than another, its effect on the endogenous latent variable is greater. These coefficients represent the estimated change in the endogenous attributes for a unit change in predictor attributes.

The t-values can be compared with the critical values from the standard normal distribution to decide whether the coefficients are significantly different from zero. The

critical values for significance levels of a one-tailed test for 5% (a = 0.05) probability of error = 1.645, respectively.

4.9.3.2 R^2 for Coefficient of Determination

The Coefficient of Determination score (R^2) was used to evaluate the framework's predictive accuracy and represents the amount of variance in the endogenous attributes explained by all of the exogenous attributes linked to it. The effect ranges from 0 to 1, having higher values indicates higher levels of predictive accuracy. In measuring the R^2, Chin (1998)'s guideline was used. The value of 0.67, 0.33, and 0.19 represent substantial, moderate, and weak predictive accuracy, respectively.

4.9.3.3 Effect size, f^2

Cohen's f^2 can be used to evaluate the effect size of the predictor attributes (Cohen, 1988); f^2 also measures all the standardised, average effect in the population across all levels of the independent variables. Specifically, it assesses how strongly one exogenous attribute contributes to explaining certain endogenous attributes regarding R^2. The value of R^2 is estimated with particular attributes, and if one of the predecessor attributes is excluded, the R^2 value will be lower. Hence, the effect size is evaluated when there is a difference in R^2 values after estimating the model with and without the predecessor attributes.

According to Cohen (1988), f^2 result was determined by three categories known as substantial (0.35), medium (0.15) and small effect size (0.02) respectively. If an exogenous attribute contributes to explaining endogenous attributes, R^2 differences between included and excluded will also be high, which will lead to a high f^2. In this

research, Cohen (1988)'s categories were referred to (the value of 0.35, 0.15 and 0.02 represent substantial, medium, and small effect size, respectively). The formula below presents the calculation of effect size, $f^{2,}$ and the differences of R^2 included and R^2 excluded.

$$f2 = \frac{R^2 \text{ included} - R^2 \text{ excluded}}{1 - R^2 \text{ excluded}}$$

4.9.3.4 Blindfolding, Q^2

Q^2 is a criterion used to evaluate how well the framework predicts the data (Predictive relevance) (Ramayah, Cheah, Chuah, Ting & Memon, 2018). Cross-validated redundancy was interpreted, focusing on predicting the data of the target DV (endogenous construct) by its IV. In this procedure, data in the data file is omitted, and the calculation is performed on how accurate the framework predicts the omitted data. The data are then reinserted into the data file, and other data are omitted for prediction. The procedure is performed several times called the omission distance (5-10), and an average value for prediction is calculated (1-SSE/ SSO) (Ramayah, Cheah, Chuah, Ting & Memon, 2018). In this study, the omission distance was established as 7 (must not be an integer).

4.9.4 Mediating Effect

This section presents how one variable increases the predictive validity of another variable when included in a regression equation. In this research, 13 mediating effects were tested, and the relationship among these attributes was developed. Mediating effects are used to establish the framework by explaining the process that underlies an observed

relationship between an independent variable and a dependent variable. At the same time, the mediator is a third hypothetical variable that explains how an element or behaviour takes on the relationships between the IV and DV.

The purpose of the mediating effect in this study was to determine how performance expectancy mediated the relationship between the predictors self-directed, prior experience, learning readiness, orientation to learning and behavioural intention, effort expectancy mediates the relationship between the predictor self-directed, and behavioural intention and behavioural intention mediates the relationship between the predictors (Self-directed, prior experience, learning readiness, performance expectancy, effort expectancy, social influence, facilitating condition) and usage behaviour.

4.10 The Development of m-Learning Guideline for Higher Education Institution

As learning theories become more advanced and instructional implications about the features of a learning environment become known, an m-Learning guideline can be used to define particular qualities and encourage, or otherwise influence the learner to use m-Learning (Bernacki et al., 2019). While developing a successful scheme of effective learning using technology, however, is challenging, and therefore a guideline should be prepared (Bernacki et al., 2019).

A commonly used method for m-Learning research is by reducing the complexity by selecting a subset of the m-Learning model components and testing relatively straightforward assumptions about the perceptions of m-Learning by higher institution learners. This approach provided valuable insight into how critical the components of a complex mobile learning network conduct themselves. As a result, the framework often ignores the consequences of other m-Learning features (Bernacki et al., 2019).

Items Source Selected

The source of the items contains the framework attributes of importance. The source chosen for this guideline was focused on the attributes that show a positive impact on behavioural intention. To avoid any misunderstanding of the terms, it is necessary first to identify the key concept because most of m-Learning guideline practitioners and readers can interpret it differently (Paananen et al., 2020).

4.11 Summary

This chapter presented and described the methodology adopted in this study to answer the research questions. The research design and sampling were supported, employing the cross-sectional method. The cluster sampling technique (probability sampling) was also used defining and grouping of categories in this study. The questionnaire instrument was administered through face-to-face discussions and via class sessions. Two measurement components were employed, namely, the acceptance scale and adult learner scale. Data were analysed using descriptive and inferences statistics during the answering sessions. Lastly, the guideline development process discussed and validated based on the data analysis results.

CHAPTER 5: RESEARCH FINDINGS

This chapter discusses the results and finding from the analysis of the attributes that influence the acceptance of m-Learning by formal part-time learners in Malaysia. To achieve the research objectives and answer the research questions, two types of statistics were used as a means to achieved research: 1) Descriptive statistics in describing the basic features of the formal part-time learner in Malaysia based on the behaviour of adult learners and evaluating their acceptance of m-Learning. 2) focusing on the development of the acceptance framework of formal part-time learners employing Structural Equation Modelling (SEM). Finally, the findings from the expert's validation in developing the guideline are also discussed. To analyse the data, two software applications were used, IBM SPSS v.21 and SmartPLS (v 3.2.7).

5.1 Result

This section presents and discusses the results of the analysis from the data collection process. All data were analysed using SmartPLS (v.3.2.7). A few processes were undertaken to ensure the reliability, trustworthiness, credibility and replicability of the data analysis. For example, the data collection process was managed by the researcher personally, starting from the designing of the questionnaire, obtaining the validation of experts, dealing with five HEIs (Appendix B), distributing and collecting the questionnaires from formal part-time learners in life-long learning centres at University 1, University 2, University 3, University 4, and University 5, which solely promote and offer programs for part-time students. The term 'formal part-time learners' was also defined and confirmed to ensure the characteristics of the respondents. Therefore, in terms of the credibility of the dataset, it could be affirmed that the data collection process had been properly managed by following specific procedures and referring to the right

resources. Additionally, the proposed framework was also developed by referring to the literature and the theories before it was validated using SmartPLS. Thus, other scholars in the fields of mobile technology and adult learning can extend their research by implementing it in other countries. The acceptance of mobile technology can not only be measured in the HEI environment, but also in other fields such as in health, sports, banking and e-commerce activities.

Therefore, the implementation of m-Learning opportunities that yield observable improvements in learning outcomes is likely to be most successful when the design of learning activities is guided by a theory of adult learning and acceptance of the ways in which formal part-time learners engage in learning seamlessly across environments. The developed framework was subjected to a rigorous investigation, evaluation, and validation to ensure its reliability (Bernacki et al., 2019).

5.1.1 Respondent's Demography Information

This subsection presents the findings from analysing the demographic data collected from the sample of participants in this research. The demographic analysis also presents the background and pattern of the sample which include gender, job status, Programme, Mode, Field, Year, Working Experience, Age, Status, Race, Mobile Literacy, m-Learning Readiness and Mobile (device) Frequent Use. The results of the analysis are presented next.

Table 5.1: Distribution of demographic respondent (N = 394)

	Characteristics		Frequency	Percentage %
Gender	1	Male	133	33.8
	2	Female	261	66.3
Occupation	1	Employ	336	85.5
	2	Retirees	1	0.3
	3	Self-employed	30	7.6
	4	Not working	26	6.6
Programme	1	Diploma	54	13.7
	2	Degree	214	54.4
	3	Master	78	19.8
	4	PhD	48	12.2
Mode	1	Full-Time	0	0
	2	Part-time	394	100
Field	1	Management	63	16
	2	Islamic Studies	19	4.8
	3	Education	74	18.8
	4	Science	11	2.8
	5	Computer Science & Information Technology	31	7.9
	6	Medical	2	.5
	7	Accounting	19	4.8
	8	Engineering	17	4.3
	9	Business	83	21.1
	10	Other	75	19
Year	1	Year 1	102	25.9
	2	Year 2	115	29.2
	3	Year 3	105	26.6
	4	Year 4 and above	72	18.3
Work Experience	1	Less than 5 years	199	50.5
	2	6 – 10 years	103	26.1
	3	11 – 20 years	67	17
	4	21 years and more	25	6.3
Age	1	25 and below	134	34.0
	2	26 -35	178	45.2
	3	36 – 46	67	17.0
	4	47 and above	15	3.8
Status	1	Single	208	52.8
	2	Married	183	46.4
	3	Other	3	0.8
Race	1	Malay	304	77.2
	2	Chinese	12	3
	3	Indian	70	7.8
	4	Other	8	2.0

Table 5.1 continued

Literacy	1	Excellent	118	29.9
	2	Good	202	51.3
	3	Average	72	18.3
	4	Weak	2	0.6
Readiness	1	High	219	55.6
	2	Moderate	162	41.1
	3	Not ready	8	2.0
	4	Don't think so	5	1.3
Frequently Use	1	5 hours and less	113	28.7
	2	6 - 9 hours	181	46.0
	3	10 - 14 hours	67	17.0
	4	More than 15	33	8.4

Formal part-time learners, in particular, like to share their ideas and information by posting comments and uploading media files about their studies on social networking sites, in addition to using chats and communication software to discuss issues regarding their studies with classmates and instructors. These observations can serve as evidence to show that social network functions and capabilities are familiar technological tools that can be used to assist in their learning, as shown in Figure 5.1.

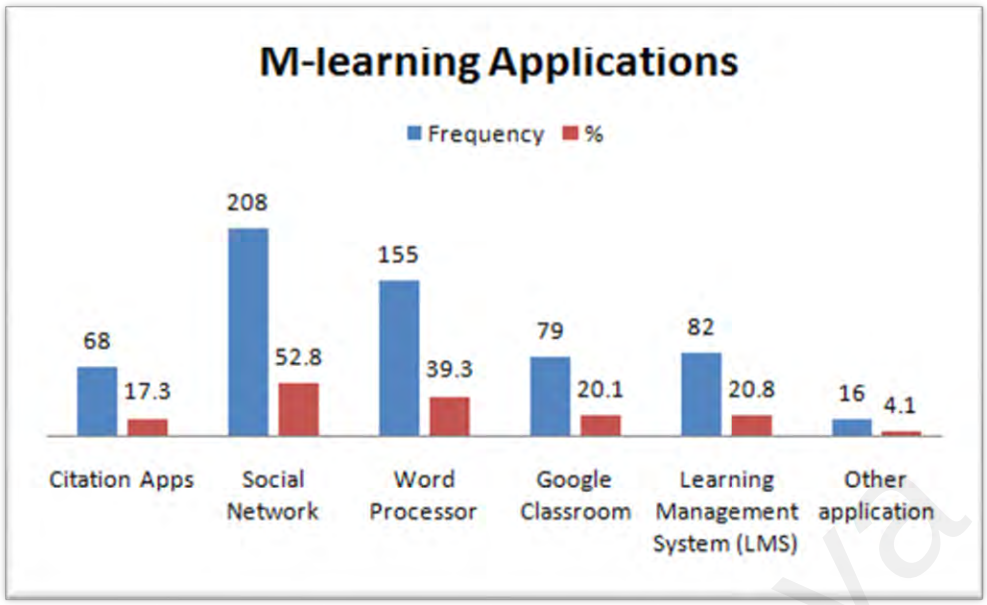

Figure 5.1: m-Learning applications

Figure 5.2 below shows the various activities selected by formal part-time learners in the frequent use of mobile devices. This particular question provided the option for formal part-time learners to choose more than one answer. This feature helped to identify the learning style of formal part-time learners. This could also help in designing the m-Learning environment that suits formal part-time learners.

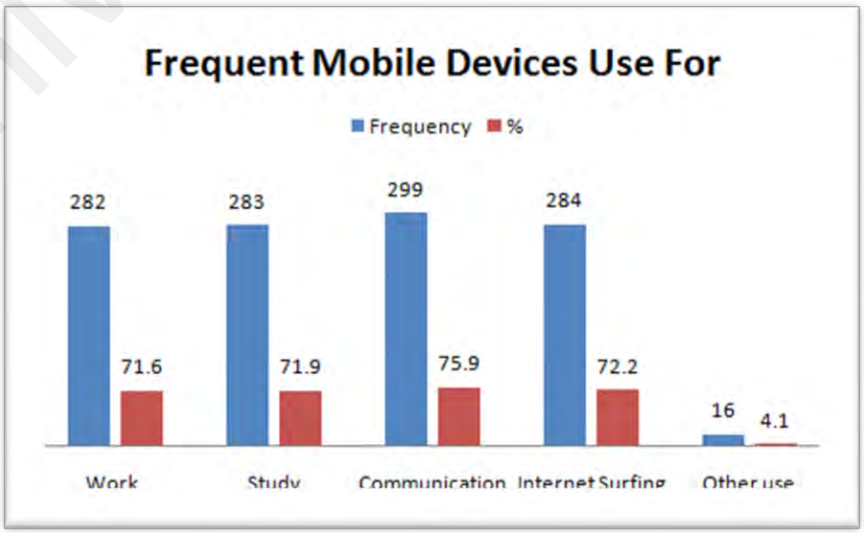

Figure 5.2: Frequent use of mobile devices

Concerning the general use of mobile devices, most used their device for daily communication with friends and family via e-mail, WhatsApp and social media. Internet surfing which was next represented at (72.2%), followed by 71.9% using mobile devices for study and learning activities and 71.6% for work-related activities. While 'other' use at (4.1%) reflected devices used to conduct online transactions, play games (entertainment) and for personal management.

Figure 5.3, as shown below, signifies that (37.3%) of learners pursue m-Learning under their own initiative, while (23.1%) use it to fulfil work requirements, (21.8%) to gain a better salary and (13.7%) to gain a better position. Only 4.1% of respondents had other reasons to engage in further studies, such as being forced to study by their parents and for other reasons not mentioned here. There were some instances where different attributes that triggered respondents to further their study having different consequences as well at the conclusion of their study. No strong or significant attributes were evident that would lead to weak determination and motivation to complete their study.

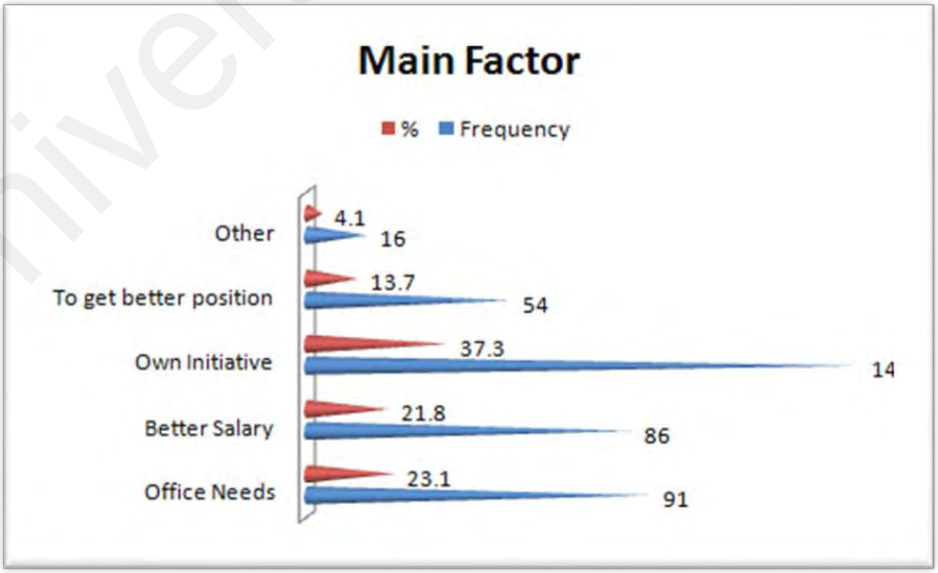

Figure 5.3: Main factors that encourage formal part-time learners

5.1.2 Measurement Model Assessment Result

SmartPLS 3.0 was used to analyse the data in this study. A data set representing formal part-time learner's (n = 87) was used.

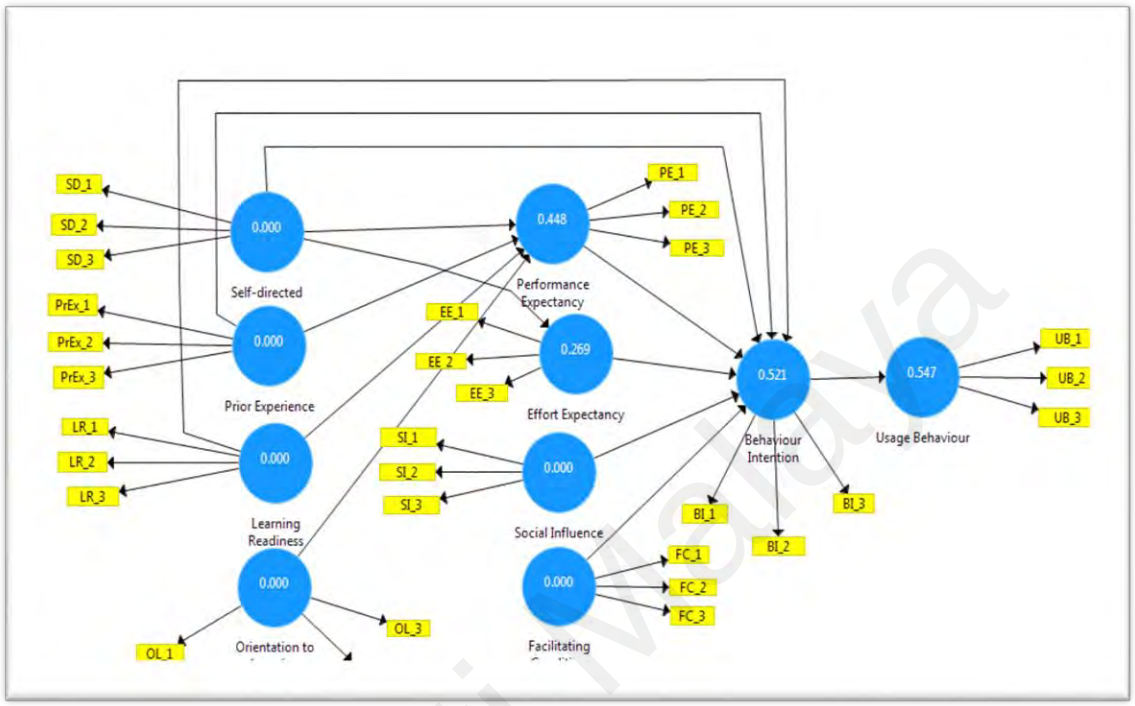

Figure 5.4: Initial stage of the measurement framework

The variables represented in the data included self-directed (SD_1, SD_2, SD_3), Prior Experience (PrEx_1, PrEx_2, PrEx_3), Learning Readiness (LR_1, LR_2, LR_3), Orientation to Learning (OL_1, OL_2, OL_3), Performance Expectancy (PE_1, PE_2, PE_3), Effort Expectancy (EE_1, EE_2, EE_3), Social Influence (SI_1, SI_2, SI_3), and Facilitating Condition (FC_1, FC_2, FC_3) as exogenous variables.

Behavioural Intention (BI_1, BI_2, BI_3) and Usage Behaviour (UB_1, UB_2, UB_3), represented the endogenous variables. Figure 5.4 above illustrates the initial stage of assessing the reflective measurement framework. Two measurements were applied, construct validity and construct reliability.

The model comprises latent constructs reflected by their indicators. In order to ensure the reliability, internal consistency of a group of statements related to the concepts included in the research, these needed to be tested. As mentioned earlier, the aim was to examine the implementation of m-Learning and conduct a pilot study to assist in confirming the survey instrument and process to be adopted for the main survey. The questionnaire was designed based on the attributes signifying 'acceptance' and also supported by the adult learning theory. The aim was also to confirm the reliability and validity of items, and instrument, before the main data collection stage. As such, a pilot study was conducted of formal part-time learner's context consisting of 87 respondents. In evaluating the results from the pilot study, a quantitative approach was adopted. The results of the quantitative approach and analysis of the process and data was positive, confirming the reliability and validity of the items and instrument.

As shown in Table 5.4 below, the results show the Cronbach alpha for all constructs with acceptance values of 0.7, and above and composite reliability (CR) greater than 0.7. All the loadings that exceeded the recommended value of 0.708 (Hair et al., 2017) were retained. Additionally, all ten constructs met the threshold value for AVE, meaning that all AVEs ranged between 0.686 and 0.861, which are greater than 0.5 (Hair et al., 2017). Hence both criteria for convergent validity are satisfied. As such, it can be concluded that the constructs meet the requirement for reliability and convergent validity at this stage.

Table 5.2: Convergent Validity – Construct reliability and validity and factor loading between the indices.

	Indicators	Factor loadings	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Behavioural Intention	BI_1	0.907	0.919	0.920	0.949	0.861
	BI_2	0.939				
	BI_3	0.937				
Effort Expectancy	EE_1	0.851	0.872	0.872	0.922	0.797
	EE_2	0.917				
	EE_3	0.91				
Facilitating Condition	FC_1	0.898	0.906	0.913	0.941	0.842
	FC_2	0.959				
	FC_3	0.895				
Learning Readiness	LR_1	0.897	0.878	0.878	0.925	0.804
	LR_2	0.918				
	LR_3	0.875				
Orientation to Learning	OL_1	0.878	0.818	0.822	0.892	0.734
	OL_2	0.821				
	OL_3	0.87				
Performance Expectancy	PE_1	0.906	0.893	0.894	0.934	0.824
	PE_2	0.905				
	PE_3	0.912				
Prior Experience	PrEx_1	0.821	0.776	0.882	0.867	0.686
	PrEx_2	0.734				
	PrEx_3	0.919				
Self-directed	SD_1	0.866	0.815	0.838	0.887	0.724
	SD_2	0.859				
	SD_3	0.828				
Social Influence	SI_1	0.896	0.852	0.853	0.910	0.771
	SI_2	0.861				
	SI_3	0.877				
Usage Behaviour	UB_1	0.937	0.918	0.924	0.948	0.859
	UB_2	0.936				
	UB_3	0.908				

Table 5.5 below indicates that all constructs exhibit sufficient discriminant validity (Larcker, 1981), where the square root of AVE (diagonal) is larger than the correlations (off-diagonal) for all reflective constructs. Thus, the pattern of loadings and cross-loadings support internal consistency and discriminant validity.

Table 5.3: Discriminant validity using Fornell-Larcker Criterion

	Behavioural Intention	Effort Expectancy	Facilitating Condition	Learning Readiness	Orientation to Learning	Performance Expectancy	Prior Experience	Self-directed	Social Influence	Usage Behaviour
Behavioural Intention	**0.928**									
Effort Expectancy	0.718	**0.893**								
Facilitating Condition	0.735	0.772	**0.917**							
Learning Readiness	0.72	0.613	0.635	**0.897**						
Orientation to Learning	0.561	0.503	0.606	0.564	**0.857**					
Performance Expectancy	0.797	0.774	0.688	0.68	0.518	**0.908**				
Prior Experience	0.637	0.551	0.753	0.573	0.616	0.56	**0.828**			
Self-directed	0.531	0.519	0.573	0.627	0.458	0.626	0.503	**0.851**		
Social Influence	0.736	0.619	0.601	0.494	0.357	0.65	0.432	0.446	**0.878**	
Usage Behaviour	0.703	0.497	0.613	0.636	0.345	0.631	0.449	0.477	0.615	**0.927**

Table 5.6 below depicts the discriminant analysis of comparing the cross-loadings between the constructs. As shown in the table, all indicators of some constructs are loaded high while low on other constructs. This indicates that discriminant validity is achieved as the constructs are distinctly different from each other.

Table 5.4: Cross loading

	Behavioural Intention	**Effort Expectancy**	**Facilitating Condition**	**Learning Readiness**	**Orientation to Learning**	**Performance Expectancy**	**Prior Experience**	**Self-directed**	**Social Influence**	**Usage Behaviour**
BI_1	**0.907**	0.613	0.653	0.563	0.44	0.67	0.55	0.417	0.687	0.664
BI_2	**0.939**	0.7	0.716	0.704	0.539	0.767	0.621	0.54	0.695	0.629
BI_3	**0.937**	0.684	0.677	0.733	0.577	0.778	0.6	0.517	0.667	0.665
EE_1	0.651	**0.851**	0.612	0.4	0.415	0.659	0.445	0.452	0.584	0.391
EE_2	0.644	**0.917**	0.735	0.594	0.49	0.683	0.554	0.426	0.533	0.467
EE_3	0.628	**0.91**	0.722	0.646	0.443	0.729	0.477	0.51	0.54	0.472
FC_1	0.718	0.711	**0.898**	0.563	0.57	0.614	0.649	0.483	0.644	0.534
FC_2	0.692	0.727	**0.959**	0.576	0.579	0.657	0.716	0.529	0.548	0.618

Table 5.6 continued

FC_3	0.602	0.686	**0.895**	0.613	0.513	0.624	0.714	0.574	0.445	0.532
LR_1	0.634	0.634	0.625	**0.897**	0.454	0.628	0.568	0.626	0.496	0.637
LR_2	0.599	0.537	0.563	**0.918**	0.481	0.612	0.455	0.568	0.377	0.625
LR_3	0.701	0.478	0.519	**0.875**	0.578	0.588	0.516	0.495	0.453	0.453
OL_1	0.559	0.514	0.565	0.533	**0.878**	0.453	0.523	0.397	0.378	0.39
OL_2	0.394	0.344	0.482	0.391	**0.821**	0.415	0.514	0.333	0.318	0.269
OL_3	0.482	0.429	0.509	0.518	**0.87**	0.461	0.545	0.442	0.224	0.227
PE_1	0.729	0.691	0.618	0.55	0.481	**0.906**	0.454	0.508	0.579	0.507
PE_2	0.726	0.748	0.649	0.672	0.426	**0.905**	0.516	0.624	0.612	0.622
PE_3	0.715	0.666	0.606	0.624	0.505	**0.912**	0.553	0.568	0.578	0.584
PrEx_1	0.412	0.448	0.592	0.353	0.433	0.411	**0.821**	0.387	0.261	0.226
PrEx_2	0.396	0.324	0.465	0.431	0.427	0.301	**0.734**	0.35	0.352	0.378
PrEx_3	0.694	0.553	0.757	0.596	0.625	0.605	**0.919**	0.488	0.438	0.477
SD_1	0.416	0.425	0.461	0.458	0.288	0.498	0.402	**0.866**	0.406	0.337
SD_2	0.321	0.312	0.315	0.375	0.285	0.44	0.355	**0.859**	0.317	0.276
SD_3	0.559	0.534	0.615	0.69	0.533	0.614	0.491	**0.828**	0.396	0.54
SI_1	0.632	0.502	0.583	0.369	0.407	0.567	0.408	0.399	**0.896**	0.594
SI_2	0.621	0.596	0.525	0.458	0.221	0.557	0.324	0.319	**0.861**	0.529
SI_3	0.682	0.535	0.479	0.471	0.31	0.587	0.403	0.451	**0.877**	0.5
UB_1	0.707	0.512	0.621	0.607	0.338	0.574	0.483	0.452	0.603	**0.937**
UB_2	0.624	0.481	0.59	0.566	0.317	0.611	0.407	0.467	0.551	**0.936**
UB_3	0.618	0.382	0.486	0.595	0.303	0.57	0.351	0.406	0.552	**0.908**

5.1.3 Structural Model Assessment Result

In this section, the assessment of the structural model regarding the acceptance of mobile learning by formal part-time learners is reported. The measurement assesses the acceptance or rejection of the hypotheses and calculated via bootstrapping, R^2, f^2, Q^2 and the mediating effect as well, and focuses on the relationship between the latent variables. In this research, the structural model assessment is undertaken to test the relationship between the exogenous variables (performance expectancy, effort expectancy, social influence, facilitating condition, self-directed, prior experience, learning readiness and orientation to learning) and the endogenous variables (behavioural intention and usage behaviour).

It was hypothesised that performance expectancy, effort expectancy, social influence, facilitating condition, self-directed, prior experience, learning readiness and orientation to learning will affect behavioural intention and usage behaviour.

Table 5.5: Bootstrapping result

Parameter	Original Sample (O)	Sample Mean (M)	Standard Deviation (SD)	T Statistics (|O/SD|)	*P Values*	Result
SD→PE	0.239	0.241	0.055	4.333	*0***	Accepted
SD→EE	0.583	0.585	0.037	15.884	*0***	Accepted
PrEX→PE	0.005	0.001	0.052	0.096	*0.462*	Reject
LR→PE	0.551	0.547	0.063	8.687	*0***	Accepted
OL→PE	0.048	0.051	0.066	0.728	*0.233*	Reject
SD→BI	0.105	0.109	0.055	1.922	*0.027**	Accepted
PreX→BI	-0.006	-0.005	0.030	0.211	*0.416*	Reject
LR→BI	0.171	0.177	0.082	2.097	*0.018**	Accepted
PE→BI	0.123	0.125	0.06	2.07	*0.019**	Accepted
EE→BI	0.225	0.223	0.067	3.372	*0****	Accepted
SI→BI	0.148	0.151	0.049	2.999	*0.001***	Accepted
FC→BI	0.223	0.215	0.098	2.273	*0.012**	Accepted
BI→UB	0.819	0.82	0.022	37.508	*0****	Accepted

*Note: *p < 0.05, **p < 0.01, ***p < 0.001*
SD – Self-directed; PrEx – Prior Experience; LR – Learning Readiness; OL – Orientation to Learning; PE – Performance Expectancy, EE – Effort Expectancy; SI – Social Influence; FC – Facilitating Condition; BI – Behavioural Intention; UB – Usage Behaviour

Observing the relative importance of the exogenous constructs in predicting the dependent attribute (Behavioural Intention) in Table 5.7, it is evident that effort expectancy (EE = 0.225) is the most important predictor, followed by facilitating condition (FC = 0.223), learning readiness (LR = 0.171), social influence (SI = 1.48), performance expectancy (PE = 0.123) and then self-directed (SD = 0.105). Prior experience (PrEx = -0.006) shows a negative relationship to the exogenous attribute, suggesting a non-significant relationship. The endogenous attribute of usage behaviour and the factor of behavioural intention has a strong effect on behavioural intention (BI = 0.819).

As shown Table 5.7, the t-value among the factors of influencing behavioural intention, self-directed ($\beta = 0.105$, $t = 1.922$, $p < 0.01$), learning readiness ($\beta = 0.171$, $t =$

2.097, p < 0.01), performance expectancy (β = 0.123, t = 2.07, p < 0.01), effort expectancy (β = 0.225, t = 3.372, p < 0.01), social influence (β = 0.148, t = 2.999, p < 0.01), and facilitating condition (β = 0.223, t = 2.273, p < 0.01) show a significant effect, respectively. Thus, hypotheses H6, H8, H9, H10, H11 and H12 are accepted.

Among the attributes influencing performance expectancy, learning readiness (β = 0.551, t = 8.687, p < 0.01) and self-directed (β = 0.239, t = 4.333, p < 0.01) with hypotheses H4 and H1, showed the level of significance, while self-directed (β = 0.583, t = 15.884, p < 0.01) shows the highest effect towards effort expectancy respectively; thus, H2 is accepted. However, prior experience (β = 0.005, t = 0.096, p > 0.05) for H3 and prior experience (β = -0.006, t = 0.211, p > 0.05) for H7 are rejected with no significant effect towards behavioural intention and performance expectancy. Orientation to learning (β =0.048, t = 0.728, p > 0.05 also indicated no significant effect. Furthermore, behavioural intention (β = 0.819, p < 0.01) showed the greatest effect on usage behaviour. Therefore, all paths except H3, H5 and H7 are supported. The t-values for the measurement and structural model estimation are illustrated in the figures below.

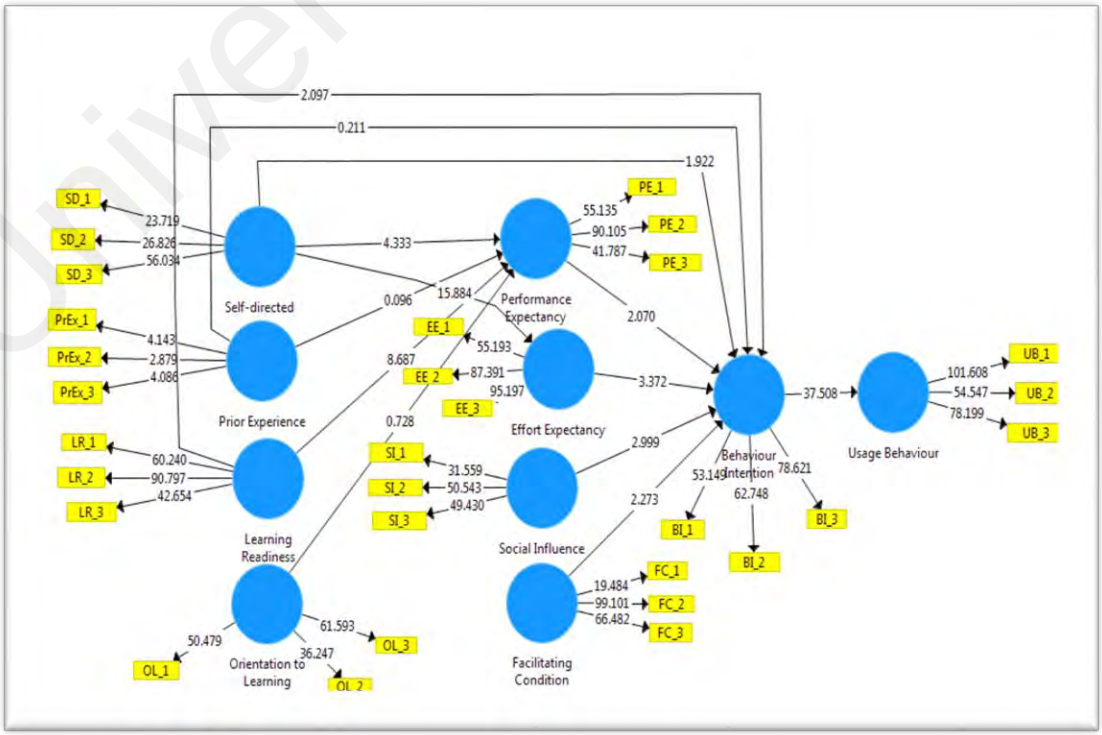

Figure 5.5: t-values result

5.1.3.1 Assessment the level of R^2 for the Coefficient Determination

Table 5.8 below displays the result for R^2 from the measurement framework. All the results show an accepted result when the scores are > 0.26 (Cohen, 1988). The R^2 values of behavioural intention (0.680) and usage behaviour (0.671) can be considered substantial while effort expectancy (0.340) and performance expectancy (0.580) can be considered as having moderate accuracy (Chin, 1998).

Table 5.6: R^2 result

	R^2	Predictive Accuracy
Behavioural Intention	0.680	Substantial
Effort Expectancy	0.340	Moderate
Performance Expectancy	0.580	Moderate
Usage Behaviour	0.671	Substantial

5.1.3.2 Effect size, f^2

As shown in Table 5.9 below, the result indicates that effort expectancy (0.046), facilitating condition (0.074), learning readiness (0.032), and social influence (0.039) have a small effect size in producing the R^2 for behavioural intention. In contrast, the result also indicates that performance expectancy (0.016), prior experience (0.000) and self-directed (0.019) have no effect in producing the R^2 for behavioural intention. Among the attributes influencing the effect factor of performance expectancy, learning readiness (0.331) indicated a substantial effect size, self-directed (0.07) indicated a small effect size while orientation to learning (0.002) and prior experience (0.000) indicated no effect size in producing the R^2. Furthermore, self-directed (0.515) indicated a substantial effect size, respectively, towards effort expectancy.

Table 5.7: f^2 result

Path	f^2 effect size	
	Value	Effect
Effort Expectancy-> Behavioural Intention	0.046	Small
Facilitating Condition -> Behavioural Intention	0.074	Small
Learning Readiness-> Behavioural Intention	0.032	Small
Learning Readiness-> Performance Expectancy	0.331	Substantial
Orientation to Learning -> Performance Expectancy	0.002	No effect
Performance Expectancy -> Behavioural Intention	0.016	No effect
Prior Experience -> Behavioural Intention	0.000	No effect
Prior Experience -> Performance Expectancy	0.000	No effect
Self-directed -> Behavioural Intention	0.019	No effect
Self-directed -> Effort Expectancy	0.515	Substantial
Self-directed -> Performance Expectancy	0.070	Small
Social Influence-> Behavioural Intention	0.039	Small

5.1.3.3 Blindfolding, Q^2

As shown in Table 5.10 below, and in reference to the right column (1-SSE/ SSO), the predictive relevance Q^2 of behavioural intention has a value of 0.521, effort expectancy (0.269), performance expectancy (0.448) and usage behaviour (0.547), indicating the framework has a predictive relevance based on the respective endogenous constructs (because the Q^2 values are considerably above zero).

Table 5.8: Q^2 result

	SSO	SSE	Q^2(1-SSE/ SSO)
Behavioural Intention	1,182, 000	566.761	0.521
Effort Expectancy	1,182, 000	864.305	0.269
Facilitating Condition	1,182, 000	1,182, 000	
Learning Readiness	1,182, 000	1,182, 000	
Orientation to Learning	1,182, 000	1,182, 000	
Performance Expectancy	1,182, 000	652.486	0.448
Prior Experience	1,182, 000	1,182, 000	
Self-directed	1,182, 000	1,182, 000	
Social Influence	1,182, 000	1,182, 000	
Usage Behaviour	1,182, 000	534.859	0.547

**SSE = Sum of squares of prediction errors, SSO = Sum of squares of observations.*

Therefore, facilitating condition, learning readiness, orientation to learning, prior experience, self-directed and social influence can be used to predict formal part-time learners' effort expectancy, performance expectancy, behavioural intention, and usage behaviour of subjects in the population. Additionally, the significant influence of PE, EE and SI confirm the validity of using the adopted UTAUT model to investigate the formal part-time learner's acceptance to use m-Learning.

Table 5.9: Hypotheses testing

Hypothesis	Relationship	Std Beta	Std Error	t-value*	*p-value*	Decision	R^2	f^2	Q^2
H1	Self-directed -> Performance Expectancy	0.239	0.055	4.333	*0*	Supported	0.580	0.070	0.448
H2	Self-directed -> Effort Expectancy	0.583	0.037	15.884	*0*	Supported	0.340	0.515	0.269
H3	Prior Experience -> Performance Expectancy	0.005	0.052	0.096	*0.462*	Not Supported		0.000	
H4	Learning Readiness -> Performance Expectancy	0.551	0.063	8.687	*0*	Supported		0.331	
H5	Orientation to Learning -> Performance Expectancy	0.048	0.066	0.728	*0.233*	Not Supported		0.002	
H6	Self-directed -> Behavioural Intention	0.105	0.055	1.922	*0.027*	Supported	0.680	0.019	0.521
H7	Prior Experience -> Behavioural Intention	0.006	0.030	0.211	*0.416*	Not Supported		0.000	
H8	Learning Readiness -> Behavioural Intention	0.171	0.082	2.097	*0.018*	Supported		0.032	
H9	Performance Expectancy -> Behavioural Intention	0.123	0.060	2.070	*0.019*	Supported		0.016	
H10	Effort Expectancy -> Behavioural Intention	0.225	0.067	3.372	*0*	Supported		0.046	
H11	Social Influence -> Behavioural Intention	0.148	0.049	2.999	*0.001*	Supported		0.039	
H12	Facilitating Condition -> Behavioural Intention	0.223	0.098	2.273	*0.012*	Supported		0.074	
H13	Behavioural Intention -> Usage Behaviour	0.819	0.022	37.508	*0*	Supported	0.671		0.547

**One-tailed*

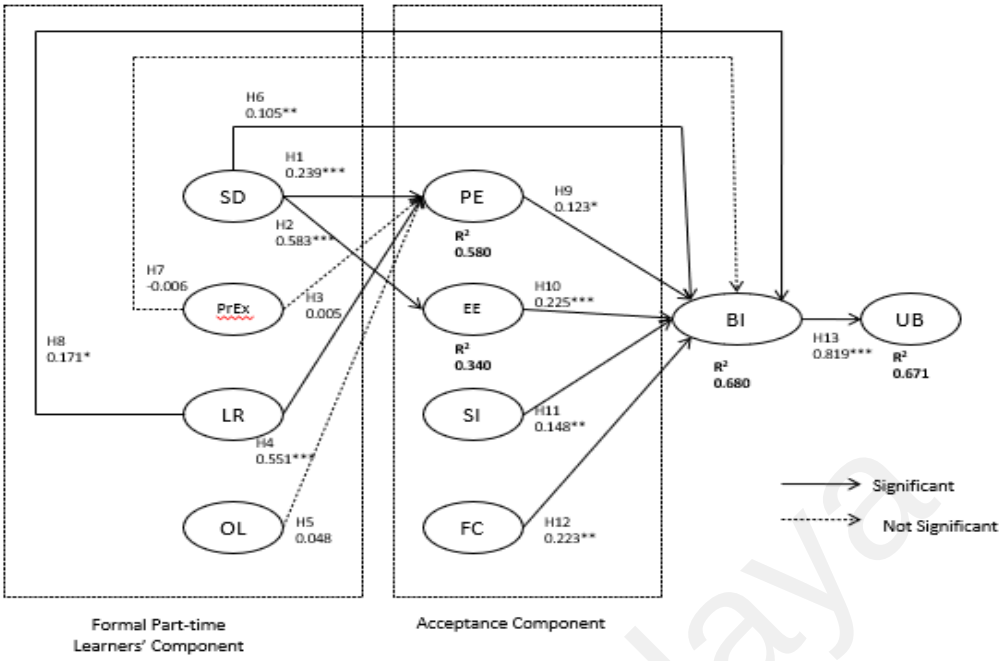

Figure 5.6: Structural Model result

This study was undertaken to examine the acceptance of m-Learning by formal part-time learners. Based on the literature review, this study posited that formal part-time learner's intention to use m-Learning is influenced by performance expectancy (PE), effort expectancy (EE), social influence (SI), facilitating condition (FC), self-directed (SD), prior experience (PrEx), and learning readiness (LR) needs through behavioural intention. Based on the results, this study has demonstrated that formal part-time learners have a strong preference to use m-Learning for the purpose of learning via self-directed (SD) and learning readiness, while performance expectancy, effort expectancy, social influence, and facilitating condition remain important predisposing attributes of UTAUT since formal part-time learners expect the acceptance and use of m-Learning. This finding is in line with the finding highlighted in the work of Venkatesh et al. (2003), and also supported by Siriwongs (2015) and Reed et al., (2014) that learners should take control of their own learning and adopt self-directed learning as lifelong practitioners. Moreover,

m-Learning enriches their learning experience by embracing learning that occurs outside the classroom.

5.1.3.4 Mediating Effect's Result

Based on the mediation analysis result as depicted in Table 5.12 below, it can be concluded that H1, H2, H3, H4, H7, H10, H11, H12 are significant at a t-value > 1.96 and p-value < 0.05. The bootstrapping analysis shows that the indirect effect, β = 0.184, β = 0.183, β = 0.068, β = 0.196, β = 0.101, β = 0.161, β = 0.218 and β = 0.121 are significant with t-values of 3.303, 2.331, 2.039, 3.235, 2.083, 4.192, 4.482 and 2.939, respectively. The indirect effects 95% Boot CI Bias Corrected [LL = 0.068, UL = 0.287], [LL = 0.041, UL = 0.335], [LL = 0.005, UL = 0.137], [LL = 0.067, UL = 0.303], [LL = 0.002, UL = 0.193], [LL = 0.084, UL = 0.234], [LL = 0.112, UL = 0.302], [LL = 0.038, UL = 0.2], do not overlap 0 in between, indicating there is mediation (Preacher and Hayes, 2004, 2008).

Table 5.10: Hypotheses testing on mediation

Hypothesis	Relationship	Std. Beta	Std. Error	t-value	Confidence Interval (BC)		Decision
					LL	UL	
Ha_1	Self-directed -> Performance Expectancy -> Behavioural Intention	0.161	0.038	4.192**	0.084	0.234	Supported
Ha_2	Self-directed -> Effort Expectancy -> Behavioural Intention	0.005	0.008	0.632**	-0.007	0.024	Not Supported
Hb_1	Prior Experience -> Performance Expectancy -> Behavioural Intention	0.001	0.008	0.082**	-0.017	0.015	Not Supported
Hc_1	Learning Readiness -> Performance Expectancy -> Behavioural Intention	0.068	0.033	2.039**	0.005	0.137	Supported
Hd_1	Orientation to Learning -> Performance Expectancy -> Behavioural Intention	0.006	0.009	0.633**	-0.009	0.030	Not Supported
Ha_3	Self-directed -> Behavioural Intention -> Usage Behaviour	0.218	0.049	4.482**	0.112	0.302	Supported
Hb_2	Prior Experience -> Behavioural Intention -> Usage Behaviour	-0.005	0.024	0.189**	-0.058	0.039	Not Supported
Hc_2	Learning Readiness -> Behavioural Intention -> Usage Behaviour	0.196	0.061	3.235**	0.067	0.303	Supported
He_1	Performance Expectancy -> Behavioural Intention -> Usage Behaviour	0.101	0.049	2.083**	0.002	0.193	Supported
Hf_1	Effort Expectancy -> Behavioural Intention -> Usage Behaviour	0.184	0.056	3.303**	0.068	0.287	Supported
Hg_1	Social Influence -> Behavioural Intention -> Usage Behaviour	0.121	0.041	2.939**	0.038	0.200	Supported
Hh_1	Facilitating Condition -> Behavioural Intention -> Usage Behaviour	0.183	0.078	2.331**	0.041	0.335	Supported

*Note: *p < 0.05, **p<0.01, BC = Bias Corrected, UL = Upper Level, LL = Lower Level*

The current results also show that self-directed and learning readiness can enhance behavioural intention through performance expectancy. While self-directed, learning readiness, performance expectancy, effort expectancy, and facilitating condition can enhance usage behaviour through behavioural intention. In other words, self-directed, learning readiness, performance expectancy, effort expectancy, and facilitating condition are relative attributes in influencing behavioural intention and usage behaviour. These results imply that self-directed, learning readiness, performance expectancy, effort

expectancy, and facilitating condition are especially important predictive variables for formal part-time learners to accept m-Learning.

5.2 Summary

This study was undertaken to examine the influence of adult learners' attributes on formal part-time learners' intention to accept m-Learning. Based on the literature review, this study posited that formal part-time learners' intention to accept m-Learning is influenced by self-directed, learning readiness, performance expectancy, effort expectancy, social influence and facilitating condition through behavioural intention.

In addition to that, the current study demonstrated that formal part-time learners have a strong preference to accept m-Learning for learning purposes. Thus, to help drive formal part-time learners' acceptance towards m-Learning, attention should be directed towards the four UTAUT and adult learners' attributes proposed in the acceptance framework, namely, self-directed and learning readiness. Notably, from the findings of this study, formal part-time learners are most likely to accept m-Learning if the application can support their learning experience.

Furthermore, formal part-time learners' decision to accept m-Learning is strongly influenced by the ability of the medium in enabling them to gain personal fulfilment and a pleasant experience when using m-Learning. The features used to support learning should also synchronise with formal part-time learners' requirements and needs; thus, able to manage the learning process given the constraints of a formally designed curriculum and teacher-supplied resources (Karimi, 2016). Although, this result is not in line with previous studies in which the results reject the hypothesis for prior experience and orientation to learning (Hagen & Park, 2016; Sălăvăstru, 2014; Susilo, 2014).

CHAPTER 6: DISCUSSION

6.1 Introduction

This study focused on the essential attributes specific to formal part-time learners that should be taken into account when evaluating the acceptance of m-Learning. These were then used to develop guidelines as a proposed tool for the comprehensive use of the m-Learning system as a supporting measure among HEI practitioners. It is crucial that the evaluation of these guidelines be repeated to confirm that the implementation of m-Learning will remain effective, while addressing the current challenges of inadequate use (Papadakis et al., 2020). Such efforts can be augmented by using the perspectives provided by theories concerning psychological learning. These theories are based on empirical research, which is effective at explaining analogous situations (Bernacki et al., 2019). Thus, while educators may be optimistic about the use of mobile devices in their teaching activities, learners may have limited skills in using these devices as their learning tools. Furthermore, it is important to recognise the intention of learners at an early stage to determine the approach of the HEI in offering an effective learning experience (Nosseir & Fathy, 2020). Therefore, support is needed in terms of general literacy. The discussion on the objectives of the study is presented below.

6.1.1 Characteristics of Formal Part-time Learners

The findings from this study suggest that the range of ages between 21 and 55 years are the typical ages of formal part-time learners. As supported by Diep et al. (2016), Gutl et al., (2015) and Molnár (2015), formal part-time learners engage with many commitments and responsibilities such as their family, career, health, financial and social life issues at this age (Hashim et al., 2015; Postan, 2014).

Moreover, these commitments indicate that the most productive age is when they need to entertain such constraints to fulfil the specific goals of each. According to Akta Umur Dewasa Malaysia (1971), the typical age of mature adults in Malaysia is 18 years and above, while 50 years of age is considered the upper age of adults. Those aged 50 years or more are known as older adults (Chin et. Al., 2015).

Referring to the statistics graph signifying the learner's age category in higher institutions in Malaysia, a person aged 15 years was stated as the beginning age to count from. However, typically people complete their study at a secondary level when aged between 17 and 19 years when they are required to sit for *Sijil Pelajaran Malaysia* (SPM) or *Sijil Tinggi Pelajaran Malaysia* (STPM). At this secondary level, the teaching approach is more teacher-oriented or pedagogy.

After deciding to further their studies, adults are offered to enrol in the programme in either a full-time or part-time mode; their decision, however, depends on their daily schedule, activities, finances and other commitments. Mostly, adult learners tend to choose the part-time programme mode given: 1) flexibility of the learning experience; 2) easy to apply the learning with the real environment; 3) Easy and fast results and 4) Gaining an award (certificate), salary, experience and skills all at once to overcome the dilemma of seeking employment following graduation.

In the context of offering a flexible learning experience, learners can learn without the physical constraints of time and place using m-Learning. The effectiveness of learning sessions can also benefit since the learner can learn at their own pace (Xu, 2014). This is closely related to the characteristics of the adult person when they need to accommodate multiple constraints regarding time, place, commitments, and fortitude (Al-Zoubib & Jali, 2014). Even though some adult learners are jobless, they still commit with other life and

personal activities such as performing a part-time job, as contract employees, conducting business online and involvement in social community activities as volunteers.

Based on the easy and fast results of the application of m-Learning, most learners have established and had reliable access to the resources. For example, the learner can gain real feedback from their established contacts, from their network, workplace department, human resource department, and any related networks with little compromise. Moreover, learners can easily obtain data; test the relevancy of the subject and learning in the real environment and receive real-time feedback. These reliable practices can be used and modified accordingly to reduce any useless information. Therefore, these become motivational factors for them to pursue study as a part-timer (Lucke et al., 2013; Moser et al., 2015).

Furthermore, most of higher institutions state a minimum requirement to pursue study as a part-time learner. Compared to the full-time programme, registration for the programme depends on the semester, intake session, in which higher requirements are stipulated; the examination date is managed and centralised by the institutions. At the same time, the part-time programme's examination date is dependent on the lecturers' and the learners' availability but is still in the academic schedule.

Lastly, another characteristic of enrolling in the part-time programme is that learners can save time (make the best use of their time) because they can obtain the certificate, salary, job, skills, and experience at one time. In this sense, the risk of unemployment or looking for a job after graduation is low because they are still connected with their current career, and even can use the certificate to transgress to a better position and another field. This is because, the aim of participating in part-time study is to receive a qualification, develop skills and recognition by a credible institution (Hegyesi et al., 2014).

In conclusion, formal part-time learners have greater access to a multitude of reliable and accurate resources to help them increase their understanding of the subject being learned. Given this access to various sources, the educator's role helps them to maintain focus and to ensure the information retrieved is useful (Diep et al., 2016).

6.1.2 Attribute that Influences Formal Part-time Learners to Accept m- Learning

This section discusses the findings from the list of the attributes that influence m-Learning acceptance and usage among formal part-time learners. The discussion is also based on the literature review and theory.

The attributes of formal part-time learners are referred to as the characteristic that influence the learner to accept and use m-Learning as a learning tool. Four attributes were adopted from the principles of adult learners that represent formal part-time learner's behaviour for acceptance and usage of m-Learning (Lawrence, 2016).

Most of the m-Learning applications developed tend to focus on young children (adolescents) and school students rather than tertiary students and learning. Previous studies entail a limited discussion regarding the scope of formal part-time learners using m-Learning, especially in the context of the attributes of formal part-time learners (Ur-Rehman et al., 2016). Therefore, in this research, to ensure the generalisation of the attributes, the theory of the adult learner, also known as andragogy, was referred to.

The adult learners' theory emphasises four principles in gaining a better understanding of the needs of formal part-time learners' which helps in promoting m-Learning usage to support these needs. These attributes have been used to identify the acceptance of learners to use m-Learning. As such, the strengths and weaknesses of these attributes and relationship are identified, thus facilitating the development of the m-Learning

infrastructure (Al-Emran & Elsherif, 2016). From these findings, the attributes that highly and less influence the acceptance of m-Learning was also identified.

Nevertheless, in measuring the level of m-Learning acceptance by formal part-time learners, behavioural intention showed a necessary condition for the success of m-Learning usage and integration, given it is an initial decision of formal part-time learners to interact with m-Learning (Venkatesh et al., 2003), which means that the acceptance of m-Learning by the formal part-time learners must consider suitable attributes otherwise failing to achieve its objectives. By identifying these unique attributes, the behavioural intention towards m-Learning consequently increased, helping to assist the learners in using the tool consistently.

Aside from that, the relationships between the attributes in this study were identified and investigated, which represent the acceptance framework and integrated with the formal part-time learners' attributes. Through this framework, the mediator between the attributes was analysed towards m-Learning usage, further enabling the researcher to adopt efficient measures to improve the learner's acceptance. In contrast, any improper relationship of this learning approach may lead to inefficient learning and even reduce the effectiveness of learning. Under this condition, the researcher examined a more explicit relationship between the attributes in order to integrate the theory with the practices better.

According to Ooi & Tan (2016), integrating the attributes related to the learner's acceptance is recommended to uncover these attributes. Therefore, from the findings, it can provide further insight for the designer and practitioner to design more appropriate m-Learning based on understanding the actual integration between acceptance and formal part-time learners' attributes. The current research overcame these challenges, as

mentioned by Venkatesh et al., (2003) by reviewing and synthesising new attributes during the development of the acceptance framework.

6.1.3 Theoretical Framework for Formal Part-time Learners to Accept m-Learning

This section discusses the related theoretical framework of m-Learning acceptance, based on the literature review, theory. And measurement results as well.

Acceptance is defined as the accepted use of m-Learning to improve the learner's performance in their ability to learn (Venkatesh et al., 2003). Here, the researcher developed a framework incorporating an inclusive approach by synthesising and unifying the adult learning theory and acceptance model to understand the usage as a dependent variable and predict the learner's acceptance and use of m-Learning.

Furthermore, the success of m-Learning can be shown through the extended acceptance model by measuring the strength of the acceptance. In other words, if the result of the measurement shows a highly significant relationship, this will help designers and practitioners to proceed with the idea of developing m-Learning. This is because understanding the strengths and weaknesses of behavioural intention and usage in the framework is the first and foremost step before beginning the development process.

The UTAUT model was used as a theoretical model in this research to provide further insight on the acceptance and adoption of m-Learning, which accounts for formal part-time learners' behaviour. Since the UTAUT helps to explain the learner's acceptance by considering their behaviour, the use of adult learner's principles is suitable to represent formal part-time learner's behaviour.

In the context of Malaysian learners, the UTAUT was referred to as the basis for the framework underlying the acceptance of HEI learners. The UTAUT was used to identify the attributes that influence the acceptance of technology. In a study conducted by Zainol et al. (2017), part of the UTAUT model was used to test the relationship between attributes in order to predict whether those attributes would affect the acceptance of m-Learning. Additionally, it was shown that the UTAUT was capable of explaining the intention of learners to use m-Learning. Besides, from the perspective of Malaysian users, most of the UTAUT studies showed multiple combinations of theories with regard to the intention of users to adopt a predefined technology such as in m-Learning (Zainol et al., 2017), online shopping (Soh et al., 2020), SMEs in the food industry (Abu et al., 2015), and user behaviour in augmented reality technology in education (Nabihah et al., 2019).

In the current study, the researcher measured the cause-and-effect relationships to predict the level of acceptance for m-Learning by formal part-time learners. This prediction is important to identify the causes of rejecting and accepting the attributes' proposed in this research. As such, the established framework developed in this research that unified the adult learners' and acceptance attributes was successful in defining and explaining possible attributes and relationships that may predict the success of the m-Learning diffusion project. These findings are also supported in a study by Ma, Chan & Chen (2016) about the importance of directing attention regarding the learner's behaviour to learn effectively.

The UTAUT and adult learning principles underlying the outcome of the m-Learning acceptance framework for formal part-time learners extend the understanding of the behaviour of learners at HEIs, where most of them are considered as adults as the majority of them are above the age of 18 years, have experienced life and share the same characteristics.

Considering the fact that this framework emphasised the practices of adult learners, it should be recommended since the majority of learners in higher education institutions are adults. This framework explains the BI in the context of m-Learning and its use by learners. According to Al-Emran et al. (2016), individual attitudes concerning the m-Learning technology are crucial since they determine whether the learners are prepared to use m-Learning, which may be understood as being the m-Learning adoption rate, which, in turn, indicates the behaviour of individuals towards the acceptance of m-Learning (Diep et al., 2016). Muresan (2014) proposed that andragogical principles be considered and emphasised because they lead to a higher responsibility towards the profiles and interests of learners. The distinct characteristics of adult learners may be employed by HEIs to choose appropriate m-Learning and training features. Several researchers have used the principles to work on programs concerning adult education (Muresan, 2014). This study used the principles of adult learning to form the basis of the design for the acceptance guidelines for m-Learning, while considering associated learning environments. As a result of the integration of these two theories, eight attributes (PE, EE, SI, FC, SD, PrEx, LR and OL) were evaluated to measure their positive influence on BI towards m-Learning. The outcome of the study indicated that six out of the eight attributes had a positive influence, while PrEx and OL had a negative effect.

At the same time, there were differences with respect to FC, which was observed to have a significant effect on BI. Similarly, Ma et al., (2016) showed that FC had a positive influence on BI towards m-Learning. This result seemed to be consistent with the results observed in prior studies, where FC had a positive impact on the acceptance of a new technology (Lawrence, 2016; Liu & Huang, 2015). The observed correlation between FC and BI towards m-Learning might be explained by the fact that learners would perceive the m-Learning application as being easy to use when the HEI supports the learners in providing an infrastructure for information technology (IT) (training, Internet coverage,

mobile devices, IT experts, etc) that has the capability to deliver information. Additionally, the results revealed that SD and LR had a positive effect on BI, which, in turn, influenced the use of m-Learning. Similarly, a study conducted by Pimmer et al., (2016) also supported the need to focus primarily on the aspect of SD. Thus, the result suggested that the higher the SD and LR through m-Learning applications, the higher would be the usage of m-Learning, which, in turn, would leverage the level of BI towards m-Learning through such applications.

Contrary to expectations, the results revealed that PrEx had an insignificant influence on the BI. The inconsistency between the results of this study and those of previous ones might be due to the need of mobile users for new experiences and skills in dealing with the evolution of mobile technology. Their past experience in using mobile technology might be insufficient to support them in the use of m-Learning due to their limited knowledge and expertise. With the rapid growth of technology, they are required to learn fast, and it may be quite challenging for them to learn new functions as they may be limited by their age. According to the literature, some adult learners have low computer literacy and are unable to compete with the younger generation, who are well-versed in technology (Cárdenas-Robledo & Peña-Ayala, 2018). Therefore, adult learners as well as formal part-time learners whose knowledge may become outdated within a few short years and who are capable of handling their own mobile devices must be able to function in a fast-changing society (Verasingam et al., 2020). Additionally, these findings were also in line with the study by Todoranova et al. (2020), where the successful implementation of m-Learning was influenced by the expectations of learners, whose social communication and learning styles differed slightly from those of the previous batch and with regard to the mobile features themselves. Nowadays, learners who have their own mobile phone devices and a comfortable learning environment rely on the latest technological skills and performance.

The use of the actual system resulted in a remarkable R^2 value of 68%, which clearly showed that the developed structural model was sound and valid, and hence, could provide a comprehensive explanation of the actual use of m-Learning systems. In line with the study by Al-Emran et al., (2020) about examining the impact of the factors of knowledge management on the acceptance of m-Learning, the results showed that the BI for the acceptance of m-Learning was positively associated with the usage behaviour of m-Learning, with the R^2 result explaining 58% of the variance in the BI. Meanwhile, the study by Al-Saedi et al., (2020) was aimed at developing a general extended UTAUT model for the adoption of m-Payment, where the proposed model was able to explain 72% of the variance in the BI. Both of these findings showed that the proposed attribute that was being measured by the acceptance model was capable of explaining the mobile acceptance and usage. Even though the study by Rahi et al., (2019) was about online banking, the result showed an R^2 value of 80%, where the model measured usage altogether between the acceptance attribute and user preferences (web site design, customer services, reliability, assurance). Meanwhile, the study by Radovan and Kristl (2017) on technology acceptance in virtual classrooms also showed a high R^2 value of 65.7% and a BI of 64.2% towards UB. These findings supported the R^2 value of 67% in this study (BI towards UB). That means that the more learners favour the use of technology as a learning tool, the more frequently they will use it.

Therefore, this result can not only provide some insights to scholars and HEI learners in Malaysia, but can also be tested for the acceptance of mobile technology in the context of adult users. The high R^2 value also showed that the higher the BI for acceptance of m-Learning by formal part-time learners, the greater will be their UB in the actual use of the technology. Hence, the BI towards the m-Learning environment turned out to be a good predictor of actual use, where it showed a high percentage of variance. For example, it can be used in mobile health, sports, banking and e-commerce activities. In this way, the

right behavioural intention of adult users towards their acceptance of mobile technology can be defined. Mobile phones have become an important device to have in hand, especially during this pandemic. It can manage multiple activities in real time. Thus, this research may help mobile programmers to design and develop a comprehensive mobile application that can meet the needs and intentions of adult users.

6.2 Guideline Evaluation by the Experts

The current study adopted six attributes which contribute to the effective use of m-Learning among higher institution learners. The guideline was developed based on the result of developing the m-Learning Acceptance Framework for Formal Part-time Learners derived from this research. As such, practitioners, software developments and programmers and educators can refer to the guideline in creating a better learning environment. The guideline also demonstrates the capability of being used by other practitioners, such as the Ministry of Higher Education (MOHE), educators, developers, and higher institution learners themselves. Table 5.16 presents the proposed guideline addressing the significant attributes of structured part-time learners from the m-Learning acceptance process.

Therefore, only the positive influence from the results of the evaluation will be emphasised. The four positive attributes (PE, EE, FC, SI, SD, LR), including BI and UB, were referred to as the terms of the guidelines. The implementation approaches were developed with the aim of creating a positive attitude to enhance the acceptance of m-Learning. With the use of technology becoming more prevalent, concerns about not being able to fulfil the requirements of learners are gradually fading. The structure of the guidelines should be such that practitioners can identify and implement the recommendations. A previous study highlighted the fact that learners felt ignored when

they chose to forego mobile devices as their learning medium. However, the study used the assumption that in the context of learners, the use of mobile devices reduced their interaction with peers if they were in constant touch with their educators. The study employed the Learning Acceptance Framework for Formal Part-time Learners to base and evaluate the guidelines concerning m-Learning (as attached in Appendix C).

Indeed, if m-Learning guidelines are appropriately developed, they can be an extremely effective tool to offer knowledge in any learning exercise (Kumar et al., 2020). Moreover, goals and values are critical factors to address when enforcing such guidelines for m-Learning. Therefore, approaches to implementation aim at developing optimistic attitudes to promote the acceptance and use of m-Learning. From reviewing the literature in this field, it revealed the use of attitudes towards PE, EE, SI, FC, and the concept of Self-directed (SD) and Learning Readiness (LR), and should be tested together to maintain the focus of the learner in higher institution learning. Also, the concerns in meeting the requirements of learners in adopting and using digital technology are becoming more and more mainstream concerns nowadays. As such, the guideline should be structured in such a way for practitioners to select and manage the use of the recommendations contained in the guideline. A previous study showed that learners felt overlooked when they refused to use mobile devices as a medium for learning. In the same study, however, learners also assumed that the use of mobile devices strengthened contact with their peers if educators stayed in touch with them.

The findings also found that the m-Learning Acceptance framework for Formal Part-time Learners useful as it allowed the categorisation of attributes influencing the implementation of m-Learning guidelines from multiple perspectives. However, the framework also identified several weaknesses in the implementation-related attributes, with organisational factors as the principal underexposed study area. Therefore, further

studies are required to increase the level of awareness about these attributes, considering the implementation of m-Learning guidelines from a multidimensional pedagogical perspective. Importantly, the benefit of using the framework is that it not only addresses the adoption of m-Learning but also the interaction between the components of adult learners. Moreover, through adopting this method in assessing m-Learning guidelines, an understanding of the characteristics that hinder or promote current underreported implementation should be investigated further. In addition, this structure can be used during the planning phases developing the guideline to identify obstacles and attributes, and strategies to minimise any possible negative impacts that may result.

6.3 Summary

This finding is in line with that highlighted by Venkatesh et al., (2003), Siriwongs (2015) and Reed et al., (2014) where learners should take control of their own learning and adopt self-directed learning as lifelong practitioners. Importantly, m-Learning enriches their learning experience by embracing extensive learning which occurs outside of the classroom.

Notwithstanding, behavioural intention was found to be significant in the adoption of m-Learning which also agrees with the result of (Bogart & Wichadee, 2015; Howard et al., 2017; Mohammadi, 2015; Yang & Su, 2017). The current results also show that self-directed and learning readiness can enhance behavioural intention through performance expectancy, whereas self-directed, learning readiness, performance expectancy, effort expectancy, and facilitating condition can enhance usage behaviour through behavioural intention. These results imply that these positive attributes are particularly important predictive variables for formal part-time learners to accept m-Learning. Finally, the

development of the proposed guideline considers the positive attributes as discussed previously.

CHAPTER 7: CONCLUSION

This thesis explores the current state of m-Learning acceptance for learners who use it for formal part-time education and intends to create a classification concerning usage and acceptance. Additionally, this study discusses the latest developments in m-Learning to characterise, where these have taken place. This information may be utilised by practitioners intending to create a design for an m-Learning framework and prepare the content.

The importance of this classification is discussed in Chapter 2. The information comprising this study was collected by analysing the literature concerning m-Learning. Six essential aspects must be considered in the context of designing and building an m-Learning system. It is essential to emphasise Behavioural Intention to enhance m-Learning acceptance among formal part-time learnings. This study proposed using the adult learning framework (Andragogy) and the Theory of Acceptance (UTAUT) to create an acceptance structure for m-Learning in the context of formal part-time learners.

The determination of the aspects necessary to define formal part-time learning is based on four constructs concerning adult learners as specified in andragogy. These four constructs are learning readiness, orientation to learning, prior experience, and self-direction. Several studies suggest that the aspects of a formal part-time learner are applicable for an adult learner since both categories share similar characteristics. The principles are discussed comprehensively in Chapter 2 (Section 2.1.1.2).

UTAUT is employed for the acceptance framework because the objective is to determine the behavioural intention aligned to m-Learning. The four attributes of the UTAUT, namely, effort expectancy, performance expectancy, facilitating conditions, and social influence, were evaluated for use and acceptance. The research questions (RQ) of

the study have been discussed in subsequent chapters. The conclusion and revisit of the research questions and objectives, as specified in Chapter 1, and their fulfilment is discussed. Lastly, the contributions of this study and avenues for further research is specified.

7.1 A Review of the Research Objectives and Questions

The objectives and questions addressed in this study are revisited in addition to a summary of the findings concerning the research questions corresponding to the objectives.

7.1.1 Objective 1: To investigate the characteristics of formal part-time learners in Malaysia

The research begins with the first objective, where the intent is to determine the characteristics of formal part-time learners in Malaysia. A set of 47 studies was selected from numerous databases such as IEEEXplore, ACM Digital Library, Scopus, Springer Link, and Web of Science, was chosen and reviewed extensively with the intent of addressing the first research objective. The first research question (RQ1) is "What are the characteristics of formal part-time learners in Malaysia?"

The answer to this question is crucial for formulating the sample design. Numerous aspects concerning formal part-time learners are identified using the literature and are specified. Moreover, in the same context, the research issues that need to be addressed are also listed.

The characteristics identified from a review of the literature are specified to highlight the differences and similarities with other research works. It is essential to define the meaning and the context of formal part-time learners. These learners are primarily characterised by their age, which is in the range of 21 to 56 years; these individuals utilise the after-hours to study in addition to the weekends amidst several domestic responsibilities. Chapter 2 (Sections 2.1 and 2.2) discuss this context comprehensively, and it forms the basis on which RO1 and RQ1 are fulfilled.

7.1.2 Objective 2: To identify the attributes influencing formal part-time learners' acceptance to m-Learning

Empirical analyses are conducted to ascertain the attributes affecting the learners' acceptance of mobile learning. In this context, the question concerning the second objective is RQ2 "What are the attributes influencing formal part-time learners for mobile learning acceptance?" Using the existing frameworks, it was determined that relatively lesser emphasis is provided to the attributes of adult learners, thereby creating potential challenges concerning the learning in the formal part-time context. Hence, the scope of the acceptance theory was widened to include the characteristics of adult learners which facilitated the integration of their intention towards m-Learning in the research model. These attributes are discussed comprehensively in Chapter 2 (Sections 2.1 and 2.6).

The premises from two leaning theories, namely, the Acceptance Theory (UTAUT) and the Adult Learning Theory have been measured and tested. Chapter 2 and 3 have a comprehensive discussion about the attributes identified using these theories.

7.1.3 Objective 3: To develop the theoretical framework for Formal Part-time Learners to Accept m-Learning

Research question 3 (RQ3) is "How to develop an m-Learning acceptance framework concerning formal part-time learners?" is chosen to address the abovementioned objective. The theoretical aspect was designed on the basis of the associations between the parameters, theory, and the literature review. Thirteen hypotheses were devised to evaluate the effect of Behavioural Intention on m-Learning.

The detailed discussion concerning the associations that form the foundation of this framework is provided in section 4.3, which also contains the observations from the research question corresponding to objective 3. The framework was synthesised using an inclusive approach, where the premises of the acceptance model were considered concurrently with those of the adult learning theory to obtain a clearer understanding of m-Learning use as a response variance along with the predictions concerning the learner's acceptance and use of m-Learning.

In the context of formal part-time learners, the acceptance level is forecast using the cause-and-effect models. This forecast is crucial since it helps determine the reasons why the proposed attributes have been accepted or rejected. The combination of the attributes concerning adult learners with the acceptance attributes has provided for a solid framework that can define and provide explanations concerning the attributes and their potential associations which are required to forecast the success of the m-Learning diffusion task. The observations from the study have been in line with the suggestions by Ma et al., (2016) concerning the significance of giving appropriate attention to learners' alignment towards effective learning.

7.1.4 Objective 4: To evaluate and validate Theoretical Framework for Formal Part-time Learners to accept m-Learning

Two research questions have been devised to address this objective. Structural Measurement Model (SMM) was utilised to ascertain the relationships in the suggested framework. The results indicate that six out of the total of eight attributes comprising the framework had a significant relationship. Sections 3.6 and 3.7 address the details concerning the results. The next research question (RQ4) is "How to assess and validate an m-Learning acceptance framework about formal part-time learners?" which is devised to address the specified objective. SmartPLS was employed to assess the proposed framework where the coefficient of determination, bootstrapping, blindfolding, and adequate size was determined. The results were compared to those indicated in the relevant literature. The detail concerning these topics is provided in Chapter 5.

The other research question (RQ5) required for the fulfilment of objective 4 is "How to formulate and assess the m-Learning guidelines for learners from higher institutions?", which required the creation of the proposed m-Learning guidelines and conducting an assessment. The guideline design considers all the significant aspects of the m-Learning acceptance framework for formal part-time learners. In this regard, out of the eight aspects, six demonstrate a positive association and have been included in the guidelines (EE, SI, SD, FC, LR, and PE). Subsequently, experts conducted a review and validated the proposal, which is discussed further in Chapter 3 and Chapter 5.

7.2 Research Contribution

The contribution of this study to the knowledge concerning this domain is discussed in this section. In this regard, four aspects have been identified; namely, questionnaire construction, thematic taxonomy, the framework for m-Learning acceptance, and the

guidelines prepared to facilitate higher institutions to implement the m-Learning framework better. The abovementioned contributions to the body of knowledge are outlined below:

1. **Thematic Taxonomy**

   This study discusses m-Learning classification considering several aspects using thematic taxonomy. The proposed scheme underscores the differences and similarities concerning the present scenario in m-Learning. Furthermore, the open research questions about this topic have also been outlined.

2. **Identification of Attributes affecting m-Learning Acceptance**

   Concerning formal part-time learners, creating a better design for the acceptance framework the aspects of higher education in the Klang Valley have been considered. It is determined that previous works do not cover the attributes as comprehensively. The authors certify that, to the best of their knowledge, this study is the first to address the principles concerning adult learners' principles as attributes, while also concurrently addressing acceptance attributes to determine the individual behaviour and intention towards using m-Learning.

3. **Building the Questionnaire**

   The questionnaire used for this research was built using a revised version of the attributes concerning the formal learners' behaviour. The changes were validated by experts in the m-Learning domain and were included after extensive validity and reliability testing. The attributes have the requisite thresholds, and the values are acceptable; hence, these attributes are deemed fit for data collection.

4. **Theoretical Framework: m-Learning Acceptance Framework for Formal Part-time Learners**

To understand how well m-Learning is accepted and used, it was also essential to determine the effect and extent of the mediator. Additionally, the UTAUT is a theoretical construct, and its validation may be modified and utilised in numerous areas that are profoundly associated with formal part-time learners and the acceptance and use of m-Learning.

5. **The Guidelines Concerning the Use of m-Learning for Higher Institutions**

The output obtained by evaluating the framework was utilised to formulate the guidelines concerning the implementation of m-Learning in higher educational institutions. Framework validations themselves serve as validations of the guidelines because the results indicate a significant positive effect of the attributes on the adoption of m-Learning. The significant attributes were selected for the formulation of the guidelines. This study is based on two aspects; the first aspect concerns the formal part-time learners, while the other concerns the acceptance of m-Learning. Four categories are proposed, namely, higher institutions, learners, educators, and the Ministry of Higher Education.

Information access can be categorised by the practitioners and creators, thereby creating priorities concerning the information sets which may be employed by those involved with creating the strategic plan for providing and deploying the resources to facilitate optimal use of m-Learning, while also making sure that the expectations of the learners and the institutions align well. The formulation of well-thought guidelines concerning m-Learning adoption can facilitate an environment where the learners can make the best use of time by

using m-Learning. Learners from higher institutions can utilise the versatility offered by m-Learning regarding access and interaction.

Formulation of these guidelines is a hierarchical process beginning with the Ministry of Higher Education. A systematic approach called System Development Cycle (SDC) is implemented for building the phases that divide the work and provide for the implementation of m-Learning through the concerned stakeholders at the respective institutions. The SDC comprises several phases, namely, analyses and capabilities, planning and management, development, deployment, and operations. Individuals who have a direct role in decision making, planning, creating and implementing strategy concerning the m-Learning deployment for higher institutions are referred to as the practitioners, which are the learners, educators, the institutions, and the MOHE.

7.3 Research Implications of the Proposed Solution

The research is associated with theoretical and practical implications, which are addressed in this section. The theoretical aspects concern the application of theory to identify promising and high-potential development areas for augmenting m-Learning while also employing the acceptance theory. Additionally, this research may have a potential impact on policymaking and future research in this domain.

7.3.1 Theoretical Implications

The study can utilise the acceptance framework to understand the andragogical aspects concerning m-Learning. The researchers can determine the challenges concerning the preferences of formal part-time learners and creating an m-Learning framework that

fulfils those preferences. This systematic approach conducted in this research can help reduce the likelihood of poor outcomes. In the context of m-Learning, self-direction is among the widely used concepts, and the alignment of the preferences of the learners and their acceptance to m-Learning remains crucial. Hence, an m-Learning framework that builds upon an andragogical design provides significant benefits to the practitioners of education. A significant association has been found between the acceptance attributes and the aspects of behavioural intention, which is in line with the premises of the UTAUT (Venkatesh et al., 2003). In terms of theoretical implications, this study successfully extended and applied the UTAUT model in a new setting and context, namely, in the context of m-Learning for formal part-time learners in Malaysia. In addition, in this study, the UTAUT was extended with andragogical attributes (i.e., self-direction, prior experience, learning readiness, orientation to learning) by proposing to model not only the impact of the use of m-Learning, but also the impact on adults with regard to the use of any mobile device. Moreover, the proposed framework explained 68% of the variance in the behavioural intention to use m-Learning in Malaysia. Taken together, the empirical findings indicate that the proposed theoretical framework can be more effective in explaining the behavioural intention and m-Learning usage behaviour in Malaysia, and specifically within the context of m-Learning. Additionally, this finding was able to explain the variance in the behavioural intention to use mobile technology at a moderate level, where the studies that were conducted showed that the level of predictive accuracy was more than 50% (Hair et al., 2017). The proposed framework is not limited to educational practices, but is also capable of measuring the acceptance of technology among adult users in Malaysia. It is important to confirm their attributes and behaviours before developing a good application, especially during this pandemic, when most adults rely on mobile phones for their daily activities. The enabling aspect for behavioural intention is significant, along with FC-UB significant in the UTAUT framework

(Venkatesh et al., 2003). While the original intent of mobile technology was facilitating communication and interaction, it is strongly suggested that the learners be provided with appropriate tools that help them use mobile technology for education.

The findings of this study offer a significant theoretical contribution to the literature. This research applied the UTAUT model to determine the intention of formal part-time learners to accept and use m-Learning in the context of HEIs in Malaysia. Technology acceptance models are frequently applied to study the acceptance of technology by learners. However, a few studies investigated technology acceptance in the context of the behaviour of formal part-time learners in general (Ramirez et al., 2018). In addition, most of the prior studies primarily adapted the basic UTAUT model with four primary attributes with little focus on the context of formal part-time learners in Malaysia (Al-Emran et al., 2020; Bernacki et al., 2019; Ramirez et al., 2018).

As far as is known, this study is the first attempt to extend the attributes of the original UTAUT model with additional variables, namely, SD, PrEx, LR, and OL, to change and empirically test them to validate their acceptance in m-Learning for formal part-time learners in Malaysia. It is believed that that the proposed extension of the UTAUT model will make a significant contribution to the literature in that it is one of few studies to investigate the attributes that influence the acceptance of m-Learning among formal part-time learners in Malaysia. The results also provide further support for the utility of UTAUT with additional variables in m-Learning acceptance.

The present study went a step further and investigated the mediating role of performance expectancy via self-direction and learning readiness to accept and use m-Learning. Hence, examining the role of performance expectancy as a mediating variable will contribute to the quality of the literature on information systems and m-Learning.

7.3.2 Practical Implications

In the context of m-Learning adoption concerning formal part-time workers, the proposed acceptance framework provides several aspects affecting adoption. Decision making at educational institutions may be done following these attributes to facilitate better adoption of m-Learning. The integration of the aspects of a formal part-time learner with acceptance-specific attributes for determining the behavioural intention and use of m-Learning is determined using several parameters. Hence, the results can offer better insight to the stakeholders so that the appropriate attributes may be considered to increase the acceptance towards m-Learning.

The principles concerning the adult learners indicate the readiness to learning and self-direction are the significant aspects guiding behavioural intention concerning m-Learning. It is emphasised that the educators and content creators have specific interactions with their peers to facilitate better learning. Put differently; it is crucial to specify the aspects controlling m-Learning acceptance so that formal part-time learners can be motivated to use m-Learning. Performance expectancy and behavioural intention are significantly affected by learning readiness and self-direction, which indicates that the expectation from formal part-time learners is to use m-Learning for their studies. Those concerned with m-Learning facilitation should focus on the betterment of learners' experience.

Increased comfort and familiarity with the mobile ecosystem may be channelled for devising advanced techniques like sharing, search, organisation, and collaboration in the study courses. Previous research has addressed the suggestion of integrating m-Learning with a well-designed structure (Shin & Kang, 2015) and self-directed interactive functioning (Sung M. , 2015). It is understood that having a structured and well-designed learning guide is advantageous for academic practitioners. Hence, the stakeholders

responsible for m-Learning implementation should focus on creating an acceptance among the learners, which is essentially built by allowing the learners to consume content at a comfortable pace.

It should be noted that adult behaviour is driven by experience and learning by addressing challenges; however, in the context of formal part-time learners, the observations are different. There has been a limited impact of the specified attributes on the adoption and acceptance of m-Learning. The UTAUT model indicates that experience is not a determinant, rather a moderator in the context of behavioural intention. It has been established that previous experience does not influence m-Learning use; however, experience may help individuals to consider the use of m-Learning (Venkatesh et al., 2003). Presently, the experience is not a driving aspect of mobile technology because it is deeply integrated with modern human life, including study.

In the context of this study, it is surprising to note that the behavioural intention to use m-Learning is mainly unaffected by learning orientation. Learners have little concern regarding problem-centric exercise. The expertise and ability of the educators are crucial for designing the questions. Data collected using open-ended questions indicate that there is still much worry among the learners regarding the readability and accessibility of content using m-Learning. These two aspects can be addressed by offering access to high-speed internet and providing better information retrieval, which can facilitate self-paced learning for individuals having a busy schedule.

The observations concerning the significance of learner readiness and self-direction especially indicate that an opportunity to use m-Learning using the several forms for mobile-based interaction is a critical factor for creating a positive attitude to m-Learning. Furthermore, there should be several sources for m-Learning to facilitate information

retrieval using more ways. The perspective of the educator is a premise for further research concerning this domain and is expected to provide meaningful insight.

The findings of this research offer practical implications for improving m-Learning acceptance in the context of Malaysia. The aim of the MCMC is to become a competitor in innovative mobile content and applications. The focus of m-Learning is the learning itself rather than the technology in mobile phones. Therefore, Malaysia, as a developing country, should adopt m-Learning to improve the knowledge, skills and expertise of its people (Zainol et al., 2017). These findings provide practical guidelines for the successful acceptance of m-Learning in Malaysia. With increased knowledge of the intention of users with regard to m-Learning activities, an expected benefit of m-Learning technology is that developers and practitioners will be able to understand the challenges and issues concerning the successful design and implementation of m-Learning. Furthermore, due to a generic approach, the findings of this study can be easily modified to assist other developing countries in the planning and uptake of m-Learning experiences.

7.4 Research Significance

This impact of the study is discussed in this section, especially in the context of the government, accountable stakeholders, higher institution, programmers, educators, researchers and formal part-time learners themselves.

1. Learning methodology had witnesses immense change facilitated by advances in Information Technology. m-Learning is gradually replacing classroom-based learning, and formal part-time learners are especially interested since m-Learning offers self-paced learning at a time of the individual's choosing. Formal part-time learners are typically working part-time or fully and have to manage several

responsibilities concerning the workplace, family and personal aspects. m-Learning is envisioned as the facilitator of study for formal part-time learners. It empowers the learners using an integration of m-Learning with andragogical aspects. Hence, the results of this research are expected to contribute towards creating an improved learning experience and motivating formal part-time learners to keep themselves engaged during the virtual sessions.

2. The government institutions responsible for managing the tertiary education framework can use these results as guidelines that should be followed to increase m-Learning adoption. Government intervention is necessary because financial and technological aspects are not enough to fulfil the learning objectives. These results may be used to several government departments like the Ministry of Higher Education, Ministry of Rural Development, Ministry of Communication and Multimedia, and non-governmental organisation. The number of formal part-time learners in the country is relatively less; however, these part-time learners are critical for the betterment of the economy. Besides, the impact of professionalism should also be considered.
3. Over the past decade in Malaysia research in the field of m-Learning in higher education institutions has seen significant progress. Institutions are responsible for introducing m-Learning applications that advance learning and teaching processes such that learners may access study materials at any time and place (Kumar et al., 2020). Higher education institutions gain several advantages in such m-Learning experiences when they establish a supportive environment as such initiatives will not only encourage the development of high-tech skillsets in student learners, but will also promote the implementing institutions through the effective implementation of competitive distance learning environments worldwide. Such courses present ideal options for enabling great learning

experiences during this pandemic. In fact, mobile technology is seen to have a great potential in addressing the growing need for educational access due to the benefits it offers. The framework provides a method of linking the research to wider outcomes. It discovers, acknowledges and includes contextual attributes that help m-Learning practitioners to apply and extend the findings. The growing interest in the study of mobile technology, especially during this pandemic, has led to the development of many applications. Thus, this study helps to reduce the uncertainty of formal part-time learners and the attributes of adults in Malaysia to provide useful technologies that meet their psychological and behavioural needs.

The results highlight the prominence of andragogical attributes, as they influence the intention of formal part-time learners or adults to accept m-Learning. The study encompassed the UTAUT attributes with adult learning principles that stand out as a central concept of the framework. Altogether, this confirmed the essential focus of formal part-time learners as well as of adults in the Malaysian context. It examined their intention during the observation of the given attributes, with particular concentration on the current empirical evidence on technology acceptance in Malaysia.

4. Educators and programmers have a significant role in making m-Learning successful by the appropriate use of technology and using their experience and skill to create the learning framework. An expert educator can help by providing andragogical information concerning present or new mobile technology. At the same time, programmers can design the technical structure and guidelines before application development is started. This integration can culminate into an improved education system for practitioners and formal part-time learners.

5. This research may be used as a reference by academicians or researchers who want to explore technology acceptance by formal part-time learners further. Numerous studies conducted in the past address the development of mobile application; hence, it is expected that the study will help with m-Learning evolution and acceptance in Malaysia.
6. Formal part-time learners can reap the benefits by using the comprehensive learning experience provided through m-Learning. Such a framework may help the learners remain engaged with the educators and peers using virtual presence. The learners can create a learning style to help ease study; hence the researchers should consider attributes that motivate the learners to use m-Learning.

It is essential to understand the learning style and the need for the learner to enhance the adoption of m-Learning Acceptance may be ascertained using specific techniques.

A well-crafter acceptance framework is recommended as a guideline for teachers, developers, and programmers before the development of mobile applications are started. Additionally, the results highlight that m-Learning holds promise when used concurrently with andragogical aspects concerning the adult learner in Malaysia

7.5 Research Limitations

While the study adds a meaningful contribution to the understanding of m-Learning acceptance, it also posits some limitations that need to be considered when carrying out future studies. The limitations of this research are specified in this section to provide an outline of the shortcomings, assumptions, restrictions and other aspects of the research.

Presently, several learning programmes are offered by many private and public educational institutions where working individuals may register for short-duration

courses or training. It is understood that m-Learning can facilitate a better understanding. At the same time, some limitations may create challenges.

1. Several researchers have a different opinion about the age at which learners are considered adults. A majority consider the 21-56-year-olds as adult learners (Diep et al., 2016; Gutl et al., 2015; Molnar & Szuts, 2014). Learning ability and accommodating study with work and family responsibilities is significant when the individuals aspire for higher qualifications or want to develop skills for career progression or wanting to start a career in a different domain (Hegyesi et al., 2014). Individuals over 56 years of age are considered to be older adults, and their learning style is different. In contrast, a majority of the younger individuals having an age of up to 21 years may still be pursuing undergraduate level education thereby lacking work experience; hence the pedagogical approach is better suited compared to the andragogical approach.
2. The developed theoretical framework was validated in only five public HEIs in the Klang Valley, Malaysia while private HEIs were not considered. Formal part-time learners from these public HEIs must register for a programme offering a standard curriculum having a specified credit duration. Information obtained from the MOHE 2017 indicates that the strength of part-time learners is 55,000 individuals. Formal part-time learners have the additional commitment of study while they are still working, at least until the studies are completed. Therefore, such learners often face a shortage of time. Several relevant aspects must be addressed like the choice of institution, course duration, and classroom training. Consequently, it is straightforward for the researcher to evaluate the intake, and drop specifically for m-Learning use and data collection.

3. The data were collected over four months. The data collection process was relatively long because of the required number of responses along with the need to collect data from the same institutions several times.
4. There were challenges concerning the readiness and the sincerity with which the chosen individuals responded to the questionnaire. The self-assessments provided by the learners were assessed for determining the variables. Appropriate choice of the sample and honest response is essential to the study. The researchers paid immense attention to choose individuals who were more likely to respond sincerely; however, there may be potential issues concerning honesty, especially with the questions that are more focused on the personal aspects. Additionally, there is a chance that the respondents understand the questions differently compared to the intention of the researcher. These attributes may have affected research data to some extent.
5. This research examined the acceptance of m-Learning among learners alone and neglected to study the academic acceptance of such technology. It also concentrated on extending the four attributes of the UTAUT with the attributes of formal part-time learners as the external variables namely, effort expectancy, performance expectancy, facilitating conditions, and social influence. These aspects can be evaluated with the principles concerning an adult learner prior experience and self-direction, orientation to learning and readiness to understand the acceptance towards m-Learning. These attributes were chosen as per the guidelines provided by the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) along with previous literature review.

7.6 Future Work

The practices and future aspects concerning m-Learning for formal part-time learners are discussed in this section. Wireless communication and its widespread use offer numerous opportunities for formal part-time learners, thereby helping build solutions and innovative techniques are also outlined along with future consideration.

1. It would be more beneficial to examine if the developed framework will work efficiently with other HEIs in other developing and developed countries. This would be a constructive and valuable procedure for evaluating the robustness of the developed framework across several cultural environments. As a future trial, it would be interesting to extend the developed framework by incorporating contextual attributes.
2. Demographics indicate that a majority of the respondents are relatively youngers, with about 79.2% being below 35 years of age. Different age groups may be addressed in future studies to evaluate if age leads to a difference in m-Learning acceptance.
3. Though the survey was conducted in public universities, the research could potentially have a bias due to the Malaysian context. Hence, future studies should explore and collect samples from private HEI in order to further generalize and heighten the results.
4. Formal part-time learners use mobile devices compatible with local mobile networks. Wireless technology has led to flexible learning, thereby causing a rising demand for mobile technology (So, 2016). The fulfilment of this demand requires the researchers to consider the internet access speed, which varies widely across geographies and regions. Speed is a function of the number of users (representing network traffic) accessing one network and the distance of the mobile devices from the antennae.

m-Learning has transformed the learning process and facilitating the access of educational content using the internet provides for easy access. Access requires building a cost-effective platform facilitating easy resource retrieval. At the same time, it is vital to ascertain the attributes that encourage or discourage its use. Diep et al., (2016) indicated lesser participation of formal part-time learners in-class activities (compared to higher secondary degree holders). A majority of the previous m-Learning platforms lack an effective collaboration environment (Manuel & Ferreira, 2014), which could be attributed to the discomfort of the learners concerning the design of the communication media. Hence, it is essential to understand the learners' perspective while also sharing experiences and combining the suggestions of other members. Integrated online and offline communication, location, information type are crucial attributes reinforcing m-Learning use since mobile devices may themselves not be completely useful as learning tools.

REFERENCES

Abatan, O. K., & Maharaj, M. (2015). Analyzing educational and social usage of mobile telecommunications in a South African university. *International Conference on Information Society, i-Society 2014*, 64–69. https://doi.org/10.1109/i-Society.2014.7009013

Abu Bakar, A., Wook, T. S. M. T., & Ashaari, N. S. (2015). An investigation of user engagement factors in E-learning for working adult learners. *Proceedings - 5th International Conference on Electrical Engineering and Informatics: Bridging the Knowledge between Academic, Industry, and Community, ICEEI 2015*, 633–637. https://doi.org/10.1109/ICEEI.2015.7352576

Abu, F., Jabar, J., & Yunus, A. R. (2015). *Australian Journal of Basic and Applied Sciences Modified of UTAUT Theory in Adoption of Technology for Malaysia Small Medium Enterprises (SMEs) in Food Industry*. *9*(August), 104–109.

Agarwal, S., Bansal, T., Agarwal, R., & Qadeer, M. A. (2013). Student's desk: My workplace on android. *Proceedings - 2013 3rd International Conference on Advances in Computing and Communications, ICACC 2013*, 292–295. https://doi.org/10.1109/ICACC.2013.61

Ajzen, I. (2011). *The theory of planned behaviour: Reactions and reflections*. *0446*. https://doi.org/10.1080/08870446.2011.613995

Al-adwan, A. S., Al-madadha, A., & Zvirzdinaite, Z. (2018). Modeling Students' Readiness to Adopt Mobile Learning in Higher Education: An Empirical Study. *International Review of Research in Open and Distributed Learning*, *19*(1).

Al-Ali, H., Bazzaza, M. W., Zemerly, M. J., & Ng, J. W. P. (2016). MyVision AIR: An augmented interactive reality book mobile application. *IEEE Global Engineering Education Conference, EDUCON*, *10-13-Apri*(April), 741–745. https://doi.org/10.1109/EDUCON.2016.7474634

Al-Emran, M., Elsherif, H. M., & Shaalan, K. (2016). Investigating attitudes towards the use of mobile learning in higher education. *Computers in Human Behavior*, *56*, 93–102. https://doi.org/10.1016/j.chb.2015.11.033

Al-Emran, M., Mezhuyev, V., & Kamaludin, A. (2020). Towards a conceptual model for examining the impact of knowledge management factors on mobile learning acceptance. *Technology in Society*, *61*(November 2019), 101247. https://doi.org/10.1016/j.techsoc.2020.101247

Al-Saedi, K., Al-Emran, M., Ramayah, T., & Abusham, E. (2020). Developing a general extended UTAUT model for M-payment adoption. *Technology in Society*, *62*(January), 101293. https://doi.org/10.1016/j.techsoc.2020.101293

Al Zoubib, A. I. S., & Jali, M. Z. (2014). An integrated success adoption model for examining e-learning among adult workers in Jordan. *2014 International Conference on Computer and Information Sciences, ICCOINS 2014 - A Conference of World Engineering, Science and Technology Congress, ESTCON 2014 -*

Proceedings. https://doi.org/10.1109/ICCOINS.2014.6868829

Altomonte, S., Logan, B., Feisst, M., Rutherford, P., & Wilson, R. (2016). Interactive and situated learning in education for sustainability. *International Journal of Sustainability in Higher Education*, *17*(3), 417–443. https://doi.org/10.1108/IJSHE-01-2015-0003

Angelaki, C., & Mavroidis, I. (2013). Communication and Social Presence: The Impact on Adult Learners' Emotions in Distance Learning. *European Journal of Open, Distance and E-Learning*, *16*, 78–93. http://www.eurodl.org/?p=archives&year=2013&halfyear=1&article=563

Antonczak, L., Keegan, H., & Cochrane, T. (2016). mLearning and creative practices. *International Journal of Mobile and Blended Learning*, *8*(4), 34–43. https://doi.org/10.4018/IJMBL.2016100103

Bacca, J., Baldiris, S., Fabregat, R., Kinshuk, & Graf, S. (2015). Mobile augmented reality in vocational education and training. *Procedia Computer Science*, *75*(Vare), 49–58. https://doi.org/10.1016/j.procs.2015.12.203

Bahasa, D. (2010). *Kamus Dewan Edisi Keempat* (D. B. dan Pustaka (ed.)).

Bandura, A. (1989). *Social cognitive theory. In R. Vasta (Ed.)* (Vol. 6). JAI Press.

Bere, A. (2014). Exploring Determinants for Mobile Learning User Acceptance and Use: An Application of UTAUT. *2014 11th International Conference on Information Technology: New Generations*, 84–90. https://doi.org/10.1109/ITNG.2014.114

Berg, D., Mani, H. S., Marinakis, Y. G., Tierney, R., & Walsh, S. (2015). An introduction to Management of Technology pedagogy (andragogy). *Technological Forecasting and Social Change*, *100*, 1–4. https://doi.org/10.1016/j.techfore.2015.08.002

Bernacki, M. L., Crompton, H., & Greene, A. (2019). Towards convergence of mobile and psychological theories of learning. *Contemporary Educational Psychology*, *60*(May 2020), 101828. https://doi.org/10.1016/j.cedpsych.2019.101828

Biggs, J. (1987). Student Approaches to Learning and Studying. Research Monograph. In *Australian Education Research and Development*. https://eric.ed.gov/?id=ED308201

Bogart, W. Van De, & Wichadee, S. (2015). Exploring students' intention to use LINE for academic purposes based on technology acceptance model. *International Review of Research in Open and Distributed Learning*, *16*(3), 65–85. https://doi.org/10.19173/irrodl.v16i3.1894

Boticki, I., Wong, L. H., & Looi, C.-K. (2013). Designing technology for content-independent collaborative mobile learning. *IEEE Transactions on Learning Technologies*, *6*(1), 14–24.

Briz-Ponce, L., Juanes-Méndez, J. A., & García-Peñalvo, F. J. (2014). A systematic review of using mobile devices in medical education. *Proceedings of 2014 International Symposium on Computers in Education (SIIE)*, 205–210.

https://doi.org/10.1109/SIIE.2014.7017731

Brown, S. A., Dennis, A. R., & Venkatesh, V. (2010). Predicting collaboration technology use: Integrating technology adoption and collaboration research. *Journal of Management Information Systems*, *27*(2), 9–54. https://doi.org/10.2753/MIS0742-1222270201

Cárdenas-Robledo, L. A., & Peña-Ayala, A. (2018). Ubiquitous learning: A systematic review. *Telematics and Informatics*, *35*(5), 1097–1132. https://doi.org/10.1016/j.tele.2018.01.009

Carpenter, J. P., & Linton, J. N. (2016). Edcamp unconferences: Educators' perspectives on an untraditional professional learning experience. *Teaching and Teacher Education*, *57*, 97–108. https://doi.org/10.1016/j.tate.2016.03.004

Castillo, A., Clunie T., C., de Clunie, G., & Rodríguez, K. (2013). A System for Mobile Learning: A Need in a Moving World. *Procedia - Social and Behavioral Sciences*, *83*, 819–824. https://doi.org/10.1016/j.sbspro.2013.06.154

Chao, C. M. (2019). Factors determining the behavioral intention to use mobile learning: An application and extension of the UTAUT model. *Frontiers in Psychology*, *10*(JULY), 1–14. https://doi.org/10.3389/fpsyg.2019.01652

Chatterton, P., & Goddard, J. (2000). *The Response of Higher Education Institutions to Regional Needs*. *35*(4).

Chauhan, S. (2016). A meta-analysis of the impact of technology on learning effectiveness of elementary students. *Computers and Education*, *105*, 14–30. https://doi.org/10.1016/j.compedu.2016.11.005

Cheon, J., Lee, S., Crooks, S. M., & Song, J. (2012). An investigation of mobile learning readiness in higher education based on the theory of planned behavior. *Computers and Education*, *59*(3), 1054–1064. https://doi.org/10.1016/j.compedu.2012.04.015

Cheung, S. K. S., Yuen, K. S., & Tsang, E. Y. M. (2011). A study on the readiness of mobile learning in open education. *IT in Medicine and Education (ITME), 2011 International Symposium*.

Chilivumbo, C. (2015). Mobile e-learning: The choice between responsive / mobile websites and mobile applications for virtual learning environments for increasing access to higher education in Malawi. *International Information Management Corporation*, 1–15. https://doi.org/10.1109/ISTAFRICA.2015.7190520

Chiu, C.-J., Hu, Y.-H., Lin, D.-C., Chang, F.-Y., Chang, C.-S., & Lai, C.-F. (2016). The attitudes, impact, and learning needs of older adults using apps on touchscreen mobile devices: Results from a pilot study. *Computers in Human Behavior*, *63*, 189–197. https://doi.org/10.1016/j.chb.2016.05.020

Crompton, H., & Burke, D. (2018). Computers & Education The use of mobile learning in higher education: A systematic review. *Computers & Education*, *123*(September 2017), 53–64. https://doi.org/10.1016/j.compedu.2018.04.007

Curum, B., & Khedo, K. K. (2015). Improving user cognitive processes in mobile learning platforms through context-Awareness. *2015 International Conference on Computing, Communication and Security, ICCCS 2015*, 1–7. https://doi.org/10.1109/CCCS.2015.7374137

Dable, R. a, Pawar, B. R., Gade, J. R., Anandan, P. M., Nazirkar, G. S., & Karani, J. T. (2012). Student apathy for classroom learning and need of repositioning in present andragogy in Indian dental schools. *BMC Medical Education*, *12*, 118. https://doi.org/10.1186/1472-6920-12-118

Davis, F. D. (1989). Information Technology Introduction. *MIS Quarterly*, *13*(3), 319–340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). *Extrinsic and Intrinsic Motivation to Use Computers in the Workplace' FRED D. DAVIS~*.

Demchenko, Y., Belloum, A., Bernstein, D., & De Laat, C. (2015). Experience of profiling curricula on cloud computing technologies and engineering for different target groups. *Proceedings of the International Conference on Cloud Computing Technology and Science, CloudCom*, *2015-Febru*(February), 949–955. https://doi.org/10.1109/CloudCom.2014.160

Diep, N. A., Cocquyt, C., Zhu, C., & Vanwing, T. (2016). Predicting adult learners' online participation: Effects of altruism, performance expectancy, and social capital. *Computers and Education*, *101*, 84–101. https://doi.org/10.1016/j.compedu.2016.06.002

Dromantiene, L., & Zemaitaityte, I. (2014). Challenges to adult education in Lithuania. *Procedia - Social and Behavioral Sciences*, *116*, 4532–4536. https://doi.org/10.1016/j.sbspro.2014.01.980

Ehrlick, S. P. (2014). Managing digital distraction: A pedagogical approach for dealing with wireless devices in the classroom. *Journal of Teaching and Education*, *03*(03), 207–216.

El-Hussein, M. O. M., & Cronje, J. C. (2010). *Defining Mobile Learning in the Higher Education Landscape Research method*. *13*, 12–21.

Elnasr, A., Sobaih, E., Moustafa, M. A., & Ghandforoush, P. (2016). Computers in Human Behavior To use or not to use? Social media in higher education in developing countries. *Computers in Human Behavior*, *58*, 296–305. https://doi.org/10.1016/j.chb.2016.01.002

Erdfelder, E., FAul, F., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, *41*(4), 1149–1160. https://doi.org/10.3758/BRM.41.4.1149

Fishbein, M., & Ajzen, I. (1975). Attitude-behavior relations: A theoretical analysis and review of empirical research Related papers. *Psychological Bulletin*, *84*(5), 888–918.

Fisher, M., King, J., & Tague, G. (2001). Development of a self-directed learning

readiness scale for nursing education. *Nurse Education Today*, *21*(7), 516–525. https://doi.org/10.1054/nedt.2001.0589

Frohberg, D., Göth, C., & Schwabe, G. (2009). Mobile Learning projects - a critical analysis of the state of the art: Original article. *Journal of Computer Assisted Learning*, *25*(4), 307–331. https://doi.org/10.1111/j.1365-2729.2009.00315.x

Gan, B., Menkhoff, T., & Smith, R. (2015). Enhancing students' learning process through interactive digital media: New opportunities for collaborative learning. *Computers in Human Behavior*, *51*, 652–663. https://doi.org/10.1016/j.chb.2014.12.048

Gartner, S., & Krašna, M. (2015). Online learning efficiency in the humanities. *2015 38th International Convention on Information and Communication Technology, Electronics and Microelectronics, MIPRO 2015 - Proceedings*, *May*, 710–714. https://doi.org/10.1109/MIPRO.2015.7160364

Gómez-Ramirez, I., Valencia-Arias, A., & Duque, L. (2019). Approach to M-learning acceptance among university students: An integrated model of TPB and TAM. *International Review of Research in Open and Distance Learning*, *20*(3), 141–164. https://doi.org/10.19173/irrodl.v20i4.4061

Gómez, J. E., Huete, J. F., & Hernandez, V. L. (2016). A contextualized system for supporting active learning. *IEEE Transactions on Learning Technologies*, *9*(2), 196–202. https://doi.org/10.1109/TLT.2016.2531685

Gutl, C., Cheong, C., Cheong, F., Chang, V., Nau, S. Z., & Pirker, J. (2015). Expectations of the generation NeXt in higher education: Learning engagement approaches in information sciences subjects. *2015 International Conference on Interactive Collaborative Learning (ICL)*, *September*, 205–214. https://doi.org/10.1109/ICL.2015.7318027

Hagen, M., & Park, S. (2016). We knew it all along! Using cognitive science to explain how andragogy works. *European Journal of Training and Development*, *40*(3), 171–190. https://doi.org/10.1108/EJTD-10-2015-0081

Hashim, K. F., Tan, F. B., & Rashid, A. (2015). Adult learners' intention to adopt mobile learning: A motivational perspective. *British Journal of Educational Technology*, *46*(2), 381–390. https://doi.org/10.1111/bjet.12148

Hegyesi, F., Kopják, J., & Rita, Ő. (2014). Educational strategies in adult education. *9th IEEE International Symposium on Applied Computational Intelligence and Informatics*, 219–223.

Hernandez, C., Vegas, J., Llamas, C., & Gonzalez, M. A. (2014). A survey on mobile devices use by university students. *Computers in Education (SIIE)*, *1*, 223–226.

Hooshangi, S. (2015). Finding effective ways to teach non-traditional students: A different model of teaching and learning. *Proceedings - Frontiers in Education Conference, FIE*, *2015-Febru*(February), 1–3. https://doi.org/10.1109/FIE.2014.7044163

Hoque, R., & Sorwar, G. (2017). Understanding factors influencing the adoption of

mHealth by the elderly: An extension of the UTAUT model. *International Journal of Medical Informatics*, *101*(May 2018), 75–84. https://doi.org/10.1016/j.ijmedinf.2017.02.002

Howard, R., Restrepo, L., & Chang, C.-Y. (2017). Addressing individual perceptions: An application of the unified theory of acceptance and use of technology to building information modelling. *International Journal of Project Management*, *35*(2), 107–120. https://doi.org/10.1016/j.ijproman.2016.10.012

Jack R. Fraenkel, Wallen, N. E., & Hyun, H. H. (2012). *How to design and evaluate research in education* (8th ed.). McGraw-Hill.

Kabakçi Yurdakul, I., Ursavaş, Ö. F., & Becit İşçitürk, G. (2014). An integrated approach for preservice teachers' acceptance and use of technology: UTAUT-PST scale. *Eurasian Journal of Educational Research*, *55*, 21–36. https://doi.org/10.14689/ejer.2014.55.2

Kakouris, A. (2015). Entrepreneurship pedagogies in lifelong learning: Emergence of criticality? *Learning, Culture and Social Interaction*, *6*, 87–97. https://doi.org/10.1016/j.lcsi.2015.04.004

Kamişli, H., & Özonur, M. (2017). The effects of training - Based on Knowles' adult education principles - on participants. *Eurasia Journal of Mathematics, Science and Technology Education*, *13*(12), 8405–8414. https://doi.org/10.12973/ejmste/80801

Karimi, S. (2016a). Do learners' characteristics matter? An exploration of mobile-learning adoption in self-directed learning. *Computers in Human Behavior*, *63*, 769–776. https://doi.org/10.1016/j.chb.2016.06.014

Karimi, S. (2016b). Do learners' characteristics matter? An exploration of mobile-learning adoption in self-directed learning. *Computers in Human Behavior*, *63*, 769–776. https://doi.org/10.1016/j.chb.2016.06.014

Karthikeyan, P., Uma, K. V., & Pudumalar, S. (2016). Effectiveness of Mobile Learning at TCE, India: A Learner Perspective. *Proceedings - IEEE 7th International Conference on Technology for Education, T4E 2015*, 41–42. https://doi.org/10.1109/T4E.2015.8

Kementerian Pengajian Tinggi. (2012). *Asas Pembelajaran dan Pengajaran Pensyarah Institusi Pengajian Tinggi*. http://penerbit.uthm.edu.my/

Keppel, F. P. (2019). Education for Adults. In *Education for Adults and Other Essays* (pp. 9–34). https://doi.org/10.7312/kepp90968-001

Khaddage, F., Müller, W., & Flintoff, K. (2016). Advancing mobile learning in formal and informal settings via mobile app technology: Where to from here, and how? *Educational Technology and Society*, *19*(3), 16–26. https://doi.org/10.2307/jeductechsoci.19.3.16

Khan, M. S. H., Abdou, B. O., Kettunen, J., & Gregory, S. (2019). A phenomenographic research study of students' conceptions of mobile learning: An example from higher education. *SAGE Open*, *9*(3). https://doi.org/10.1177/2158244019861457

Khosravi, P., Rezvani, A., & Wiewiora, A. (2016). The impact of technology on older adults' social isolation. *Computers in Human Behavior*, *63*, 594–603. https://doi.org/10.1016/j.chb.2016.05.092

Kilicay-Ergin, N., & Laplante, P. A. (2013). An online graduate requirements engineering course. *IEEE Transactions on Education*, *56*(2), 208–216. https://doi.org/10.1109/TE.2012.2208461

Knowles, M. (1973). The adult learner: A neglected species. In *Educational Researcher* (Vol. 8, Issue 3). https://doi.org/10.2307/1174362

Knowles, M. S. (1986). Andragogy in Action: Applying Modern Principles of Adult Learning. *Canadian Journal of Communication*, *12*(1), 77–80.

Kometani, Y., Tomoto, T., Akakura, T., & Nagaoka, K. (2014). Correlation between teaching behavior and real-time student evaluations. *Proceedings - IEEE 6th International Conference on Technology for Education, T4E 2014*, 68–71. https://doi.org/10.1109/T4E.2014.25

Kopeinik, S., Nussbaumer, A., Winter, L. C., Albert, D., Dimache, A., & Roche, T. (2014). Combining self-regulation and competence-based guidance to personalise the learning experience in moodle. *Proceedings - IEEE 14th International Conference on Advanced Learning Technologies, ICALT 2014*, 62–64. https://doi.org/10.1109/ICALT.2014.28

Kumar, B. A., Goundar, M. S., & Chand, S. S. (2020). A framework for heuristic evaluation of mobile learning applications. *Education and Information Technologies*, *August*. https://doi.org/10.1007/s10639-020-10112-8

Larcker, C. F. D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research*, *18*(1), 39–50.

Lawrence, B. A. M. (2016). IPad acceptance by English learners in Saudi Arabia. *English Language Teaching*, *9*(12), 34–46. https://doi.org/10.5539/elt.v9n12p34

Liu, Y. C., & Huang, Y.-M. (2015). Using the UTAUT model to examine the acceptance behavior of synchronous collaboration to support peer translation. *JALT CALL Journal*, *11*(1), 77–91.

Lo, P., Cho, A., Leung, M., Chiu, D. K. W., Ko, E. H. T., & Ho, K. K. W. (2016). Use of smartphones by art and design students for accessing library services and learning. *Library Hi Tech*, *34*(2Library Hi Tech), 224–238. https://doi.org/10.1108/LHT-02-2016-0015

Lu, A., Chen, Q., Zhang, Y., & Chang, T. (2017). Investigating the Determinants of Mobile Learning Acceptance in Higher Education Based on UTAUT. *Proceedings - 2016 International Computer Symposium, ICS 2016*, 651–655. https://doi.org/10.1109/ICS.2016.0133

Lu, J., Wu, D., Mao, M., Wang, W., & Zhang, G. (2015). Recommender system application developments: A survey. *Decision Support Systems*, *74*, 12–32. https://doi.org/10.1016/j.dss.2015.03.008

Lucke, T., Keyssner, U., & Dunn, P. (2013). The use of a Classroom Response System to more effectively flip the classroom. *Proceedings - Frontiers in Education Conference, FIE*, 491–495. https://doi.org/10.1109/FIE.2013.6684872

Ma, Q., Chan, A. H. S., & Chen, K. (2016). Personal and other factors affecting acceptance of smartphone technology by older Chinese adults. *Applied Ergonomics*, *54*, 62–71. https://doi.org/10.1016/j.apergo.2015.11.015

Mackintosh-Franklin, C. (2016). Pedagogical principles underpinning undergraduate Nurse Education in the UK: A review. *Nurse Education Today*, *40*, 118–122. https://doi.org/10.1016/j.nedt.2016.02.015

Madhumathi, C., & Ganapathy, G. (2015). An effective time-based load balancer for an academic cloud environment. *2015 International Conference on Computer Communication and Informatics, ICCCI 2015*. https://doi.org/10.1109/ICCCI.2015.7218106

Mahan, J. D., & Stein, D. S. (2014). Teaching adults - Best practices that leverage the emerging understanding of the neurobiology of learning. *Current Problems in Pediatric and Adolescent Health Care*, *44*(6), 141–149. https://doi.org/10.1016/j.cppeds.2014.01.003

McFadden, C. (2013). *Advancing Active Learning with Adult Learners* (Issue 2008, pp. 778–794). https://doi.org/10.4018/978-1-4666-4249-2.ch045

Milošević, I., Živković, D., Manasijević, D., & Nikolić, D. (2015). The effects of the intended behavior of students in the use of m-learning. *Computers in Human Behavior*, *51*(PA), 207–215. https://doi.org/10.1016/j.chb.2015.04.041

Mohammadi, H. (2015). Social and individual antecedents of m-learning adoption in Iran. *Computers in Human Behavior*, *49*, 191–207. https://doi.org/10.1016/j.chb.2015.03.006

Moldovan, A., Weibelzahl, S., & Muntean, C. H. (2014). Energy-aware mobile learning: opportunities and challenges. *IEEE Communications Surveys & Tutorials*, *16*(1), 234–265.

Molnár, G. (2015). Teaching and learning in modern digital environment. *SAMI 2015 - IEEE 13th International Symposium on Applied Machine Intelligence and Informatics, Proceedings*, 213–217. https://doi.org/10.1109/SAMI.2015.7061878

Molnar, G., & Szuts, Z. (2014). Advanced mobile communication and media devices and applications in the base of higher education. *SISY 2014 - IEEE 12th International Symposium on Intelligent Systems and Informatics, Proceedings*, 169–174. https://doi.org/10.1109/SISY.2014.6923580

Moorthy, K., Yee, T. T., T'ing, L. C., & Kumaran, V. V. (2019). Habit and hedonic motivation are the strongest influences in mobile learning behaviours among higher education students in Malaysia. *Australasian Journal of Educational Technology*, *35*(4), 174–191. https://doi.org/10.14742/ajet.4432

Moser, S., Krapp, F., Bärtele, S., Wunderlich, K., Gröger, G., Slomka, F., & Schumacher,

H. (2015). Cloud-based virtual desktop environment for advanced online master's courses. *2014 International Conference on Web and Open Access to Learning, ICWOAL 2014*. https://doi.org/10.1109/ICWOAL.2014.7009235

Muresan, M. (2014). Using Cybergogy and Andragogy Paradigms in Lifelong Learning. *Procedia - Social and Behavioral Sciences*, *116*, 4722–4726. https://doi.org/10.1016/j.sbspro.2014.01.1015

Nabihah, N., Nizar, M., Rahmat, M. K., & Maaruf, S. Z. (2019). *Mới.Pdf*. *2015*.

Navarro, C. X., Molina, A. I., & Redondo, M. A. (2016). Factors influencing students' acceptance in m-learning: A literature review and proposal of a taxonomy. *2016 International Symposium on Computers in Education, SIIE 2016: Learning Analytics Technologies*, 1–6. https://doi.org/10.1109/SIIE.2016.7751840

Nawi, A., Fkhrudin, A., Yusoff, M., & Ajmain, H. H. (2014). Engaging student through ICT: strategies and challenges for using website in teaching and learning. *International Letters of Social and Humanistic Sciences ISSN*, *16*(1), 49–56.

Noor, N. M., Harun, J., & Aris, B. (2014). Application of the pedagogical and andragogical model in web-based learning instruction among non-major computer science students' learning programming. *Proceedings - 2014 International Conference on Teaching and Learning in Computing and Engineering, LATICE 2014*, 106–111. https://doi.org/10.1109/LaTiCE.2014.27

Nosseir, A., & Fathy, Y. M. (2020). A mobile application for early prediction of student performance using fuzzy logic and artificial neural networks. *International Journal of Interactive Mobile Technologies*, *14*(2), 4–18. https://doi.org/10.3991/ijim.v14i02.10940

Nygren, H., Nissinen, K., Hämäläinen, R., & De Wever, B. (2019). Lifelong learning: Formal, non-formal and informal learning in the context of the use of problem-solving skills in technology rich environments. *British Journal of Educational Technology*, *50*(4), 1759–1770. https://doi.org/10.1111/bjet.12807

Ooi, K. B., & Tan, G. W. H. (2016). Mobile technology acceptance model: An investigation using mobile users to explore smartphone credit card. *Expert Systems with Applications*, *59*, 33–46. https://doi.org/10.1016/j.eswa.2016.04.015

Opfer, V. D., Pedder, D. G., & Lavicza, Z. (2011). The role of teachers' orientation to learning in professional development and change: A national study of teachers in England. *Teaching and Teacher Education*, *27*(2), 443–453. https://doi.org/10.1016/j.tate.2010.09.014

Ouedraogo, B. (2017). Model of information and communication technology (ICT) acceptance and use for teaching staff in sub-Saharan Africa public higher education institutions. *Higher Education Studies*, *7*(2), 101–118. https://doi.org/10.5539/hes.v7n2p101

Paananen, H., Lapke, M., & Siponen, M. (2020). State of the art in information security policy development. *Computers and Security*, *88*, 101608. https://doi.org/10.1016/j.cose.2019.101608

Papadakis, S., & Kalogiannakis, M. (2017). Mobile educational applications for children. What educators and parents need to know. *International Journal of Mobile Learning and Organisation*, *11*(2), 1. https://doi.org/10.1504/ijmlo.2017.10003925

Papadakis, S., Vaiopoulou, J., Kalogiannakis, M., & Stamovlasis, D. (2020). Developing and exploring an evaluation tool for educational apps (E.T.E.A.) targeting kindergarten children. *Sustainability (Switzerland)*, *12*(10), 1–10. https://doi.org/10.3390/su12104201

Pembridge, J. J., & Paretti, M. C. (2013). Student perceptions of andragogical orientation and student learning. *Proceedings - Frontiers in Education Conference, FIE*, 64–68. https://doi.org/10.1109/FIE.2013.6684789

Peng, H., Su, Y. J., Chou, C., & Tsai, C. C. (2009). Innovations in education and teaching international ubiquitous knowledge construction: mobile learning re - defined and a conceptual framework. *Innovations in Education and Teaching International*, *46*(May 2009), 171–183. https://doi.org/10.1080/14703290902843828

Pesuruhjaya Penyemak Undang-undang Malaysia. (2006). UNDANG-UNDANG Akta 21 AKTA UMUR DEWASA 1971. In *Malayan Law Journal Sdn Bhd*. http://www.agc.gov.my/agcportal/uploads/files/Publications/LOM/MY/Akta 21.pdf

Pilar, R.-A., Jorge, A., & Cristina, C. (2013). The use of current mobile learning applications in EFL. *Procedia - Social and Behavioral Sciences*, *103*, 1189–1196. https://doi.org/10.1016/j.sbspro.2013.10.446

Pimmer, C., Mateescu, M., & Gröhbiel, U. (2016). Mobile and ubiquitous learning in higher education settings. A systematic review of empirical studies. *Computers in Human Behavior*, *63*, 490–501. https://doi.org/10.1016/j.chb.2016.05.057

Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1991). Motivated Strategies for Learning Questionnaire (MSLQ). In *The University of Michigan* (Vol. 6, Issue 1). https://doi.org/10.5901/mjss.2015.v6n1p156

Poletti, G. (2015). *Work in Progress: mobile technology for teaching in higher education Augmented Reality in the classroom to support learning*. *March*, 789–792.

Postan, L. (2014). Adult education and some andragogical dimensions of higher education in the Republic of Moldova. *Procedia - Social and Behavioral Sciences*, *142*, 127–132. https://doi.org/10.1016/j.sbspro.2014.07.621

Radovan, M., & Kristl, N. (2017). Acceptance of technology and its impact on teacher's activities in virtual classroom: Integrating UTAUT and CoI into a combined model. *Turkish Online Journal of Educational Technology*, *16*(3), 11–22.

Rahi, S., Othman Mansour, M. M., Alghizzawi, M., & Alnaser, F. M. (2019). Integration of UTAUT model in internet banking adoption context: The mediating role of performance expectancy and effort expectancy. *Journal of Research in Interactive Marketing*, *13*(3), 411–435. https://doi.org/10.1108/JRIM-02-2018-0032

Rahimi, M. R., Ren, J., Liu, C. H., Vasilakos, A. V., & Venkatasubramanian, N. (2014).

Mobile cloud computing: A survey, state of art and future directions. *Mobile Networks and Applications*, *19*(2), 133–143. https://doi.org/10.1007/s11036-013-0477-4

Ramirez, G. M., Collazos, C. A., & Moreira, F. (2018). All-Learning: The state of the art of the models and the methodologies educational with ICT. *Telematics and Informatics*, *35*(4), 944–953. https://doi.org/10.1016/j.tele.2017.10.004

Reed, S., Shell, R., Kassis, K., Tartaglia, K., Wallihan, R., Smith, K., Hurtubise, L., Martin, B., Ledford, C., Bradbury, S., Bernstein, H., & Mahan, J. D. (2014). Applying adult learning practices in medical education. *Current Problems in Pediatric and Adolescent Health Care*, *44*, 170–181. https://doi.org/10.1016/j.cppeds.2014.01.008

Reychav, I., Ndicu, M., & Wu, D. (2016). Leveraging social networks in the adoption of mobile technologies for collaboration. *Computers in Human Behavior*, *58*, 443–453. https://doi.org/10.1016/j.chb.2016.01.011

Road, S., & Kingdom, U. (2015). An Exploration of Students' Lived Experiences of Using Smartphones in Diverse Learning Context Using a Hermeneutic Phenomenological Approach. *Durham Research Online*, *44*(December 2014), 1–18.

Rodriguez-Gomez, D., Ion, G., Mercader, C., & López-Crespo, S. (2020). Factors promoting informal and formal learning strategies among school leaders. *Studies in Continuing Education*, *42*(2), 240–255. https://doi.org/10.1080/0158037X.2019.1600492

Rogers, E. M. (1995). Diffusion of Innovations: Modifications of a Model for Telecommunications. *Die Diffusion von Innovationen in Der Telekommunikation*, 25–38. https://doi.org/doi:10.1007/978-3-642-79868-9_2

Sălăvăstru, D. (2014). Experiential learning and the pedagogy of interrogation in the education of adults. *Procedia - Social and Behavioral Sciences*, *142*, 548–552. https://doi.org/10.1016/j.sbspro.2014.07.664

Samaroo, S., Cooper, E., & Green, T. (2013). Pedandragogy: A way forward to self-engaged learning. *New Horizons in Adult Education & Human Resource Development*, *25*, 76–90. https://doi.org/10.1002/nha3.20032

Sekaran, U. (2013). Research methods for business. In *Research methods for business* (Vol. 65, Issue 3). https://doi.org/10.1017/CBO9781107415324.004

Shin, W. S., & Kang, M. (2015). The use of a mobile learning management system at an online university and its effect on learning satisfaction and achievement. *International Review of Research in Open and Distributed Learning*, *16*(3), 110–130. https://doi.org/10.19173/irrodl.v16i3.1984

Shorfuzzaman, M., & Alhussein, M. (2016). Modeling learners' readiness to adopt mobile learning: A perspective from a GCC higher education institution. *Mobile Information Systems*, 1–10. https://doi.org/10.1155/2016/6982824

Shuib, M., Azizan, S. N., & Ganapathy, M. (2018). Mobile learning readiness among

English language learners in a public university in Malaysia. *Pertanika Journal of Social Sciences and Humanities*, *26*(3), 1491–1504.

Silverman, D. (2013). *Doing qualitative research* (K. Metzler (ed.); Fourth Edi). SAGE.

Siriwongs, P. (2015). Developing students' learning ability by dint of self-directed learning. *Procedia - Social and Behavioral Sciences*, *197*(February), 2074–2079. https://doi.org/10.1016/j.sbspro.2015.07.577

Slavkovic, N., & Savic, A. (2015). The Usage of m Learning for Adult Education in Serbia. *Procedia - Social and Behavioral Sciences*, *174*, 2806–2812. https://doi.org/10.1016/j.sbspro.2015.01.971

So, S. (2016). Mobile instant messaging support for teaching and learning in higher education. *Internet and Higher Education*, *31*, 32–42. https://doi.org/10.1016/j.iheduc.2016.06.001

Soh, P. Y., Heng, H. B., Selvachandran, G., Anh, L. Q., Chau, H. T. M., Son, L. H., Abdel-Baset, M., Manogaran, G., & Varatharajan, R. (2020). Perception, acceptance and willingness of older adults in Malaysia towards online shopping: a study using the UTAUT and IRT models. *Journal of Ambient Intelligence and Humanized Computing*, *0123456789*. https://doi.org/10.1007/s12652-020-01718-4

Stanton, G., & Ophoff, J. (2013). Towards a method for mobile learning design. *Issues in Informing Science and Information Technology*, *10*, c.

Strandell-Laine, C., Stolt, M., Leino-Kilpi, H., & Saarikoski, M. (2015). Use of mobile devices in nursing student-nurse teacher cooperation during the clinical practicum: An integrative review. *Nurse Education Today*, *35*(3), 493–499. https://doi.org/10.1016/j.nedt.2014.10.007

Su, Y. S., Huang, C. S. J., & Ding, T. J. (2016). Examining the effects of MOOCs learners' social searching results on learning behaviors and learning outcomes. *Eurasia Journal of Mathematics, Science and Technology Education*, *12*(9), 2517–2529. https://doi.org/10.12973/eurasia.2016.1282a

Sung, M. (2015). A study of adults' perception and needs for smart learning. *Procedia - Social and Behavioral Sciences*, *191*, 115–120. https://doi.org/10.1016/j.sbspro.2015.04.480

Sung, Y.-T., Chang, K.-E., & Liu, T.-C. (2016). The effects of integrating mobile devices with teaching and learning on students' learning performance: A meta-analysis and research synthesis. *Computers & Education*, *94*, 252–275. https://doi.org/10.1016/j.compedu.2015.11.008

Susilo, A. (2014). Emerging technologies acceptance in online tutorials: tutors' and students' behavior intentions in higher education. *Open Praxis*, *6*(3), 257–274. https://doi.org/10.5944/openpraxis.6.3.108

T. Ramayah, Cheah, J., Chuah, F., Ting, H., & Memon, M. A. (2018). *Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS 3.0* (Second Edi). Pearson Malaysia.

Tabuenca, B., Kalz, M., Ternier, S., & Specht, M. (2015). Stop and think: Exploring mobile notifications to foster reflective practice on meta-learning. *IEEE Transactions on Learning Technologies*, *8*(1), 124–135. https://doi.org/10.1109/TLT.2014.2383611

Taylor, S., & Todd, P. (1995). Marketing Decomposition and crossover effects in the theory of planned behavior: A study of consumer adoption intentions. *International Journal of Research in Marketing*, *12*, 137–155.

Thompson, R. L., Higgins, C. A., Howell, J. M., Thompson, R. L., Higgins, C. A., Howell, J. M., & Howell, J. M. (1994). Influence of Experience on Personal Computer Utilization: Testing a Conceptual Model Influence of Experience on Personal Computer Utilization: Testing a Conceptual Model. *Journal of Management Information System*, *11*(1), 167–187. https://doi.org/10.1080/07421222.1994.11518035

Tinggi, K. P. (2017). *Kadar taburan graduan mengikut kumpulan umur dan peringkat pengajian*. https://www.data.gov.my/data/ms_MY/dataset/jadual-2-6-2

Todoranova, L., Nacheva, R., Sulov, V., & Penchev, B. (2020). A model for mobile learning integration in higher education based on students' expectations. *International Journal of Interactive Mobile Technologies*, *14*(11), 171–182. https://doi.org/10.3991/ijim.v14i11.13711

Typhina, E. (2015). Designing eco-apps to engage adult learners. *Proceedings of 2015 International Conference on Interactive Mobile Communication Technologies and Learning, IMCL 2015*, *November*, 83–87. https://doi.org/10.1109/IMCTL.2015.7359560

UNESCO/UIL. (2016). *Recommendation on Adult Learning and Education: 2015*.

Ur-Rehman, I., Shamim, A., Khan, T. A., Elahi, M., & Mohsin, S. (2016). Mobile based user-centered learning environment for adult absolute illiterates. *Mobile Information Systems*, *2016*, 1–6. https://doi.org/10.1155/2016/1841287

Utama, S., & Buruh, T. (2020). *SIARAN AKHBAR*.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, *27*(3), 425–478. https://doi.org/10.2307/30036540

Verasingam, K., Supramaniam, K., Arumugam, N., & Sathyiasenan, S. D. (2020). A Study on Factors Influencing Young and Matured Adult Learners to Continue Their Education. *International Journal of Modern Languages and Applied Linguistics*, *4*(2), 1. https://doi.org/10.24191/ijmal.v4i2.9467

Viberg, O., Andersson, A., & Wiklund, M. (2021). Designing for sustainable mobile learning–re-evaluating the concepts "formal" and "informal." *Interactive Learning Environments*, *29*(1), 130–141. https://doi.org/10.1080/10494820.2018.1548488

Wang, M., Chen, Y., & Min, W. (2014a). Mobile learning design: the LTCS model. *2014 International Conference on Intelligent Environments Mobile*.

https://doi.org/10.1109/IE.2014.68

Wang, M., Chen, Y., & Min, W. (2014b). Mobile Learning Design: the LTCS Model. *International Conference on Intelligent Environments*, 318–325. https://doi.org/10.1109/IE.2014.68

Weyns, D., Milrad, M., Nussbaum, M., Gil, D., Iglesia, D., & Felipe, J. (2015). A self-adaptive multi-agent system approach for collaborative mobile learning. *IEEE Transactions on Learning Technologies*, *8*(2), 158–172.

Yang, H. H., & Su, C. H. (2017). Learner behaviour in a MOOC practice-oriented course: In empirical study integrating TAM and TPB. *International Review of Research in Open and Distance Learning*, *18*(5), 35–63. https://doi.org/10.19173/irrodl.v18i5.2991

Yassine, A., Berrada, M., Tahiri, A., & Chenouni, D. (2018). A cross-platform mobile application for learning programming basics. *International Journal of Interactive Mobile Technologies*, *12*(7), 139–151. https://doi.org/10.3991/ijim.v12i7.9442

Youde, A., & Youde, A. (2018). Andragogy in blended learning contexts: effective tutoring of adult learners studying part-time, vocationally relevant degrees at a distance Andragogy in blended learning contexts: effective tutoring degrees at a distance. *International Journal of Lifelong Education*, *1370*, 0. https://doi.org/10.1080/02601370.2018.1450303

Zainol, Z., Yahaya, N., Mohamat, N. A., Nadia, N., & Zain, B. (2017). *Factors Influencing Mobile Learning Among Higher Education Students in Malaysia*. *2*(8).

Zydney, J. M., & Warner, Z. (2016). Mobile apps for science learning: Review of research. *Computers and Education*, *94*, 1–17. https://doi.org/10.1016/j.compedu.2015.11.001