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Mobile Learning Based ICT Training for Teachers in Indonesia

by

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DECLARATION

I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university and that, to the best of my knowledge and belief, it does not contain any material previously published or written by another person except where due reference is made in the text.

Adelaide, August 2018

Iin Karmila Yusri

PUBLICATIONS SUPPORTING THIS RESEARCH

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

AMOS	Analysis of moment structure
ANOVA	Analysis of variance
AVE	Average variance extracted
BTS	Base transceiver stations
BTS	Base transceiver stations
CDMA	Code-division multiple access
CFA	Confirmatory factor analysis
CFI	Comparative fit index
CR	Construct reliability
EFA	Explanatory factor analysis
GFI	Goodness-of-fit index
GOF	Goodness-of-fit
GNI	Gross National Index
GSM	Global System for Mobile communication
HSD	Honestly significant difference
ICT	Information and communication technology
IS	Information systems
IT	Information technology
KMO	Kaiser-Meyer-Olkin
ML	Maximum likelihood
MMS	Multimedia message service
MoEC	Ministry of Education and Culture
MoIC	Ministry of Information and Communication
NUIT	Northwestern University Information Technology
OHP	Overhead projector
PAF	Principal axis factoring
PCA	Principal component analysis
PCs	Personal computers
p.c.	Per capita
PDAs	Personal digital assistants

RMSEA	Root mean square error of approximation
RMSR	Root mean square residual
SD	Standard deviation
SEM	Structural equational modelling
Sig.	Significant
SIM	Subscriber identity module
SMC	Squared multiple correlation
SMS	Short message service
SPSS	Statistical Package for Social Science
SRMR	Standardised root mean residual
TALULAR	Teaching And Learning Using Locally Available Resources
TAM	Technology acceptance model
TD	Transactional distance
TLI	Tucker-Lewis Index
TPB	Theory planned behaviour
TRA	Theory reasoned action
UNESCO	United Nations Educational, Scientific and Cultural Organization
VoIP	Voice over Internet Protocol

ABSTRACT

This thesis presents the result of a study aimed to develop, and implement, a mobile learning system for information and communication technology (ICT) training for teachers in Indonesia. The objectives of this study are to investigate the possibility of using mobile phones as a medium to deliver training for teachers in Indonesia, and to assess teachers' perceptions, readiness and acceptance of mobile learning in order to propose a model of ICT training for teachers.

This study began with a review of teachers and their use of mobile phones in the Indonesian context. This was followed by a survey to investigate teachers' readiness for mobile learning using mobile phones. A prototype of a training system was developed in order to introduce and demonstrate the training system to teachers. A second survey was carried out to assess teachers' acceptance of mobile learning for ICT training. Finally, the findings were combined to develop a model of ICT training.

The review of teachers showed that teachers in Indonesia were required to have ICT skills to meet the competencies set by regulation. However, many teachers were unable to meet the requirements. ICT training programs provided by stakeholders to support teachers' ICT skill development had time, cost, and geographic challenges, as well as limited seat availability preventing teachers from participating in the training. The review found that a mobile phone is the most suitable device for mobile learning due to its extensive use, low cost of services, and the wide coverage of the mobile network.

A survey was conducted to investigate teachers' readiness for mobile learning. The survey collected information about teachers' mobile phones, ICT activities, training experiences, and also their perceptions about mobile learning. The survey found that teachers in Indonesia had access to, and were capable of using, their mobile phone as a medium of training. They had positive perceptions of mobile learning and looked forward to engaging in mobile learning.

A prototype of a mobile learning program via mobile phone was developed and trialled to give a mobile learning experience to teachers. The trial confirmed that mobile learning for ICT training via mobile phones was able to solve problems in delivering training to teachers who had geographical challenges and time constraints. This trial study also confirmed the mobility characteristics of mobile learning, which were supported by the portability and features of the mobile phone.

Another survey was carried out to investigate the factors influencing teachers' acceptance of mobile learning. The results showed that perceived usefulness, perceived ease of use, perceived mobility value, institutional influence, and self-efficacy affected 53% of teachers' intention to use mobile learning. Of the factors investigated, perceived mobility value was the strongest in affecting teachers' acceptance of mobile learning, followed by institutional influence and perceived usefulness. Perceived ease of use and self-efficacy did not have a direct effect.

The outcomes of this study led to the development of a training model giving an overview of elements that need to be addressed in mobile learning for teacher training. The training model consists of five components; mobile phone, training curriculum, activities, support and reward, and promotion. The model is proposed as a road map for the development of a mobile learning project in teacher training in Indonesia. Teacher-training providers can use this model as a reference in developing a mobile-learning-based training program.

CHAPTER 1. INTRODUCTION

1.1 Overview

This chapter introduces the research background and presents the research aim, the research objectives, the research questions, and the research significance. The thesis outline is briefly explained in this chapter.

1.2 Research background

The introduction of information and communication technology (ICT) into schools has been widely accepted and is transforming learning and teaching through the curriculum (Yang, 2012). ICT is expected to provide many benefits for learning and teaching practice.

According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), the term ICT in general is associated with the technologies utilised for searching, gathering, accessing, manipulating, and presenting information (UNESCO, 2003). The technologies encompass the range of hardware (computers, including laptop and desktop computers, digital recording equipment, and projection technology), software applications (generic software, multimedia resources) and connectivity (intranet, internet, networking infrastructure). Using ICT in the education field can provide a learning environment that enables learners to comprehend complex phenomena from a variety of perspectives, to accommodate different learning styles, and to encourage the development of knowledge in a learning domain (Godfrey, 2006).

As a result of the fast development of ICT, teachers are no longer the centre of information for students (Mahmud & Ismail, 2010). Students can obtain and access information at any time from any place. Accordingly, the teacher's role in learning has changed; they can be consultants, managers, learning resources, coordinators, facilitators, or navigators (Clark & Mayer, 2016). Teachers are required to be creative when integrating technology into their subjects to produce effective and fun learning activities. They do, however, retain their important function in creating and structuring students' learning experiences (Anderson & Cohen, 2015).

Teachers' hesitation to use ICT in activities in their classes is one reason for the unsuccessful ICT integration into the curriculum. In Indonesia, only 0.39% of teachers apply ICT in their teaching and learning activities (Tim TIK Indonesia, 2011). The low use of ICT in education in Indonesia is caused by teachers' resistance to using ICT in the classroom (Harendita, 2013; Surjono & Gafur, 2010). This resistance is mostly due to their low confidence in their ICT knowledge and skills (Clarke Sr & Zagarell, 2012).

The results of the Online National Examination of Teachers' Competency showed that teachers in Indonesia have low levels of ICT skills. The national average score achieved by teachers in the 2012 examination was only 47.84 while the passing grade was 70 (BPSDMPK-PMP, 2012). Unfortunately, the national average score of the 2015 examination still not reach the passing grade (Maulipaksi, 2016).

Most teachers failed in the examination because of low levels of ICT skills; operating a computer was difficult, and they did not know how to take an online examination (Fajar, 2012), which is a burden for teachers who have a lack of ICT skills (Hasrul, 2015).

In addition, the Ministry of Education and Culture (MoEC) started to implement the new national curriculum – *Kurikulum 13* – in 2013. In this curriculum, ICT is integrated into learning and teaching activities in schools. The low level of teachers' ICT skills is one of the obstacles for *Kurikulum 13* implementation (Alawiyah, 2014).

In order to successfully integrate ICT into education, teachers should be equipped with relevant ICT knowledge and skills (Abuhmaid, 2011). The Asian policy forum on ICT integration into education recommends that educating teachers is the most important stage in ICT integration, and should be prioritised before providing the technology and infrastructure (World Links, 2007).

Various ICT training is provided for teachers by the government and other stakeholders. However, teachers still face challenges in participating in the training. Current training for teachers presents participation problems, such as geographical

challenges, limited opportunity, and financial and time constraints (Sari, 2012; Yusri & Goodwin, 2013).

With the rapid development of mobile technology, and the increasing availability of wireless mobile devices in everyday life, mobile learning can be a solution to the problem of delivering ICT training to teachers in Indonesia. Mobile learning is a learning model that enables learners to get learning resources from anywhere and at anytime through wireless devices; for example personal digital assistants (PDAs), mobile phones, wireless laptops, tablets, and personal computers (PCs) (Ozdamli & Cavus, 2011).

Some research has suggested that mobile learning is an effective tool for skill training because it is appropriate for delivering training and offers the advantages of personalised education (Douch, Savill-Smith, Parker, & Attewell, 2010; Sampson, 2006c; Tucker & Winchester III, 2009).

Mobile learning training for teachers is one of the least explored topics in mobile learning research, with research focused on teacher training as a main topic very limited (Ekanayake & Wishart, 2015). A review of mobile learning project in Asia by UNESCO (2012a) could not find stand-alone teacher development programs in Asia using mobile technologies or mobile phones. The projects were generally developed as tools for learning and teaching activities or administrative support (UNESCO, 2012a).

Research objectives on mobile learning and teacher training to date has aimed to solve problems of training teachers in rural area (JingDong & Zhen, 2009; Junqi, Lili, & Hu, 2010; Liu & Jiao, 2010; Zhang & Li, 2011) and to support teacher mentoring and supervision (Cushing, 2011; Douch et al., 2010; Ferry, 2008; Seppälä & Alamäki, 2002; Wishart, 2009).

In these training projects, teachers were allowed to access training resources, had discussion with other training participants, and contributed to self-assessment. Conversely, the content of these training program materials was not systematic and the competencies teachers gained after the training were not defined.

In Indonesia, mobile learning has begun to be used as a teaching tool. The MoEC provides a mobile learning portal for teachers named *m-edukasi* (BPMP Kemdikbud, 2012). In this portal, teachers can choose a mobile learning program that is suitable for their teaching subject. Mobile learning has also started to be applied in teacher training in Indonesia. The British Council is developing a Teaching And Learning Using Locally Available Resources (TALULAR) project for mentoring English teachers in remote areas of Indonesia (Pegrum, 2014). The TALULAR program proposes Voice over Internet Protocol (VoIP) calls and/or short message services (SMS) as a method of mentoring. However, the model for the project is still under consideration. Hence, in the context of teacher training in Indonesia, mobile learning has not yet been implemented.

Before developing and implementing a mobile learning project for teacher training, the device used for mobile learning should be defined (Schofield, West, & Taylor, 2011). Then the mobile learning perception and acceptance of teachers needs to be investigated because these two things determine their willingness to use mobile learning (Abu-Al-Aish, 2014). The success of a mobile learning program depends on its users' willingness to use the program, which is probably different from programs they have used previously (Wang, Wu, & Wang, 2009).

As mentioned previously, mobile learning in the teacher-training context in Indonesia has not yet been implemented. Hence, it is important to determine the device to be used in mobile learning for teacher training. The chosen device will determine the cost of the program and the type of activities in the program.

Furthermore, there is limited understanding of teachers' readiness and the factors affecting their acceptance of mobile learning for their training. Therefore, there is a need to investigate these aspects. Identification of the critical factors of the successful development of mobile learning for teacher training will support teacher educators and teacher-training providers to arrange their development plans in accordance with the demands of teachers, give significant technology integration in learning and teaching activities, and produce better policy decisions.

1.3 Research aim, objectives, and questions

This study aimed to develop a model of mobile-learning-based ICT training via mobile phone for teacher training. The training model was developed in order to solve some of the problems encountered by teachers in Indonesia when participating in ICT training due to time, location, cost, and limited opportunity to obtain seat in a training program.

The objectives of the research were as follows:

1. To explore the possibility of using a mobile phone as medium of ICT training for teachers.
2. To investigate teachers' readiness for mobile learning via mobile phone.
3. To explore the ICT experiences of teachers in Indonesia.
4. To evaluate whether mobile learning can solve the participation problems of teachers.
5. To assess teachers' acceptance of mobile learning.

Based on the research aim and objectives, this study addressed the following research questions:

RQ1: Is it possible to use mobile phones for teacher training in Indonesia?
RQ2: What is the level of teachers' readiness for mobile learning for training?
RQ3: What are teachers' experiences in using ICT and participating in ICT training?
RQ4: Is mobile learning a solution to teacher problems in participating in training?
RQ5: Do perceptions of mobility value, institutional influence, self-efficacy, ease of use, and usefulness significantly affect teachers' acceptance of mobile learning for training?
RQ6: What are the key issues in developing mobile learning for teacher training using mobile phones?

1.4 Research significance

This research contributes to teacher professional development in Indonesia by proposing a mobile-learning-based ICT training model. This contribution is important since the motivation for developing the training model is to solve the problems that prevent teachers from participating in ICT training. The problems are time, location, and limited seat availability in training sessions.

The ICT training modelled in this research is easy to access, saves time and reduces the cost of training. Implementation of the training model provides flexibility for the teaching and learning process and wider opportunities for teachers to participate, particularly those who have limited time for training due to work commitments and workplaces located in geographically challenged areas. The government can implement this training program to improve ICT skills and knowledge of teachers. This improvement will increase teachers' confidence in using ICT in the classroom. As a result ICT integration into education in Indonesia will be improved.

This research contributes knowledge to the information systems and education disciplines by developing a mobile learning program for teacher training. This is necessary because research about mobile learning that focuses exclusively on the development of teachers is limited. Existing mobile learning projects for teachers were mostly developed as tools for learning and teaching activities or administrative support, not for training.

1.5 Thesis outline

This thesis comprises nine chapters. This section provides an overview of the content of each chapter in the thesis. The structure of the thesis is presented in Figure 1.1.

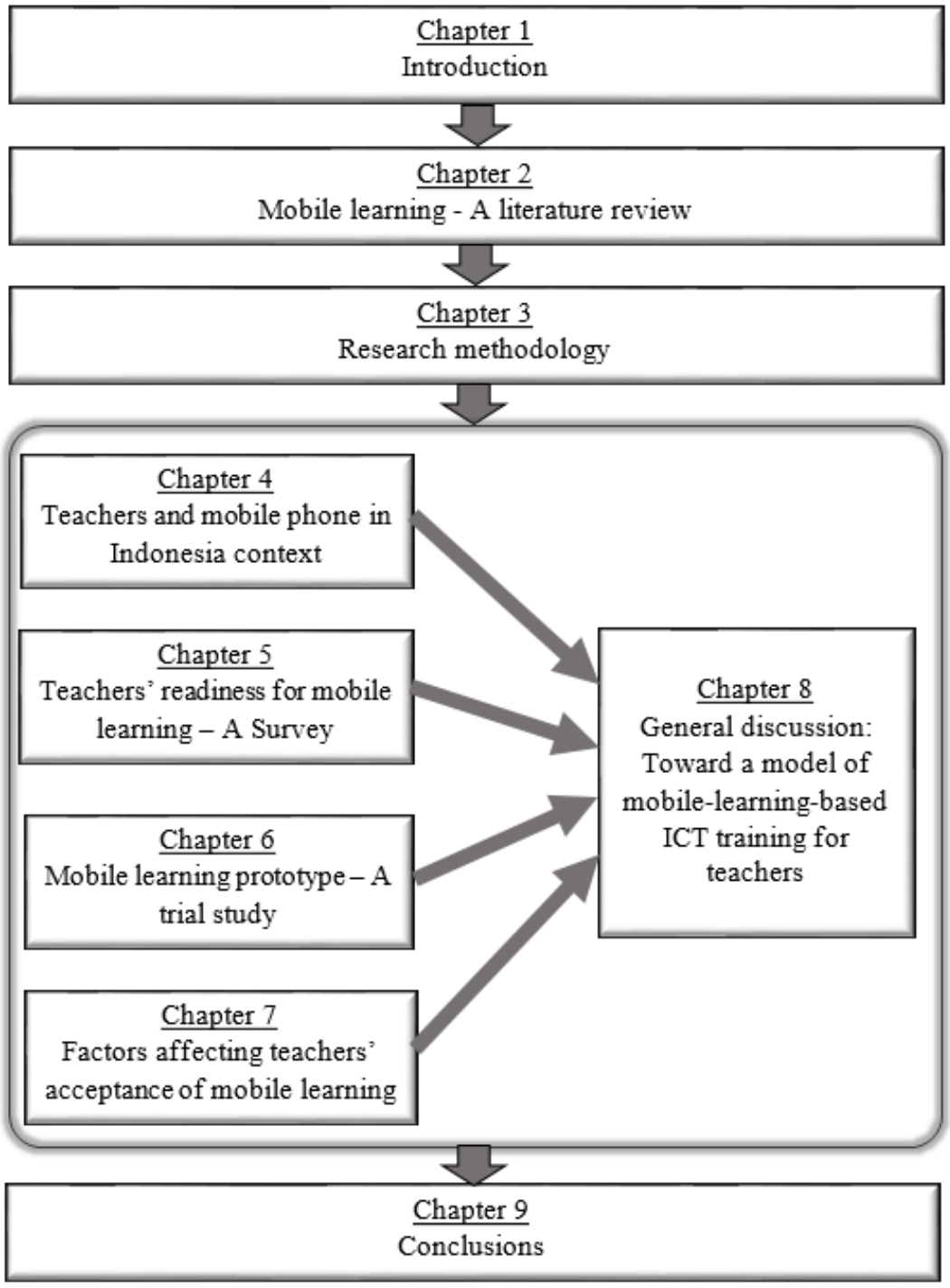

Figure 1.1. The structure of the thesis

Chapter 1: Introduction

Chapter 1 provides an explanation of this research; the background, aim, objectives, research questions, significance, and thesis outline.

Chapter 2: Mobile learning - A literature review

This chapter reviews existing literature on mobile learning. It provides an explanation of learning and education, and the impact of technology on learning. The definition of learning using mobile devices and mobile learning are discussed.

The chapter also includes the benefits and advantages, and limitations and challenges in implementation. Studies on mobile learning in Indonesia, mobile learning for training and for teacher training, as well as studies on readiness and acceptance of mobile learning are discussed. In addition, the literature review outlines three theoretical models of mobile learning.

Chapter 3: Research methodology

This chapter presents an explanation of the research methodology applied in this research. It discusses the strategy of the research, and the design and method used in this thesis. This chapter also describes the research instruments, the participants in this research, the procedures of data collection and data analysis, and the ethical concerns for each study in the research.

Chapter 4: Teachers and mobile phones in the Indonesian context

The situation of teacher and mobile phone use in the Indonesian context is reviewed in this chapter. Starting with illustrating teacher attributes in Indonesia, particularly their ICT skills and training, the chapter also explains the state of mobile phones and the mobile phone network in the Indonesian context, and presents the potential of mobile phones as a medium for training in Indonesia.

Chapter 5: Teachers' readiness for mobile learning – A survey

The first study conducted in this research, a survey on teachers' readiness for mobile learning, is reported in Chapter 5. The survey explored the current mobile phone technology and services used by teachers, and the perception of teachers about the

use of mobile learning for training. This survey also explored teachers' experience in using ICT and attending ICT training.

Chapter 6: Mobile learning prototype – A trial study

This chapter reports on the trial of the prototype for mobile learning for ICT training for teachers via mobile phones.

Chapter 7: Factors affecting teachers' acceptance of mobile learning

The report of the third study in this research is presented in this chapter. It presents the investigation of the factors affecting teacher's acceptance of mobile learning for ICT training through mobile phones. A discussion of the research model and the hypotheses developed for this study is also presented. Details of data analysis and findings are provided.

Chapter 8: General discussion

The key findings of the study in relation to other published work and the research questions of the study are outlined in this general discussion chapter. The chapter then presents a model of mobile-learning-based ICT training for teachers via mobile phone that was developed based on the key findings of this study.

Chapter 9: Conclusions

As the last chapter, Chapter 9 concludes this thesis by outlining what the research has achieved and the findings related to the research questions. It outlines the research contribution and implications, and finally, provides the research limitations and suggestions for future research.

1.6 Summary

This chapter introduced the research topic of this thesis. The research background, the research aim, and the research questions were presented. The significance of the research was discussed and the layout of the thesis was highlighted. The next chapter will review studies on mobile learning in the literature.

CHAPTER 2. MOBILE LEARNING - A LITERATURE REVIEW

2.1 Overview

Any research project should begin with a literature assessment in order to find studies related to the research questions that are going to be answered (Bryman, 2012). A literature review provides the basis and the context for the research to be conducted. This chapter provides a literature review on mobile learning as a background to this study.

The chapter begins with discussion about learning, education, and training, and changes in those fields due to the impact of technology in learning. The chapter then presents an explanation of mobile learning, which covers a definition of mobile learning, its benefits and advantages, limitations and challenges in implementing mobile learning systems, and mobile learning implementation in training and teacher training.

The chapter then reviews studies related to user readiness and perception of mobile learning, followed by a discussion of the theoretical background for the model of mobile learning acceptance and studies about mobile learning acceptance. The last section outlines three theoretical models related to mobile learning implementation.

2.2 Learning, education, and training

The terms learning and education are often used interchangeably and seem to be used as synonymous in many instances. Actually, they are different (Tight, 2002). It can be said that everyone learns, but not everyone gets an education, while training is an act of learning particular skills in order to prepare someone to carry out their task in a workplace (Buckley & Caple, 2009).

Learning is something everyone does all the time, even if they do not realise it. It is a fundamental human process, like breathing. However, there are many and varied opinions between scholars about what learning is. Some regard learning as an outcome, and others see learning as a process. These differences have produced

many learning theories, such as behavioural, cognitive, and humanistic (Tight, 2002).

As an individual is always learning, from birth to death, learning can be defined as an ongoing process and this process may be unplanned or intentional (Garavan, Heraty, & Barnicle, 1999). According to Wedge and Kearns (2005), learning is provided through access to a manual, collaboration, appropriate resources, informed research, critical analysis, and integrated outcomes; whereas knowledge and wisdom are the expression of learning.

Learning can be categorised according to structure and planning (Moravec & Peña-López, 2013) as shown in Figure 2.1. In the quadrant between planned learning and structured teaching, formal learning occurs in an educational institution environment with a planned learning design that generally achieves certification. This certification becomes a target for learners who undertake formal learning as evidence of their achievement of a specific learning objective in a structured plan (Moravec & Peña-López, 2013).

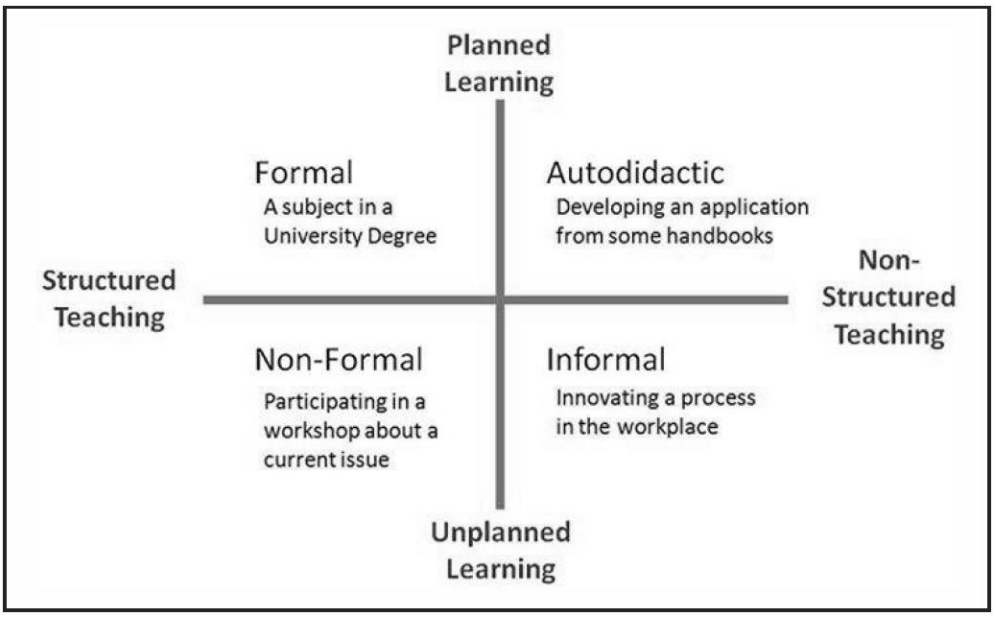

Figure 2.1. Learning types according to structure and planning (Moravec & Peña-López, 2013)

The non-formal learning quadrant is below the formal learning quadrant, and also occurs in an environment of institutional teaching. However, unlike formal

learning, non-formal learners do not have particular mid to long-term learning objectives, hence their learning processes are usually unplanned (Moravec & Peña-López, 2013).

Autodidactic learning or self-learning is on the right quadrant between planned-learning and non-structured teaching. This learning type still features the planning of learning objectives and other related objectives, but it is not conducted in a formal education structure or educational institution (Moravec & Peña-López, 2013). As Moravec and Peña-López (2013) emphasise, self-learning does not automatically imply solo learning or learning on your own.

The last type of learning is informal learning, which lies in the quadrant between unplanned learning and non-structured learning. This learning typically occurs without any formal structure and often happens unintentionally (Moravec & Peña-López, 2013).

Education is often associated with educational institutions such as universities, colleges, and schools. Jarvis (2012) states that UNESCO describes education as a mixture of knowledge, skill, and comprehending the meaningfulness of life, which represents an organised and continuing pedagogy. Different from learning, education requires an appreciation of its broader social context and includes the position, relationship, and linkages within society (Tight, 2002). In addition, Jarvis (2012) states that education is the social organisation of learning activities.

According to Buckley and Caple (2009), training is an organised effort with the intention to transform and increase skill and knowledge by practice, and to successfully reach the required performance in working activity. Similar to education, training is also associated with an institution, such as training providers and colleges. To distinguish education from training, Tight (2002) defines education as contributing to the development of the breadth and depth of knowledge and understanding, while training increases the specificity of knowledge and understanding.

The relationship between learning, education, and training is shown in Figure 2.2. Learning is represented as a large oval that contains a smaller oval labelled education, which itself contains an even smaller oval called training. This shows that training is part of education, and education and training are parts of learning.

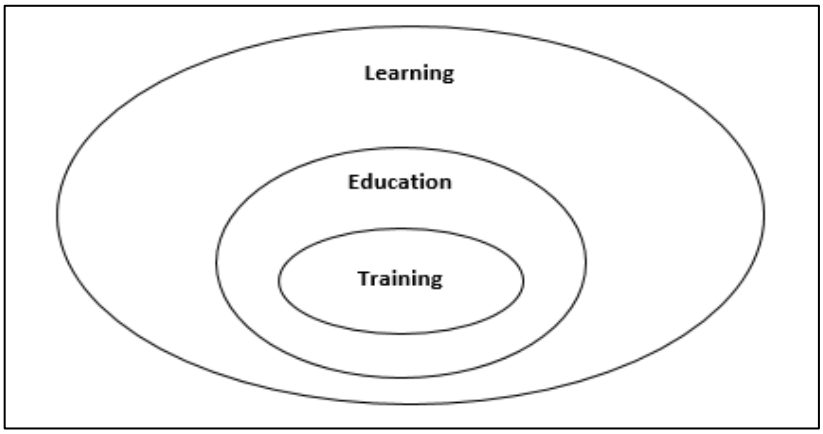

Figure 2.2. Relationship between learning, education and training (Tight, 2002)

Learning occurs in both training and education where learning is organised for the development of knowledge and skill (Tight, 2002). However, learning activities in education are more general while in training they are more specific.

2.2.1 Changes in learning, education and training

The development of computer and network technologies provides various facilities to make learning more personal and flexible (Monika, 2013). These technologies provide a variety of new and powerful opportunities for learning and learners such as media for learning, resulting in a learning style that is different to conventional learning – distance learning (Monika, 2013).

The conventional learning method in academic education is teacher-lecturing and student-listening, also known as face-to-face learning. Usually, a teacher lectures while students listen and make notes. Interaction between the teacher and students, usually referred to as ‘the sage on the stage’, is regarded as an essential learning element of face-to-face learning (O'Malley & McCraw, 1999), whereas in distance learning the interaction is ‘the guide on the side’ (Williams & Goldberg, 2005).

Initially, distance learning was conducted to provide access for learners with a geographic burden to participate in learning activities (Moore, Dickson-Deane, & Galyen, 2011). From various definitions on distance learning in the literature, Moore et al. (2011) found some commonalities; some form of instruction occurs between a learner and an instructor, it is held at different times and/or different places, and it uses varying forms of instructional materials.

Based on the technology involved in the learning, distance learning then evolved into other forms of learning. Distance learning can take many forms, including paper-based distance learning, online learning, electronic learning (e-learning), and mobile learning, by applying many forms of communication (Brown, 2003; Conrad, 2006) as depicted in Figure 2.3.

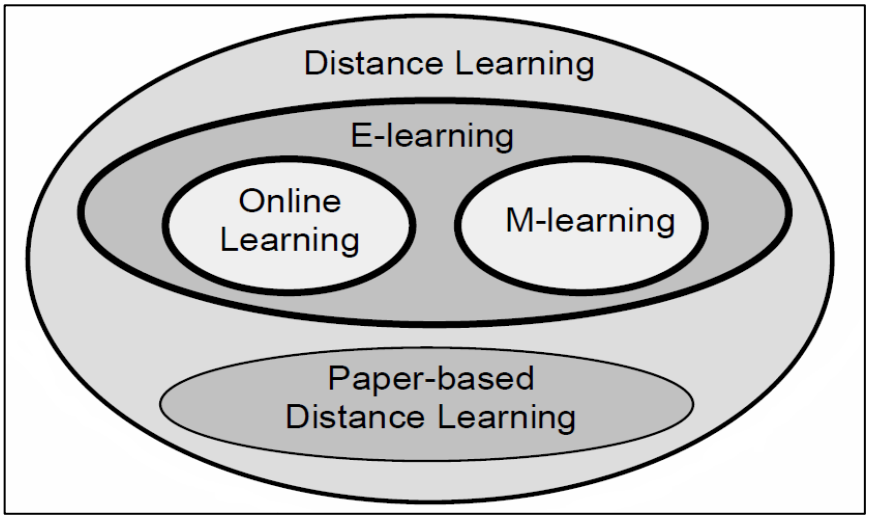

Figure 2.3. Learning styles evolved from distance learning (Brown, 2003)

Another learning style, blended learning, which combines distance learning with conventional face-to-face learning, has emerged as an alternative teaching and learning method (Monika, 2013).

2.2.2 Using mobile technology in a learning environment

The involvement of technology in learning has resulted in many forms of learning, depending on what technology is used. Integrating mobile technologies in learning brings various possibilities and benefits for educators and learners because the technologies provide mobility in terms of time and place, control over learning, and wide interaction and communication (Naismith, Lonsdale, Vavoula, & Sharples, 2004; Traxler, 2009).

Mobile technologies are considered the most used information and communication technologies. People tend to have more than one mobile device and employ its innovative multimedia abilities in their daily lives (Gedik, Hanci-Karademirci, Kursun, & Cagiltay, 2012). Naismith et al. (2004) classify mobile technologies using two orthogonal dimensions of personal versus shared and static versus portable. Figure 2.4 depicts this classification.

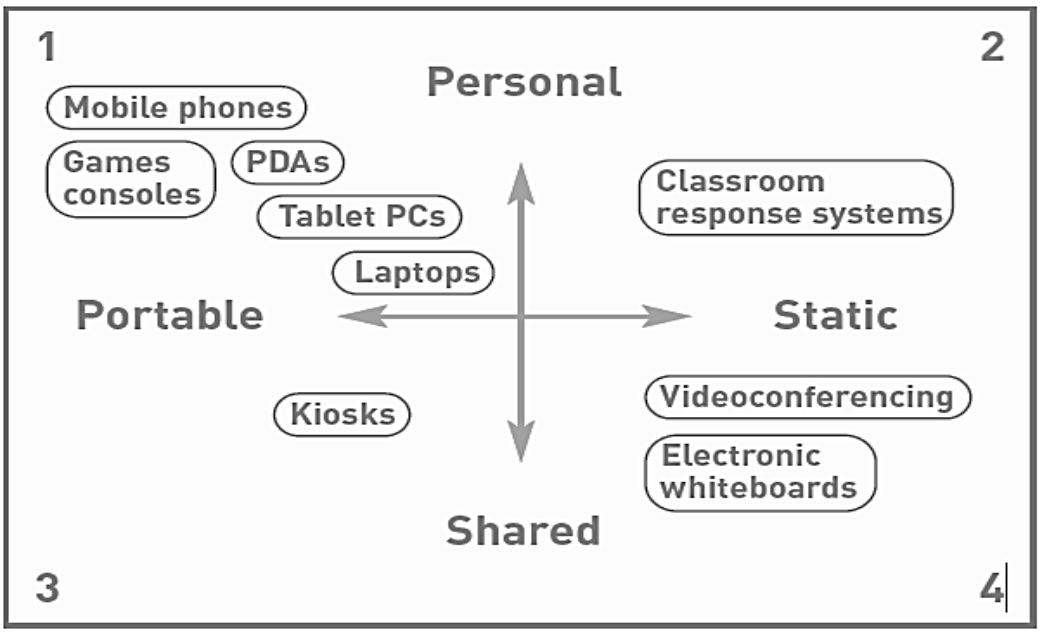

Figure 2.4. Classification of mobile technologies (Naismith et al., 2004)

It can be seen in Figure 2.4, Quadrant 1 contains devices that can be classified as both personal and portable, such as mobile phones, games consoles, PDAs, tablet PCs, and laptops. Normally, these devices support a single user, thus they are perceived as personal. Portable means these devices can be available in many different locations (Naismith et al., 2004).

Quadrant 2 consists of devices that are static and personal; the devices can only be used in one location; however personal interactions with learning experiences are still provided (Schofield et al., 2011). Devices in Quadrant 3 are categorised as portable and shared. Devices such as kiosk are shared since they can be used by multiple users (Schofield et al., 2011). The devices themselves are not portable, but the learner is (Naismith et al., 2004). The last category, shared and static, lies in Quadrant 4, which comprises larger, less portable devices such as electronics whiteboards and videoconferencing that enable further shareable interactions (Naismith et al., 2004). While videoconferencing used to require larger devices, today it can be conducted using smartphone.

According to Naismith et al. (2004), mobile technologies can be related to six learning types; behaviourist, constructivist, situated, collaborative, informal/ lifelong, and support/coordination learning. Figure 2.5 shows that learning activities based on each of these types of learning can apply to mobile technology, thus showing the potential for education (Schofield et al., 2011).

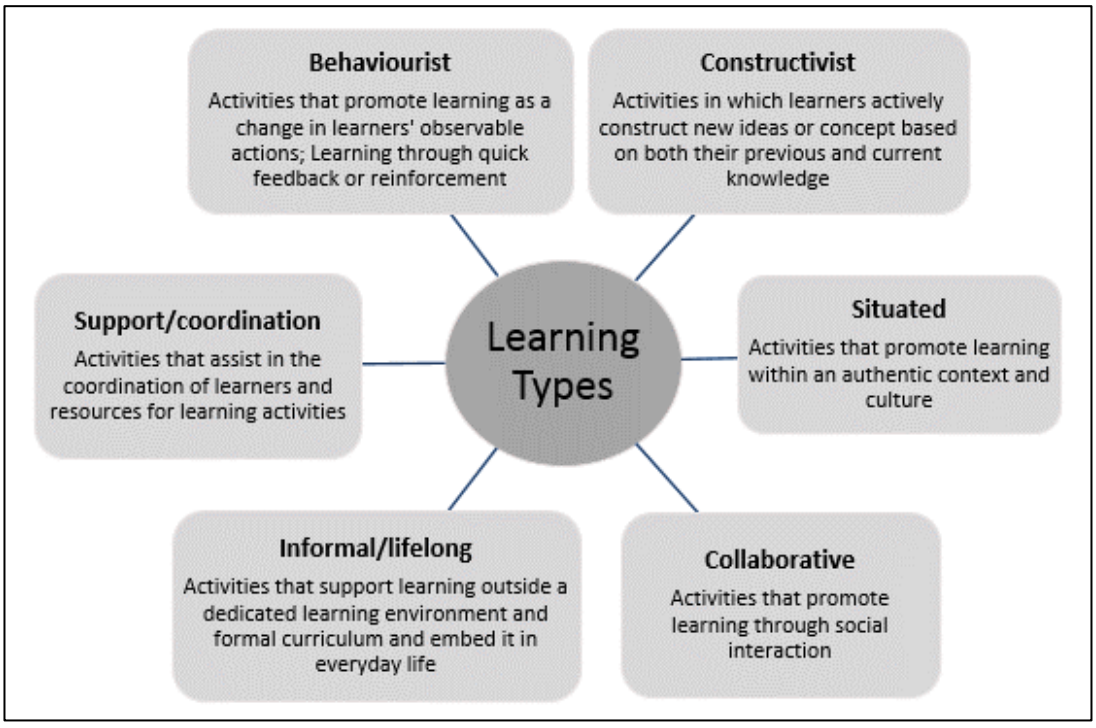

Figure 2.5. Learning activities that can be carried out using mobile technologies (Schofield et al., 2011)

Behaviourist learning consists of activities that encourage a transformation in the observable actions of learners, and learning by means of corroboration (Schofield et al., 2011). Learning activities using mobile technologies in behaviourist learning include classroom response systems and drill and feedback activities.

Constructivist learning involves activities that support learners to construct fresh concepts and ideas created from their knowledge. Participatory simulation activities can be performed by using mobile technologies (Schofield et al., 2011).

The activities in situated learning should promote learning within an authentic culture and context (Schofield et al., 2011). Context awareness activities, and problem and case-based learning are examples of learning activities supported by mobile devices in situated learning (Schofield et al., 2011).

Collaborative learning promotes learning by means of social interactions and mobile computer-supported collaborative learning, which is a collaborative learning activity conducted using mobile technologies (Schofield et al., 2011).

Mobile technologies can be applied in learning beyond a defined learning environment and formal curriculum by supporting intentional and accidental learning episodes. This type of learning is known as informal and lifelong learning (Schofield et al., 2011).

Additionally, mobile technologies can be used for learning and teaching support, such as personal organisation and support for administrative duties.

The application of mobile technologies in education is known as mobile learning, referred to as m-learning in literature. In mobile learning, mobile devices are available to everyone, can be carried everywhere and are regarded as friendly and personal devices (Boja, Bătăgan, & Vişoiu, 2011). Therefore, they are classified as personal and portable mobile technologies (Quadrant 1 in Figure 2.4). People generally always carry and use their phones, PDAs, or mobile devices but rarely their laptop, computer, or tablet PC without a particular purpose, and then only for a limited time (Traxler, 2009).

2.3 Mobile learning

The integration of current mobile and wireless computing technology with traditional learning processes is known as mobile learning. This integration becomes the foundation of the basic elements of mobile learning. The first element is the capability of mobile learning to convey learning materials to learners who can join conventional learning environments. The other element is its ability to provide ease in learning and adaptability to individual learning styles (Locke, 2010). The following sections discuss the definition, characteristics, basic learning elements, benefits and advantages, and also the limitations and challenges of mobile learning.

2.3.1 What is mobile learning?

The term mobile learning is still evolving. Definitions in the literature vary based on the devices used, the mobility of learners, and its association to e-learning.

In terms of devices, mobile learning is defined as learning by using wireless devices like mobile phones, smart phones, PDAs, iPods, laptops or even USB keys and digital cameras in the learning and teaching activities (Motiwalla, 2007). Similarly, mobile learning is described as a method of sending learning material via mobile devices (Parsons, Ryu, & Cranshaw, 2007). The term mobile learning covers the connected, individualised, and interactive use of mobile devices in diverse situations, for example in collaborative learning, in a classroom environment, in counselling and guidance, and in fieldwork (Traxler, 2007).

Mobile learning's mobility provides learners with the freedom to practice learning anytime, anywhere, and has the ability to extend the learning environment beyond the class setting (Ozdamli & Cavus, 2011; Valk, Rashid, & Elder, 2010; Wang & Ryu, 2009) due to the features and portability of mobile devices (Georgieva, Smrikarov, & Georgiev, 2005; Naismith et al., 2004). Mobile technologies have enabled learning despite learners' locations (El-Hussein & Cronje, 2010; O'Malley et al., 2005).

E-learning is a networked form of learning supported by technologies that provide learning opportunities for individuals (Moore et al., 2011). Mobile learning is considered an e-learning extension by means of the application of communication

technologies and wireless mobile devices for teaching and learning (Alzaza & Yaakub, 2011; Doneva, Kasakliev, & Totkov, 2007).

Mobile learning is defined as the intersection of e-learning and mobile technologies (Jacob & Issac, 2008) and the intersection of web-based learning and mobile technologies with the purpose of delivering an anywhere, anytime learning situation (Khaddage & Zhou, 2009). This research describes mobile learning as a learning model that provides mobility, ubiquitous, and anytime access to educational resources. This research does not associate mobile learning and e-learning because as Peters (2007) and Horton (2011) state, mobile learning has some features of e-learning such as communications with other learners and multimedia contents, but flexibility of time and location has made mobile learning different from e-learning.

2.3.2 Mobile learning characteristics

There are numerous characteristics of mobile learning described in the literature, including that it is pervasive, technocratic, handheld, spontaneous, portable, remote, on-the-move, on-the-road, online, situated, bite-sized, quick, 24/7, convenient, learner-centred, anywhere, anytime, flexible, personal, accessible, technology, and networked (Schofield et al., 2011).

Among those characteristics, there are core characteristics that allow learners to be in the right place and at the right time where they can feel the real enjoyment of learning. The fundamental characteristics of mobile learning are that it is portable, ubiquitous/spontaneous, blended, personal, interactive, provides instant information, and collaborative (Ozdamli & Cavus, 2011; Seppälä & Alamäki, 2003; Traxler, 2005).

Portable characteristics are derived from the mobile devices applied in mobile learning application, which are small and portable (Cavus & Ibrahim, 2009; Quinn, 2000). Ubiquitous and spontaneous are perhaps the most significant features of mobile learning (Ozdamli & Cavus, 2011). Mobile learning is context aware, which means learning activities can happen everywhere (Ozdamli & Cavus, 2011). Compared to other learning types, mobile learning is more spontaneous.

Teachers can apply mobile learning in their class with a model of blended learning (Uzunboylu, Cavus, & Ercag, 2009). A combination of mobile learning and classroom instruction maximises the benefit of both methods (Bonk & Graham, 2012; Ocak, 2011). Mobile technologies convey an interactive learning situation for teaching and learning activities (Uzunboylu et al., 2009) and facilitates collaborative learning by allowing an environment that supports collaboration and communication, and improving interaction in learning activities (Barker, Krull, & Mallinson, 2005; Denk, Weber, & Belfin, 2007). Interaction and communication happens not only between learners but also between learners and instructors/teachers (Abu-Al-Aish & Love, 2013).

In addition, using a mobile device is about immediacy (Cavus & Ibrahim, 2009). Learning content must reflect the requirement of prompt answers to particular questions (Cohen, 2010) by providing learning materials that are easy for a learner to comprehend and understand (Ozdamli & Cavus, 2011).

Other characteristics that define and distinguish the types of mobile learning experiences that should also be taken into consideration are shown in Figure 2.6. These characteristics are connectivity, usability, and latency (Traxler, 2005). Connectivity refers to the network connection that can be ‘always on’ to ‘have not got any’; latency is interval time for a connection to occur; and usability is the degree to which users employ their technology devices, such as mobile phone, PDA, laptop, and PC (Traxler, 2005).

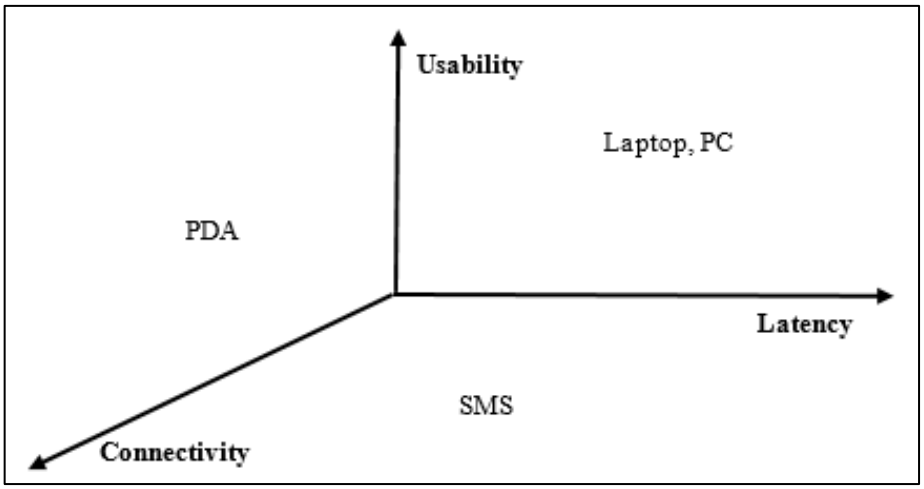

Figure 2.6. Latency, usability, and connectivity in mobile learning (Traxler, 2005)

Besides the learning experience, other specific characteristics of mobile learning have been analysed in the literature. These include the types of learning and learning activities that can be applied, the way mobile learning provides learning opportunities, and the environments where mobile learning can occur (Kukulska-Hulme & Traxler, 2007; Naismith & Corlett, 2006; Sharples, 2006).

2.3.3 Mobile learning elements

Figure 2.7 depicts the basic elements of mobile learning. They are learner, teacher, environment, content, and assessment (Ozdamli & Cavus, 2011)

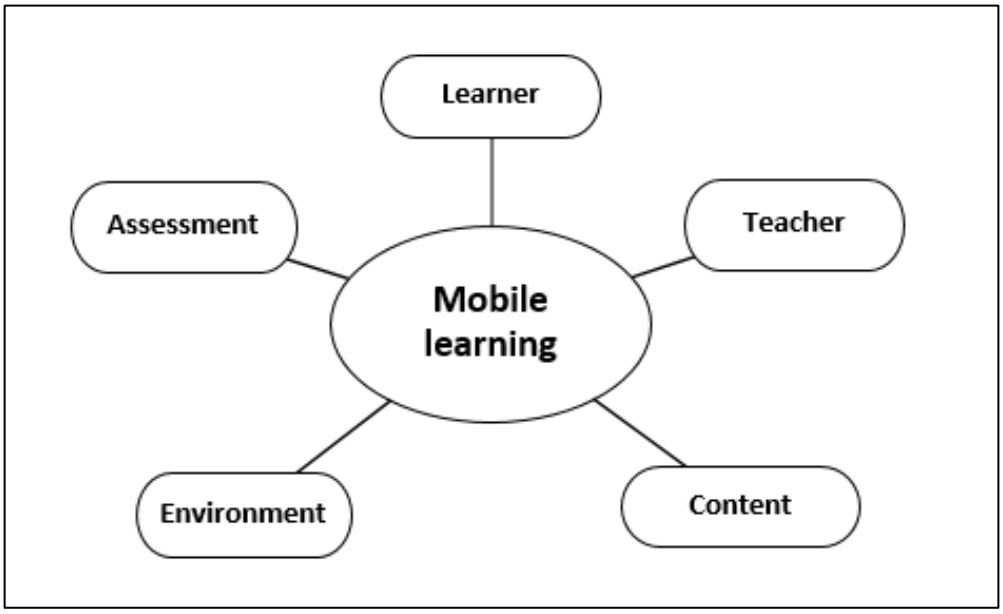

Figure 2.7. Basic elements of mobile learning (Ozdamli & Cavus, 2011)

The first element on mobile learning is the learner. The learner is the centre of all mobile learning activities (Makoe, 2010). The other mobile learning elements work for the learner, helping to determine their goals through to the evaluation stage as defined by the learner (Ozdamli & Cavus, 2011).

The second element is the teacher. In a mobile learning environment, teachers have a consultancy role. As a consultant, teachers are required to identify their learners' interests in order to determine learning goals, and help them to achieve the goals according their own capabilities (Ozdamli & Cavus, 2011).

Another element of mobile learning is content. Content is what is expected to be learned by learners and should be resolved by all the stakeholders such as teachers and learners (Ozdamli & Cavus, 2011). The pedagogical requirement of learners influence the content provided in mobile learning (Siragusa, Dixon, & Dixon, 2007).

The last two elements of mobile learning are environment and assessment. The environment is a place where learners access information. The environment must increase the interaction among learners, and between learners and teachers (Uzunboylu & Ozdamli, 2011). In mobile learning, the environment must be designed for mobile phones, PDAs, and other mobile devices. Mobile learning allows interaction between the individual and groups in the education process resulting in co-operative learning situations (Uzunboylu & Ozdamli, 2011).

A critical component of mobile learning is assessment, which examines the capability of the learners and provides analysis and supervision to support the learners (Sharples, Taylor, & Vavoula, 2005). In designing a mobile learning course, an immediate feedback feature should be provided (Ozdamli & Cavus, 2011). Using this feature, learners can evaluate their comprehension of the course by themselves. However, an assessment method can only support the learning process if it is actively used by learners (Koorsse, Olivier, & Greyling, 2014).

2.3.4 Mobile learning benefits and advantages

The results of mobile learning projects and research indicate that mobile learning, with the help of mobile technologies, is able to support various learning activities in different settings and for different ages. According to Naismith et al. (2004), the traditional lesson's quality can be enhanced by the addition of a blended approach; mobile learning and face-to-face learning. Mobile learning presents distinct learning opportunities, which are personalised, secure, and can be carried out anywhere, anytime (Attewell, 2005). Mobile learning provides convenience, with easy and flexible access to learning materials by using personalised devices (Caudill, 2007; Parsons et al., 2007).

Mobile learning that utilises pervasive mobile communication devices becomes a successful learning approach because these mobile devices are more attractive and cheaper than other devices, such as PCs and laptops, while still offering efficient and satisfactory tools (Mahamad, Ibrahim, & Mohd Taib, 2010). Mobile learning is capable of embedding learning into everyday life through conveying the learning content into bite-sized formats and delivering it via a wireless network.

Due to its mobility characteristics, mobile learning becomes a solution for those who cannot attend learning institutions physically due to geographical challenges, work constraints, or other hostile demands on their time (Valk et al., 2010). In mobile learning, learners create their own learning environment, and learning can occur without being limited to classroom availability (Schofield et al., 2011). Moreover, mobile learning increases access to education since it allows learners to learn in line with their own schedule (Valk et al., 2010).

In addition, learners' participation and engagement can be increased by using mobile learning. Mobile devices utilised in this learning approach present a method of increasing learners' involvement and engagement in situations where they are probably hesitant to participate (Schofield et al., 2011). Data interchange and social collaboration through communication channels enabled by mobile technologies such as messages, email, blogs, and forums increases the interaction between learners and other learners, and learner and instructor or teachers (Barker et al.,

2005; Denk et al., 2007). This not only improves interaction but also encourages communication by both teachers and learners.

2.3.5 Mobile learning limitations and challenges

Mobile learning can be defined as a type of learning using mobile technology. Mobile technologies applied in this learning approach not only support the advantages of mobile learning but also bring limitations. Interestingly, learners can become reluctant to use mobile devices for learning due to mobile learning's limitations (Cheon, Lee, Crooks, & Song, 2012).

The main limitations of mobile learning with respect to mobile devices, according to the literature, are technical limitations. Some technical limitations of mobile devices include small and low-resolution screens, insufficient memory, absence of standardisation and comparability, and slow network speeds (Haag, 2011; Huang, Kuo, Lin, & Cheng, 2008; Park, 2011).

A micro lecture format was introduced as one solution to this limitation (Kovachev, Cao, Klamma, & Jarke, 2011; Zhao, Xia, & Zhu, 2010). Another suggestion for mobile learning is that instructional content should consider the screen size of mobile devices and be presented in a grain mode due to the amount of time needed to access the content (Lowenthal, 2010).

A limitation of mobile learning in regard to the learner is the users' psychological constraints (Abu-Al-Aish, 2014). Employing mobile technologies may enhance informal learning; however, learners tend to use the technologies for entertainment purposes, rather than focusing on mobile learning tasks (Park, 2011; Wang et al., 2009). Effective mobile instructional design are required to organise and reproduce the experience of mobile learning for informal learners (Naismith et al., 2004).

According to Park (2011) and Wang et al. (2009), certain pedagogical factors should be considered when integrating mobile devices in learning. Mobile learning provides a link to learning material anywhere and anytime, outside and inside the learning place. Mobile learning is projected to increase relationships between learners and lecturers; however, learners' disengagement with their lecturers or with

the curriculum is still likely to happen (Park, 2011). Mobile learning requires learners' commitment to learn independently.

In a mobile learning system, learners access learning using their own mobile devices. It means that each learner has their own access to mobile learning (BenMoussa, 2003; Virvou & Alepis, 2005). However, mobile devices are subject to damage, are easy to lose, and have more probability of being stolen and misused. These possibilities not only bring safety and security issues, but can also influence the learning progress of learners.

Another limitation of mobile learning is the cost of implementation (Abu-Al-Aish, 2014). In implementing mobile learning, an institution requires a budget for infrastructure, development, training and support for teachers/instructors, maintenance and repairing the application and tools, and an administrator. On the learners' side, they have to provide the cost of the mobile device and its connectivity.

Mobile learning is a promising area for enabling learning in various contexts, not limited by locations and time-schedules, and assisting learning for non-traditional learners. Mobile learning can facilitate ubiquitous access not only to learning, but also to computing and information. Mobile learning has been implemented in many areas of learning including in the training environment.

2.4 Mobile learning for teacher training

This section discusses aspects of mobile learning for training in general, teacher training, and teachers in Indonesia.

2.4.1 Mobile learning for training

Sampson (2006a), and Tucker and Winchester III (2009) investigated the prospect of a mobile learning system for use in a training environment. Their research showed that mobile learning is appropriate for conveying training and offers the advantages of personalised education anywhere and anytime. Martin et al (2009) conducted a project on mobile learning by applying a mobile performance-centred self-directed system for education and training in engineering education. This

project was conducted in actual training settings and users were satisfied with the system.

Furthermore, mobile learning has been demonstrated as an effective method for skills training. The largest mobile learning initiative in Europe, The Mobile Learning Network, has carried out programs specifically intended at employing mobile technologies for skills training in areas such as heating, hairdressing, ventilation, wood machining, and plumbing (Douch et al., 2010). The programs succeeded, highlighting the main advantages of mobile learning for training – flexibility of learning, access to learning resources, personalisation of learning, engagement with learning, and learner retention and achievement.

The University of Colombo also implemented a mobile learning solution, Mobitel, to provide remote vocational qualifications in Sri Lanka. The project then extended to the Maldives, whereby students there could participate in the course from their own country in parallel with the Sri Lankan students (Locke, 2010).

The applications of mobile learning for information technology (IT) training were developed by Cisco learning network (Cisco, 2012). Through these applications, network engineer can take the Cisco Certified Network Association certification. However, these applications are only available for particular brands of video-enabled mobile devices; Apple, Android, and BlackBerry.

2.4.2 Mobile learning for teachers

Mobile learning for teachers is one of the least explored topics in mobile learning research, with very limited research focused on teacher training as a main topic (Baran, 2014; Ekanayake & Wishart, 2015). Mobile learning projects for teachers are usually conducted in three formats; teacher training on how to use mobile learning tools, the mobile learning package as teaching tool, and the use of mobile learning for student support and administrative (UNESCO, 2012b). Mobile learning projects for teacher training can be grouped into two based on the aim of the projects. The first group of projects aimed to train teachers how to integrate mobile learning into their classroom, and the other group aimed to enhance teacher learning with mobile learning (Baran, 2014).

Further research focused on how to integrate mobile learning into the classroom was conducted in Sri Lanka, providing a workshop series for teachers on integrating mobile phones into their teaching and learning activities (Ekanayake & Wishart, 2015). Similar studies carried out in the Philippines (Text2Teach) and Tanzania (BridgeIT) presented mobile learning as complementary to classroom learning and for teacher support (Locke, 2010). Another study in Malaysia for pre-service teachers focused on incorporating iPads for online learning (Hashim, 2014).

Some research on mobile learning focused on enhancing teacher learning to solve teachers-training problems in rural area (JingDong & Zhen, 2009; Junqi et al., 2010; Liu & Jiao, 2010; Zhang & Li, 2011). The teacher training in these projects used the question-answer method, gave teachers access to training resources and self-assessment, and enabled involvement in discussions with other participants. However, the training was not systematic and teacher competencies after the completion were unclear.

Other mobile learning programs for teachers were developed to support teacher mentoring and supervision (Cushing, 2011; Douch et al., 2010; Ferry, 2008; Seppälä & Alamäki, 2002; Wishart, 2009). These programs used mobile devices as a teaching tool that can take the place of, and/or supplement, face-to-face meetings. These programs were focused on pre-service teachers and aimed to enhance their teaching practice and ability through self-reflection, peer support, idea sharing, and peer assessment using mobile devices. Pre-service teachers' confidence and capability in using technology were increased by these training sessions.

Mobile learning for teacher training generally utilised mobile phones, smart phones, and PDAs (Junqi et al., 2010; Liu & Jiao, 2010; Walsh et al., 2012). Some training projects used certain brands of mobile devices, such as Palm Treo mobile devices (Ferry, 2008; Wishart, 2009), Nokia Communicator 9210 (Seppälä & Alamäki, 2002), Samsung, HTC and iPhone (Cushing, 2011), and iPad (Kearney & Maher, 2013). Other mobile devices, such as iPod, MP3 and MP4 players, and Sony Play Stations are also utilised in some mobile learning projects (Douch et al., 2010).

2.4.3 Mobile learning for teachers in Indonesia

UNESCO (2012c) reports the mobile learning activities the educational levels from primary education to tertiary education in several countries. According to the report, mobile learning activities in the tertiary education sector in Indonesia is considered as high since some activities have been implemented and widely used by many higher education institutions.

However, the activities of mobile learning in the primary and secondary sectors in Indonesia is categorised as low by the UNESCO (2012c) report. The low level indicates that there were some activities, but the activities are mostly only in the early stages of development and barely going beyond one particular school or institution.

Several research projects on mobile learning for teachers have been conducted by higher education institutions, including universities to investigate the prospect of using mobile devices in education (Alamsyah & Ramantoko, 2012; UNESCO, 2012c). Ratri and Waskito (2012) proposed the potential of mobile learning to support teacher education in Indonesia.

Some teachers in Indonesia have used a mobile learning program as a teaching tool. The MoEC provides a mobile learning portal for teachers named *m-edukasi* (BPMP Kemdikbud, 2012). In this portal, teachers can choose a mobile learning program suited to a topic in their subject.

In terms of teacher training, the British Council is developing a TALULAR project aimed to offer continuing support for English teachers working in remote areas of Eastern Indonesia who have participated in training provided by the British Council (Pegrum, 2014). The project is planned to employ mobile devices to enable communication between teacher trainers and trainees including weekly messages exchanged, and between trainee and other trainees in the program (Pegrum, 2014).

2.5 Mobile learning readiness and acceptance

In order to identify the success factors for mobile learning development and implementation, user readiness and perception of mobile learning and factors affecting their acceptance of mobile learning need to be assessed. This information is useful to determine the key issues that have to be addressed in the development and implementation of a mobile learning system (Abu-Al-Aish, 2014).

2.5.1 Mobile learning readiness

One of the main determinant factors for successful implementation of technology innovations in the education context is the degree of user readiness for the adoption of the technology (Lam, Wong, Cheng, Ho, & Yuen, 2011). In the education environment, readiness can be considered as the learners' ability to adapt to technological improvements, collaborative learning, and self-paced training (Schreurs, Moreau, & Ehlers, 2008).

In order to succeed with the implementation of mobile learning in education, the readiness of the learners as a mobile learning user needs to be assessed (Corbeil & Valdes-Corbeil, 2007). Some external factors may have an effect on mobile learning readiness; for instance, organisational context, personal demographic situation, and social atmosphere (Park, Nam, & Cha, 2012). Hence, investigation of the factors that affect mobile learning readiness will help institutions prepare for mobile learning development and implementation.

In general, mobile learning readiness can be divided into four areas - basic, skill, psychological, and budget readiness (Hussin, Manap, Amir, & Krish, 2012). Basic readiness is about learners' mobile devices while skill readiness is related to how learners use their mobile devices. Learners' readiness to participate in mobile learning can be defined by if they have appropriate mobile devices and have the capability to use it (Hussin et al., 2012).

Psychological readiness deals more with learners' perception of mobile learning (Hussin et al., 2012). This is important because their perception will affect their readiness and intention for using the system (Mahat, Ayub, & Luan, 2012).

Budget readiness relates to the capability of learners to acquire appropriate mobile devices on which to use the mobile learning system. Budget readiness also relates to the ability of learners to pay for the cost of mobile service connectivity in order to sustain their participation in the learning system (Hussin et al., 2012).

Some studies investigated mobile learning readiness. Research on mobile learning readiness conducted at the Open University Malaysia (Abas, Peng, & Mansor, 2009) showed that the students perceived themselves as mobile learners and believed that mobile learning could increase their interest in learning and support them in time management. Another study examined learners' mobile readiness, mobile self-efficacy, and personal innovativeness for participating in mobile learning program (Mahat et al., 2012). The findings indicated that despite only a moderate level of mobile self-efficacy, the participants' mobile readiness and personal innovativeness were considered high.

In the literature review for this study, research about mobile learning perception and readiness generally had university students as the research subjects. In addition, some research focused exclusively on teachers' perceptions and readiness for mobile learning. One study on teachers' readiness for mobile learning conducted in Sudan revealed that the majority of teachers confirmed their readiness and supported the concepts of flexibility and independence in the mobile learning environment (Abdall & Hegazi, 2014). However, this research only focused on teachers' readiness to use mobile learning for teaching in their class.

The attitude of pre-service teachers' readiness to use, the nature of usage, and attitude to mobile technologies for learning has been investigated (Shaqour, 2014). The study was conducted in the College of Education and Teacher Preparation at The An Najah National University in Palestine. The results revealed most pre-service teachers had used mobile devices in their learning. This signified a positive attitude for learning via a mobile device, even without direction or guidance from their teachers. Additionally, they preferred their teacher to integrate mobile devices into the teaching process and required courses to develop their mobile technology skills.

2.5.2 Mobile learning acceptance

Acceptance of new IT, or a system, has proven to be an important factor in the successful implementation of the system. Determining the factors that affect individual acceptance of a new technology is essential. This discussion on mobile learning acceptance starts with a review of theories of individual acceptance of technologies.

2.5.2.1 Theories of individual acceptance of technologies

Technology acceptance theories describes the acceptance and intention of IT users based on social psychology, information systems, and the theories of the behavioural sciences in order to explain how individuals perceive technology and decide to adopt the new technology (Venkatesh, Morris, Davis, & Davis, 2003).

In the world of information systems, several theories have been developed to assess the acceptance and intention of individuals in adopting new systems. Table 2.1 summarises prominent the theories of acceptance technologies.

The theory of reasoned action (TRA) is an early theory aimed to understand individual behaviour regarding a technology. The TRA was then adapted specifically for the IT field and resulted in the technology acceptance model (TAM), which became the most popular model for individual acceptance of technologies (Lee, Kozar, & Larsen, 2003).

The primary purpose of the TAM is to explain and predict IT acceptance of individual in a workplace (Susanto, 2012). The TAM adapted the TRA by excluding the subjective role and specifying two beliefs; *perceived ease of use* and *perceived usefulness* as the major factor in determining the *attitude* to using the technology (Huang, Lin, & Chuang, 2007).

Table 2.1. Theories of acceptance technologies (Venkatesh et al., 2003)

Theory	Core constructs
Theory of Reasoned Action (TRA)	
TRA is derived from social psychology and regarded as the most influential and fundamental of the human behaviour theories. It has been applied to the acceptance of technology of individuals and the variance explained is consistent with TRA studies in different contexts.	Attitude toward behaviour Subjective norm
Theory of Planned Behaviour (TPB)	
TPB extended TRA by including perceived behavioural control to the construct. In TPB, perceived behavioural control is theorised to be an additional determinant of behaviour and intention.	Perceived behavioural control Subjective norm Attitude toward behaviour
Technology Acceptance Model (TAM)	
TAM is adjusted to the context of information system (IS), and projected to predict the acceptance and usage of information technology (IT) in the workplace. TAM has been broadly used with a diverse set of technologies and users.	Perceived ease of use Perceived usefulness Subjective norm
Motivational Model (MM)	
Research in the field of psychology has supported general motivation theory as a description for behaviour. This theory has been assessed and tailored for specific contexts. MM is applied to understand the adoption and usage of new technology.	Intrinsic motivation Extrinsic motivation
Combined TAM and TPB (C-TAM-TPB)	
The predictors of TPB and the perceived usefulness of TAM are combined to develop a hybrid model, C-TAM-TPB.	Perceived behavioural control Subjective norm Attitude toward behaviour Perceived usefulness
Model of PC Utilisation (MPCU)	
MPCU has a perspective opposite to TRA and TPB. It has been used to calculate PC utilisation. The nature of MPCU is appropriate for predicting acceptance and usage of individuals in using a variety of information technologies. This theory is generally used only to predict usage behaviour, not intention.	Predict usage behaviour Long-term consequences Job-fit Complexity Social factors Facilitating conditions
Innovation Diffusion Theory (IDT)	
IDT has been applied in the research of many fields of innovation. Within IS, IDT adapted innovation characteristics and developed a set of constructs to examine the technology acceptance of individuals.	Image Ease of use Relative advantage Results demonstrability Visibility Voluntariness of use Compatibility
Social Cognitive Theory (SCT)	
SCT is the most powerful theories of human behaviour. It was applied to computer utilisation and usage context. Then it was extended to assess the acceptance and use of IT in general.	Self-efficacy Outcome expectations performance Affect Outcome expectations personal Anxiety
Unified Theory of Acceptance and Use of Technology (UTAUT)	
UTAUT is a theory that attempts to integrate and empirically compare elements from the eight different theories of individual acceptance technologies previously mentioned.	Social influence Performance expectancy Facilitating conditions Effort expectancy

The TAM construct is shown in Figure 2.8. TAM consists of attitude, actual system use, perceived ease of use, perceived usefulness, external variables, and behavioural intention. Perceived ease of use is defined as the level of someone's belief that the proposed system is easy to use, and perceived usefulness is defined as the degree to which someone believes that their work performance will increase by using the proposed system (Davis, Bagozzi, & Warshaw, 1989). External variables include the characteristics of the technology and other external stimulus toward using the technology, which includes self-efficacy, social influences, and experience (Susanto, 2012).

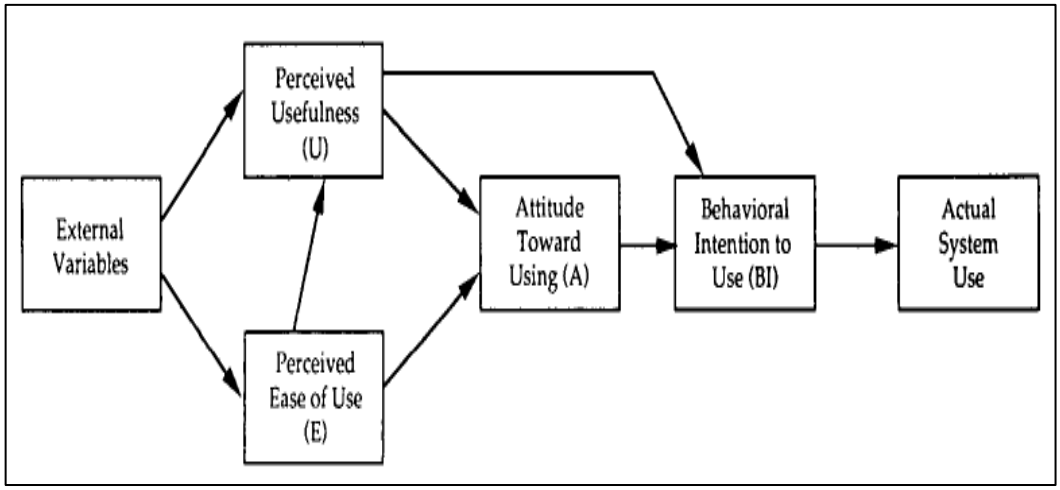

Figure 2.8. Technology acceptance model (Davis, 1986)

TAM describes attitude as someone's feelings about conducting a specific behaviour where this feeling is influenced by their beliefs about the behaviour's consequences (Fishbein & Ajzen, 1975). Behavioural intention is defined as someone's perceived likelihood of their intention to carry out a particular behaviour (Fishbein & Ajzen, 1975).

TAM theorises that the external variables affect perceived ease of use and perceived usefulness (Davis, 1986). Moreover, perceived ease of use influences perceived usefulness and these beliefs have direct positive effects on the attitude toward using technology (Davis et al., 1989). Together with perceived usefulness, attitude influences behavioural intention to use, while intention determines actual usage (Davis et al., 1989).

TAM has been validated empirically through an extensive number of studies since its introduction (Marangunić & Granić, 2015). For understanding the acceptance and usage of information systems, TAM has become one of the most powerful theoretical models (Davis et al., 1989; King & He, 2006; Marangunić & Granić, 2015). TAM has also been extended and used with different technologies, contexts, and populations with valid and successful results (Lee et al., 2003). TAM has been used in educational settings and has been validated in many trials (Baturay, Gökçearslan, & Ke, 2017; Persico, Manca, & Pozzi, 2014). For this research, TAM was applied to investigate factors affecting teachers' user acceptance of mobile learning.

2.5.2.2 Studies on mobile learning acceptance

Research shows that mobile learning has the potential to enhance the teaching and learning process. Therefore, understanding learners' acceptance of mobile learning is important when developing and implementing a successful mobile learning system (Abu-Al-Aish & Love, 2013).

Some research has focused on the factors that influence the mobile learning acceptance of learners. These studies are summarised in Table 2.2. Several of the studies applied TAM as the research model to describe the behavioural intention of learners for using mobile learning (Chong, Chong, Ooi, & Lin, 2011; Huang et al., 2007; Liu, Li, & Carlsson, 2010; Lu & Viehland, 2008; Park et al., 2012) and other studies used the unified theory of acceptance and use of technology (Iqbal & Qureshi, 2012; Jairak, Praneetpolgrang, & Mekhabunchakij, 2009) and the theory of planned behaviour (TPB) (Cheon et al., 2012).

The model of technology acceptance theory was modified in the studies in Table 2.2 by adding two or more constructs related to the context of the studies. These studies indicated that their adapted models were acceptable in explaining the factors influencing mobile learning adoption. Based on their findings, these studies proposed recommendations to the university administration in designing a mobile learning system.

Table 2.2. Studies on mobile learning acceptance

Authors	Sample	Model of acceptance of technology	Results
Huang et al. (2007)	313 undergraduate and graduate students in two Taiwan universities	Perceived enjoyment and perceived mobility value were added into the technology acceptance model (TAM).	The result of this study confirmed that the key determinants of mobile learning perception of users are perceived usefulness and perceived ease of use. This research reveals the significance of perceived mobility value to the mobile learning acceptance of users. Individuals who perceived the mobile learning technology well also find that mobile learning is simple to use. The individual also has a positive attitude toward mobile learning. A significant factor that attracts learners to use mobile learning is enjoyment.
Lu and Viehland (2008)	184 students from six New Zealand universities	Self-efficacy, perceived financial, and prior use of e-learning were added to TAM as external variables.	The result showed all variables except prior use of e-learning were accepted as key factors affecting the behavioural intention for mobile learning adoption. However, learners experience in using e-learning is not regarded to be an important aspect that influences their adoption of mobile learning.
Jairak et al. (2009)	390 students in five universities in Thailand	The Unified Theory of Acceptance and Use of Technology (UTAUT) model used five major factors; effort expectancy, performance expectancy, facilitating condition, social factors, and attitude, that give direct effect to intention and cut off the mediator variables such as age, gender, voluntariness of use, and experience.	This research concluded that performance expectancy and effort have a significant positive relationship with attitude toward behavioural intention in using mobile learning. The research also suggested that users' good perception of mobile learning and support from university are two main factors in the successful implementation of a mobile learning system.
Liu et al. (2010)	220 undergraduate students in Zheijang Normal University in China	A construct of perceived near-term and long-term usefulness in TAM was used to describe the educational information system innovation adoption.	This research indicated that perceived long-term usefulness, perceived near-term usefulness, and personal innovativeness have significant effect on intention to adopt mobile learning, and the perceived long-term usefulness was the strongest predictor in mobile learning adoption. Different from other studies, this study found that perceived ease of use has no significant effect on mobile learning acceptance.

Chong et al. (2011)	181 Malaysian students	Extended TAM by adding technical feasibility cost-effectiveness, cultural aspects, and quality of services.	The results showed that perceived usefulness, cultural aspects, perceived ease of use, and quality of services have significant and positive influences on mobile learning adoption in Malaysia. Cost-effectiveness and technical feasibility were revealed to be non-significant influence.
Park et al. (2012)	288 students in Konkuk University in South Korea	Constructed TAM with mobile learning self-efficacy, subjective norm, major relevance, perceived ease of use, perceived usefulness, mobile learning attitude, system accessibility, and intention to use mobile learning as variables.	This study confirmed the acceptability of the constructed TAM model to explain the acceptance of mobile learning. In explaining the causal process in the model, mobile learning attitude was the most significant construct in the model, followed by subjective norm and major relevance.
Cheon et al. (2012)	189 undergraduate students in the Southwest, United States.	Used the TPB based conceptual model.	The findings showed that the TPB can be applied to explain mobile learning acceptance of college students. Subjective norm, attitude, and behavioural control positively influenced the users' intention for mobile learning adoption. This study suggested other researchers pay more attention to end-user acceptance or resistance to mobile learning as the way to increase user acceptance of mobile learning.
Iqbal and Qureshi (2012)	261 university students in Pakistan	UTAUT model with perceived usefulness, social influence, perceived ease of use, perceived playfulness, and facilitating conditions have a direct effect on intention, and all the mediator variables were cut off.	The results of this research showed that facilitating conditions, perceived usefulness, and perceived ease of use significantly influence the intention of students for mobile learning adoption, while perceived playfulness only had a small influence on intention. However, this study indicated that social influence had a negative influence on mobile learning adoption.

Despite much research on the acceptance of mobile learning, research focusing on the mobile learning adoption of teachers are few in number. Examples are studies on pre-service teachers in Hong Kong (So, 2008), Malaysia (Ismail, Idrus, & Johari, 2010; Rosli, Ismail, Idrus, & Ziden, 2010), and the United States (Chen, 2010). However, the research was not based on theories of individual acceptance technology.

2.6 Mobile learning theoretical model

This section discusses three theoretical models considered relevant to the design of a model of mobile learning for teacher training.

2.6.1 Mobile learning adoption in developing countries

Barker et al. (2005) propose a theoretical model for the adoption of mobile learning in a developing country. This proposed model validates mobile device usage for academic activities of learners by providing course content, online assessment, and access to the internet.

The proposed model, as shown in Figure 2.9, consists of a traditional learning environment, a mobile learning environment, and mobile learning guidelines and policies (Barker et al., 2005). The traditional learning environment in this model shows that learning activities could be carried out using PCs (Barker et al., 2005). The mobile learning environment contains a communication infrastructure in the form of wireless access points to support communication between mobile devices including mobile phones, or any other wireless handheld device, and the learning institution containing teachers, learners, and support staff (Barker et al., 2005).

According to this model, the communication infrastructure, teachers, learners, mobile devices and support staff should be available for the learning institution to establish a mobile learning environment (Barker et al., 2005).

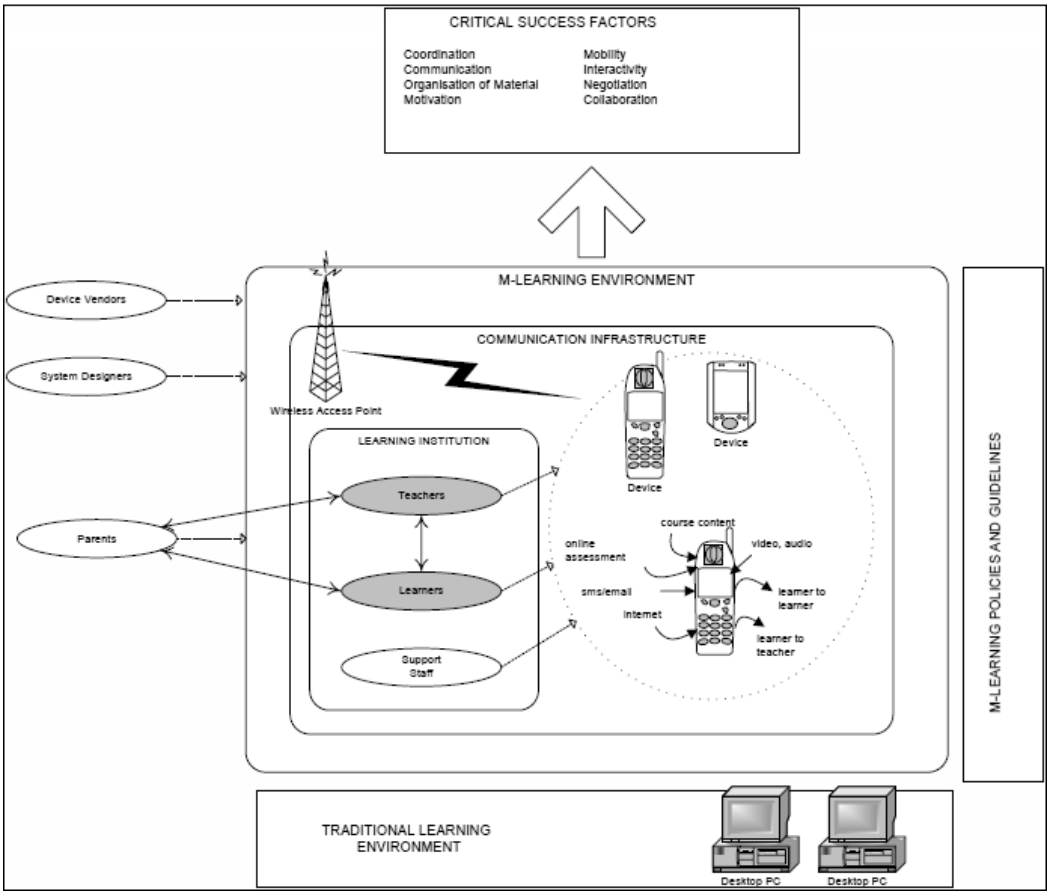

Figure 2.9. Model for the adoption of mobile learning in developing countries (Barker et al., 2005)

The model defines critical factors of successful adoption of mobile learning including coordination, mobility, communication, interactivity, negotiation, motivation, collaboration, and organisation of materials (Barker et al., 2005).

2.6.2 A Pedagogical Framework for Mobile Learning

The transactional distance theory was adopted as the theoretical framework for mobile learning in distance education by Park (2011). In this framework, mobile learning activities can be categorised into four types as depicted in Figure 2.10.

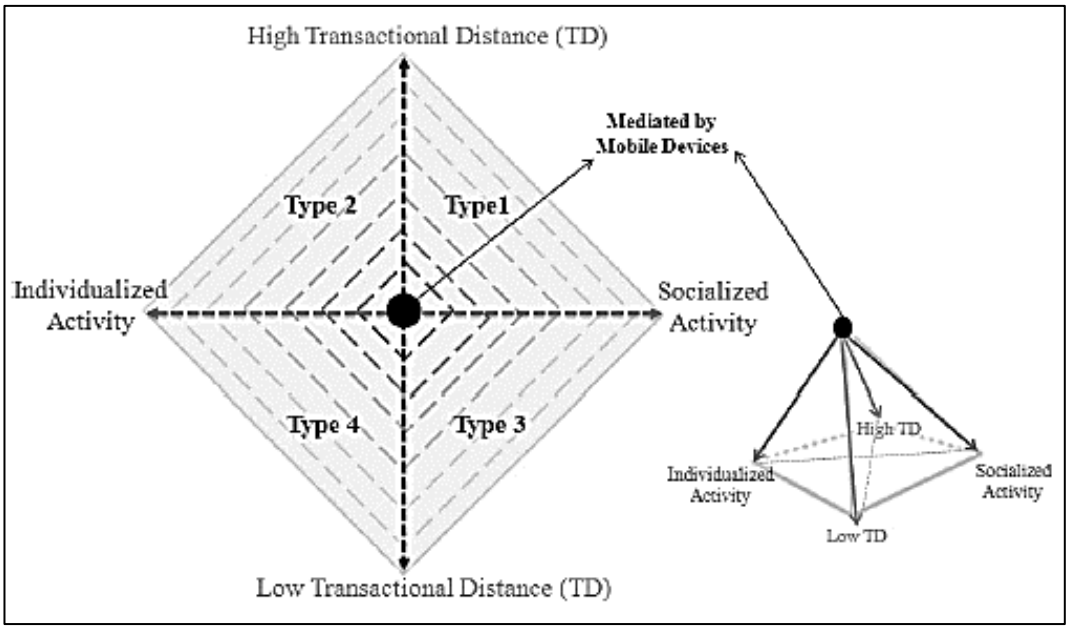

Figure 2.10. Four types of mobile learning activities (Park, 2011)

Type 1 consists of high transactional distance socialised mobile learning activities. The learners in this type of mobile learning activity have a closer relationship with their instructor as well as to other learners than the learners in other types (Park, 2011). Learning materials are provided through mobile devices prior to activities starting (Park, 2011). Interactions between learners occur as they conduct the learning activities together as a group, and the instructor is involved in assisting the group activity (Park, 2011).

Type 2 consists of high transactional distance individualised mobile learning activities. Similar to Type 1, the learning materials are delivered through mobile learning prior to starting the activities; however, the content of the materials are better structured and well organised (Park, 2011). Learners have to complete their learning activities individually; hence, the interactions occur only between the learner and the learning materials, not with other learners (Park, 2011). Learners control their learning process by themselves, with some assistance from the teacher or instructor for mastery (Park, 2011). The learning activities fit well into the learner's daily life. This type of mobile learning systems is for suitable distance learning (Park, 2011).

Type 3 consists of low transactional distance socialised mobile learning activities. In this type, the interaction of a learner with other learners and the instructor occur through a mobile device. Similar to Type 1, the learners work together in a group but the involvement of the instructor is less (Park, 2011). The learning outcome is not defined in advance; the learners are just given a task to finish together and try to reach a collective goal (Park, 2011). This type reveals the versatility of mobile devices in developing learners' social interactions (Park, 2011).

The last type, Type 4, consists of is low transactional distance individualised mobile learning. In Type 4, learners carry out the learning activities individually but the learning is led and controlled by the teacher or instructor (Park, 2011). Interactions between learners and the instructor are loosely structured, and learners can have direct interaction with the instructor (Park, 2011). The learning content for this type are undefined before the activities begin (Park, 2011). Type 4 can be applied in order to develop mobile learning that supports blended or hybrid learning (Park, 2011).

2.6.3 A Design Requirements Framework for Mobile Learning Environments

The conceptual framework for mobile learning applications, as shown in Figure 2.11, provides systematic support for mobile learning experience design as proposed by Parsons et al. (2007). It involves four factors; learning objectives, mobile learning context issues, learning experiences, and generic mobile environment issues.

Applying mobile learning in dynamic complex situations can explain the relationships between these four factors. Complex situations, as in a hospital, call for learning objectives that are reinforced by learning experiences, and the learning experiences are facilitated by the learning context in order to define the design of the mobile environment (Parsons et al., 2007).

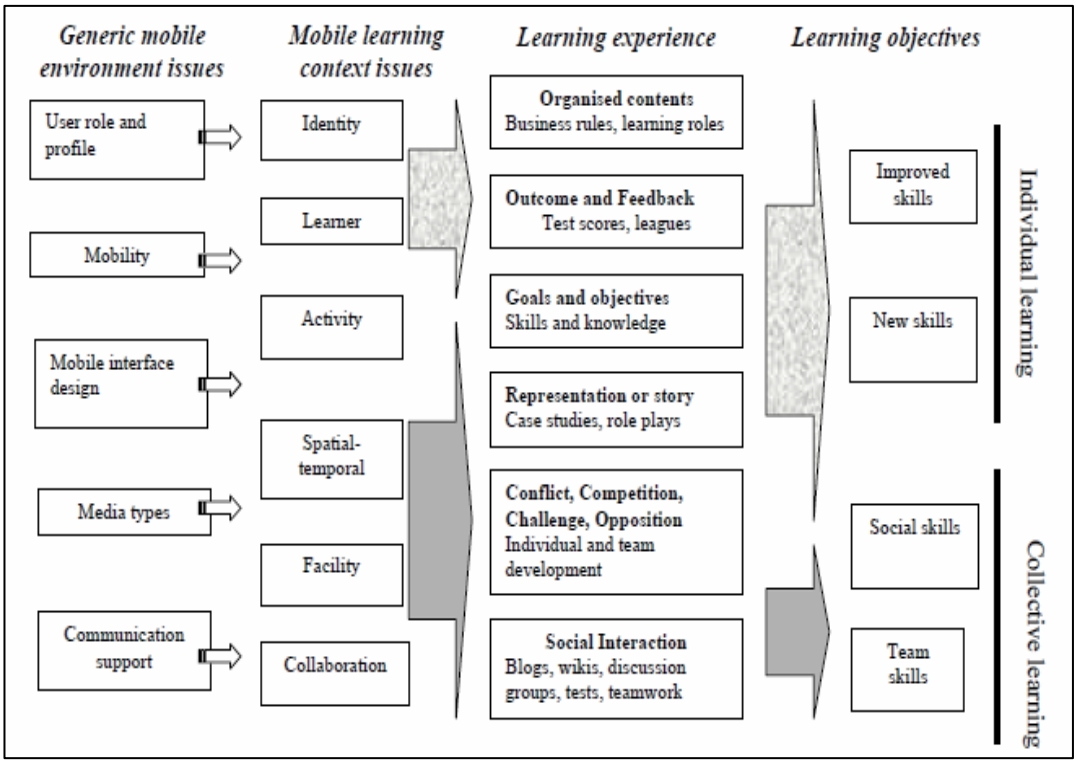

Figure 2.11. A framework of mobile learning design requirements (Parsons et al., 2007)

Figure 2.11 shows that generic mobile environment issues consists of user role and profile, mobility, mobile interface design, media types, and communication support. User role and profile are important in a generic mobile environment, because the way that mobile device users employ their devices are unique (Parsons et al., 2007). Mobility is the most significant issue in the generic mobile environment. Theoretically, mobility can be seen from three sides - the user, the device, and the services - and these should all be handled contextually and technically (Parsons et al., 2007).

In mobile interface design, the limitation of mobile devices - screen, input method, and battery life - should be considered (Parsons et al., 2007). According to Parsons et al. (2007), in designing mobile learning contents these limitations should be addressed by employing different media types for the mobile devices. The communication support for mobile learning is then defined by the continuous contact between its users due to the mobile technologies (Parsons et al., 2007).

There are six issues in the mobile learning context identified in Figure 2.11 that should be considered in mobile learning design. Identity, learner, activity, and

collaboration issues form the situational context of mobile learning; spatial-temporal and facility issues are related to the environment context of mobile learning (Parsons et al., 2007).

Identities of mobile learning users are important to personalise learning experiences for different learners, and considerations of the learner is also necessary, since the personality of the user influences their learning experience (Parsons et al., 2007). The most significant feature of the mobile learning context is collaboration, and this feature is empowered by mobile technology (Parsons et al., 2007). The spatial-temporal feature can be the means to consideration of time and location in the mobile learning context, while the facility feature has an effect on mobile learning interfaces (Parsons et al., 2007).

According to Parsons et al. (2007), mobile learning design and evaluation should focus on the learning experience due to the ubiquitous feature in mobile learning. Learning experiences, as shown in Figure 2.11, comprise organised content; outcome and feedback; goals and objectives; representation or story; conflict, completion, challenge, and opposition; and social interaction.

Organised content can increase the quality of the learning experience by developing the learning material carefully (Parsons et al., 2007). The goals and objectives of mobile learning should be developed to fit in learners' capabilities and circumstances, and goals and objectives are evaluated by outcomes and feedback (Parsons et al., 2007).

In a learning experience, representation or story should promote the cultivation of fresh and/or advanced skills (Parsons et al., 2007). Self-motivation and self-regulation of the learner in a mobile learning experience is determined by the learner's capability of solving a problem due to conflict, competition, challenge, and opposition (Parsons et al., 2007). Social interaction allows collective understanding within a group of learners, which is important to improve the social and team skills of learners (Parsons et al., 2007).

2.7 Summary and conclusions

This chapter presented a review of the mobile learning literature. This chapter also reviewed studies related to user readiness, perception, and acceptance of mobile learning. Finally, this chapter highlighted three theoretical models related to mobile learning implementation.

This literature review found a gap in the mobile learning literature, with research on mobile learning programs implemented exclusively for teacher self-development being very limited. In Indonesia, particularly, mobile learning in the teacher-training context has not yet been implemented. A mobile learning model that provides guidelines for mobile learning development, especially in the teacher-training environment, was not found in the literature. The aim of this research is to develop a model of ICT training for teachers in Indonesia. The review has highlighted the importance of this research.

The literature review also found a scarcity of studies on teachers' readiness and acceptance of mobile learning for training. There is, therefore, limited understanding of teachers' readiness of mobile learning, and as such, this research conducted an investigation on teachers' readiness. The investigation is a contribution to the literature of mobile learning.

Studies on the factors that influence the acceptance of mobile learning in teacher training are also scarce. Studies on teachers' acceptance of mobile learning did not perform analyses based on any of the existing theories of individual acceptance technologies. Hence, the assessment of factors affecting the acceptance of teachers on mobile learning in this research was analysed based on a theory of individual acceptance technologies; TAM.

The following chapter explains the research methodology used in this research.

CHAPTER 3. RESEARCH METHODOLOGY

3.1 Overview

This chapter presents the research methodology used in this study. The chapter starts with the research approach and design, and then details the research method applied at each stage in this study. The chapter also discusses ethical considerations regarding this study.

3.2 Research approach

This study applied a quantitative research methodology as the research approach. According to Creswell (2014), a quantitative research tests hypotheses or objective theories by investigating the relationship between variables that can be measured using instruments, with the obtained data being analysed using statistical procedures. This type of research produces a written report that typically consists of an introduction, theory and literature, methodologies, results, and discussion (Creswell, 2014).

The research method is a specific technique employed in research implementation, and includes how data are collected and how the collected data are analysed (Sim & Wright, 2000). This study applied surveys as the research method. Surveys consists of a series of questions posed to survey participants. Participants' responses are then summarised statistically, and from the responses inferences about a particular population are concluded (Leedy & Ormrod, 2005). Most research uses surveys as they can be carried out in a short time and are economical as a means of data collection (Creswell, 2014). Surveys can also manage large numbers of participant.

A survey can involve a specific instrument, such as a questionnaire, interview or observation (Bryman, 2012). The surveys in this study employed a questionnaire to gather information from the respondents. The questionnaire in this study was a self-completing questionnaire, which is commonly presented as written questions completed personally by the participant (Bryman, 2012).

This research can be categorised as a cross-sectional study based on time for data collection. A cross-sectional study involves data collection on more than one case at a particular point in time to obtain quantitative or quantifiable data related to two or more variables that then examines the data to identify patterns of association (Bryman, 2012; Cohen, Manion, & Morrison, 2007). The cross-sectional study is often called a survey study since the research methods associated with surveys are commonly applied within the cross-sectional study's context (Bryman, 2012).

3.3 Research design

A research design is a structural plan for conducting research – from a set of research questions to the answers to these questions – which consists of a number of main stages, including the collection and analysis of the data obtained (Yin, 2003).

The research questions in this study are as follow:

RQ1: Is it possible to use mobile phones for teacher training in Indonesia?
RQ2: What is the level of teachers' readiness for mobile learning for training?
RQ3: What are teachers' experiences in using ICT and participating in ICT training?
RQ4: Is mobile learning a solution to teacher problems for participating in training?
RQ5: Do perceptions of mobility value, institutional influence, self-efficacy, ease of use, and usefulness significantly affect teachers' acceptance of mobile learning for training?
RQ6: What are the key issues in developing mobile learning for teacher training using mobile phones?

In order to answer the research questions, this study was designed to run in five stages. Stage 1 was a literature review to answer RQ1. Stage 2 was conducted to answer RQ1, RQ2, and RQ3. This study developed and ran a training prototype in Stage 3 in order to answer RQ4. Stage 4 was carried out to answer RQ5 and the last

stage, Stage 5, was conducted to answer RQ6. The research design developed for this study is depicted in Table 3.1.

Table 3.1. Research design

Stage		Research objective	Research questions answered
1	Literature review	To explore the possibility of using a mobile phone as a medium for information and communication technology (ICT) training for teachers.	RQ1
2	Teachers' readiness for mobile learning	To investigate teachers' readiness for mobile learning via mobile phones	RQ1,RQ2, RQ3
3	Trial of the training prototype	To evaluate whether mobile learning can solve participation problems of teachers.	RQ4
4	Teachers' acceptance of mobile learning	To assess teachers' acceptance of mobile learning	RQ5
5	A model of mobile-learning-based ICT training for teachers	To produce a model of ICT training by mobile learning for teachers	RQ6

The details of the methods applied in each stage of this study are described below.

3.3.1 Stage 1: Literature review

A literature review is an examination and evaluation of the available documents and studies in a particular field or topic (Hart, 1998). The main purposes of the literature review are to explore and investigate what is already known on a particular subject, and to identify the gap in the existing research. A literature review should help the researcher to address and answer various important questions related to research topics.

The literature review in Chapter 2 explored theory and studies on mobile learning including its definitions, benefits and advantages, limitations and challenges in implementing mobile learning systems, and the implementation of mobile learning for training and teacher training. Some studies related to readiness and acceptance of mobile learning were also reviewed.

The literature review in Chapter 3 focused on teachers in Indonesia in regard to ICT, including their ICT skills, ICT training for teachers, and the problems and challenges in participating in an ICT training program. Since this study proposes the mobile phone as a medium of training for teachers, the potential of the mobile phone in the Indonesian context was explored.

3.3.2 Stage 2: Investigation into teachers' readiness for mobile learning

The objectives of this stage were to define the possibility of using mobile phones for ICT training by exploring the basic and skill readiness of teachers, and to view teachers' perceptions about mobile learning by questioning the psychological and budget readiness of teachers. The survey was also used to assess teachers' experience in using ICT in their activities, and participating in ICT training to ascertain what ICT training teachers need.

This stage was conducted using a paper-based questionnaire survey. The questionnaire was constructed to investigate the possibility of using mobile phones for ICT training, teachers' perceptions about mobile learning for training, and their need for ICT training.

3.3.2.1 Research participants

The participants in this study were teachers from general and vocational high schools in South Sulawesi Province, Indonesia. The reason for choosing high school teachers was because the ICT training system developed in this research was designed specifically for high school teachers in Indonesia to support the *Kurikulum 13* implementation, in which ICT is integrated into all subjects in the high school curriculum.

3.3.2.2 Research instrument

Data obtained from this study were applied in designing the ICT training system for teachers in Indonesia. The questionnaire used in this study covered three topics; demographic profile, the readiness of teachers for mobile learning, and the ICT activities and training experience of teachers.

The questionnaire consisted of five sections and can be found in Appendix 1. Section A of the questionnaire comprised demographic questions to gather information about the teachers' profiles. In this section, the participants were asked about gender, age, educational background, years of service, type of school they worked in, teaching subject, and whether they had side-task at their school.

In Section B, teachers were asked about their mobile phones and the features they use regularly. The information gained from this section was important in revealing the basic and skill readiness of teachers for using mobile phones for mobile learning.

The questions in Section C asked for information about how teachers use ICT in their teaching and learning activities. The challenges for teachers in using ICT and teachers' self-evaluation of their ICT skills and knowledge were also included. The challenges for teachers provided in the questionnaire were adapted from a study by Bingimlas (2009).

Section D asked about teachers' ICT training experiences. The questions in Sections C and D were used to explore teachers' needs for ICT training.

Section E consisted of 20 statements adapted from a study by Hussin et al. (2012) intended to examine the readiness of mobile learning users in terms of psychological readiness and budget. The questions on each variable were grouped into five groups; knowledge about mobile learning, learning method issues, device issues, willingness for mobile learning, and financial issues. The first four groups represent psychological readiness.

The questions in Sections A, B, C, and D were in the form of closed questions, while the statements in Section E were measured using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

The questionnaire employed was originally constructed in English. Participants in this project were high school teachers in Indonesia. Consequently, the questionnaire and information provided to participants needed to be in Bahasa Indonesia (Appendix 2). The questionnaire was translated into Bahasa Indonesian by the

researcher and the translation verified by a PhD student in the field of information system whose first language is Bahasa Indonesia.

3.3.2.3 Data collection

The survey packages were delivered by the researcher to the principal of a number of general and vocational high schools. The survey package included:

- letters of approval for conducting research (Appendix 3)
- a letter for the principal, which included information about the objectives of the study, confidentiality protection and a request to forward the questionnaires to teachers (Appendix 4)
- packages for teachers which contained a letter of introduction, an information sheet that contained information about the purpose of the study, confidentiality protection and instructions for completing the questionnaire, and the questionnaire (Appendix 2, 7, and 9).

Teachers in this study were recruited directly in their school, where they also received their packages. Then they were asked to complete the questionnaire in their spare time.

3.3.2.4 Data analysis

The responses to the survey were numerically coded in order to be analysed using the Statistical Package for the Social Sciences (SPSS) version 20.0. SPSS is a software application that is used to carry out statistical analysis on quantitative data. This software enables users to organise and analyse data effectively whether simple or complex, depending on the requirements of the study.

Descriptive statistics were performed for data obtained in this stage. According to Trochim and Donelly (2008), descriptive statistics enable researchers to analyse a quantity of data simply and practically.

In order to understand more about teacher perceptions about mobile learning, the study compared groups of teachers based on their demographic profiles; gender, academic background, teaching experience, etc., across different perception

variables; knowledge of mobile learning, learning method issues, device issues, willingness for mobile learning, and financial issues.

An independent *t*-test and a one-way analysis of variance (ANOVA) were used for these comparisons. These are statistical techniques applied to compare the means between the groups and determine whether any of those means are significantly different from each other (Pallant, 2013). A *t*-test is conducted to compare means between two groups, while ANOVA is used to compare means between three or more groups.

Chapter 5 presents the details and the results of this stage of the study.

3.3.3 Stage 3: The trial of the mobile-learning-based ICT training prototype

As part of the research procedure, this study developed and ran a prototype of mobile learning for ICT training through a mobile phone. This stage aimed to give mobile learning experience to teachers.

3.3.3.1 Participants

Corresponding to the previous stage, participants in Stage 3 were high school teachers in South Sulawesi Province, Indonesia.

3.3.3.2 Research instrument

The research instruments in this stage were the training prototype and a questionnaire. Detail about the training prototype can be found in Chapter 6. The questionnaire in the online survey consisted of four sections (Appendix 10). Section 1 was an information section that comprised a brief description of the study, and the purposes and importance of the study. This section also informed teachers that their details and answers to all questions in the survey would be kept anonymous. They were informed that they were free to withdraw from the survey at any time.

Section 2 comprised questions on the demographic profile of the teachers asking about their gender, age, educational background, years of service, the type of school they worked in, the location of the school, the subjects they teach, and whether they have side-task at school or not.

Section 3 consisted of questions about the training experience of teachers. It contained three closed-ended questions asking about the completion of the training, and three open-ended questions on the time and place they accessed the training, and their comments and feedback on the training.

Section 4 in the questionnaire was dedicated to the survey about teachers' acceptance of mobile learning. Section 3.3.4.2 in this chapter provides detail about this survey questionnaire.

3.3.3.3 Data collection

At the end of the training, an email with a link to the survey was sent to all participants in the mobile learning course. The survey was conducted online due to participants' dispersed locations. The survey was administered using the online survey application www.surveymonkey.com. The participants were given a week to complete the survey.

3.3.3.4 Data analysis

Similar to Stage 2, descriptive statistics were performed to analyse the data in this stage using SPSS 20.0. The responses from the survey in this stage were analysed using thematic analysis. Thematic analysis is conducted in four stages: organising the data; coding the data; defining the themes of the data, representing the themes into narrative, figures or tables, and interpretation (Creswell, 2014).

Chapter 6 provides details about developing and running the training prototype.

3.3.4 Stage 4: Investigating factors affecting teachers' acceptance on mobile learning

This stage of the study was aimed at assessing the acceptance of teachers for mobile learning. The data were obtained using an online questionnaire. It was used to identify what factors encouraged teachers to accept mobile learning for ICT training.

3.3.4.1 Participants

Participants in this stage of the study were teachers who had participated in the training trial (Stage 3).

3.3.4.2 Research instrument

A questionnaire was developed to investigate factors affecting the teachers' acceptance of mobile learning for ICT training using mobile phones. This questionnaire was embedded into the online survey questionnaire of the previous stage, and can be found in Section 4 of the online survey (Appendix 8).

The questionnaire contained 18 statements asking about perceived mobility value, self-efficacy, institutional influence, perceived ease of use, perceived usefulness, and behavioural intention of teachers about mobile learning for ICT training. Similar to the questions on the readiness of teachers for mobile learning in the previous survey, the questions about teachers' acceptance of mobile learning also used a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

The variables included in the survey were adapted from studies on technology acceptance. Table 3.2 presents the variables used in the research, and the literature from where the items were adapted.

Table 3.2 Variables and the references

Description	Items	Adapted from
Perceived mobility value (PMV)	3	Huang et al. (2007)
Mobile learning self-efficacy (MSE)	3	Compeau and Higgins (1995)
Institution influence (II)	3	Venkatesh and Davis (1996)
Perceived usefulness (PU)	3	Davis et al. (1989) Venkatesh and Davis (1996)
Perceived ease of use (PEoU)	3	Davis et al. (1989) Venkatesh and Davis (1996)
Behavioural intention (BI)	3	Bagozzi, Yi, and Phillips (1991)

3.3.4.3 Data collection

Data for this stage were collected through the online survey of the previous stage. As mentioned previously, the questionnaire for this stage was included in the survey of the training trial study.

3.3.4.4 Data analysis

Descriptive and inferential statistics were performed to analyse the data obtained in this stage of study. The descriptive statistics analysis was used to assess the

normality of the collected data. The *t*-test and ANOVA test was also applied to assess the relationship between the participants' demographic profiles and the factors affecting teachers' acceptance of mobile learning.

In order to test the hypotheses developed in this stage of the study, inferential statistics were applied. This type of statistic allows generalisations to be made about a population based on interpretation of the sample data (Trochim & Donelly, 2008). Furthermore, the probability of observed differences between groups can be assessed using inferential statistics (Trochim & Donelly, 2008).

To test the hypotheses, the data were analysed using structural equation modelling (SEM). SEM comprises two steps; the analysis of the measurement model and the structural model. The analysis of the measurement model is known as confirmatory factor analysis (CFA), which specifies how the variables of measurement converge to emphasise the latent variables, whereas the structure models are analysed to identify the correlation between the latent variables (Hair, Black, Babin, & Anderson, 2010).

In the first step, CFA is conducted to assess the measurement model's validity. Before performing CFA, many researchers carry out exploratory factor analysis (EFA) (Hair et al., 2010). EFA is a statistical approach for determining factors among the variables in a dataset, and then the results are used to develop a theory that will lead to a proposed measurement model in the CFA (Hair et al., 2010; Yong & Pearce, 2013).

SPSS 20.0 was used to perform the descriptive statistics and the EFA. Analysis of moment structure (AMOS) Version 22 was used for the CFA and testing the hypotheses.

3.3.4.4.1 Exploratory factor analysis

In EFA, the data are examined to determine whether it is suitable for factor analysis. The data have to meet the requirements with respect to sample size and the results of the Kaiser-Meyer-Olkin (KMO) test of sampling adequacy, and Bartlett's test of Sphericity (Williams, Brown, & Onsman, 2012).

For factor analysis, sample size is important. There are several rules of thumb and opinions found in the literature about sample size recommendations. A general rule of thumb for sample size suggests at least 300 cases for factor analysis (Tabachnick & Fidell, 2007). Another guide categorises sample size based on the number of cases; very poor if sample size has 50 cases; poor if it has 100 cases; fair if it consist of 200 cases; then good, very good, and excellent for a sample size with 300, 500, and 1000 cases respectively (Abu-Al-Aish, 2014).

However, these guides can sometimes be misleading and do not consider some of the complex dynamics of factor analysis (Tabachnick & Fidell, 2007). The sample to variable ratio (*N:p* ratio) is another recommendation for determining the number of respondents required for each variable in the research, where *N* refers to the number of participants and *p* refers to the number of variables (Hair et al., 2010; Williams et al., 2012). The rule of thumb for this recommendation range from 3:1, 6:1, 10:1, 15:1, or 20:1 (Hair et al., 2010).

Before conducting the factor extraction, KMO and Bartlett's test are carried out to assess whether the data are appropriate for factor analysis or not (Williams et al., 2012). The KMO index ranges from 0 to 1, with 0.50 considered suitable for factor analysis while The Bartlett's test result should be significant ($p < 0.05$) for factor analysis to be suitable (Hair et al., 2010; Tabachnick & Fidell, 2007).

There are various methods to extract factors in EFA such as principal component analysis (PCA), principal axis factoring (PAF), maximum likelihood (ML), image factoring, unweighted least squares, canonical, and alpha factoring (Williams et al., 2012). The most popular methods for factor extraction in the literature are PCA and PAF (Tabachnick & Fidell, 2007). PCA is the most popular extraction method since many statistical software packages, including SPSS, put PCA as the default method of extraction (Williams et al., 2012). PAF is applied when the multivariate normality assumption of data is violated, while for normally distributed data, ML is the best method (Costello & Osborne, 2005).

After extraction, Kaiser' criteria (eigenvalue > 1.00) is used to determine the retained factors for rotation (Yong & Pearce, 2013). Rotation maximises the item

with high loading, and minimises the item with low loading, to generate a more interpretable and simplified solution (Williams et al., 2012). There are two types of rotation; orthogonal constructs uncorrelated factors, and oblique enables factors to correlate (Costello & Osborne, 2005; Williams et al., 2012). The most used rotation method in the literature is varimax, which is an orthogonal method (Costello & Osborne, 2005). Once the rotation was performed, the factors for all variables were determined and the factors were labelled.

3.3.4.4.2 Confirmatory Factor Analysis

After the EFA, the CFA was conducted using AMOS software to examine the validity of the model derived from the EFA result. The validity of the measurement model is determined by the levels of goodness-of-fit (GOF) generated by the measurement model and particular evidence of construct validity (Kline, 2005). GOF specifies the degree of how the measurement model replicates the observed covariance matrix among the indicator items (Hair et al., 2010). A number of GOF measures are available in the literature and are classified into three general groups; absolute, incremental, and parsimony fit measures (Hair et al., 2010).

The absolute fit indices estimate the proportion of variability in the sample covariance matrix explained by the proposed model (Kline, 2005). The chi-square (x^2), the goodness-of-fit index (GFI), the normed chi-square (x^2/df), the root mean square residual (RMSR), and the root mean square error of approximation (RMSEA) belong to this group.

In the absolute fit indices, the proposed model is evaluated independently of other alternative models, while in the incremental fit indices the estimated model is compared to some possible baseline models (Hair et al., 2010). This group includes the Tucker-Lewis index (TLI), the normed fit index, the comparative fit index (CFI), and the relative non-centrality index.

Parsimony fit indices estimate a model fit in regard to the amount of estimated coefficients required for the fitness level (Hair et al., 2010). It contains the parsimony ratio, the parsimony goodness of fit index, and the parsimony normed fit index.

In order to provide sufficient evidence of model fit, Hair et al. (2010) suggest reporting the chi-square (x^2), the associated degree of freedom, and at least one incremental index and one absolute index. The chi-square (x^2) should always be complemented with other GOF indices since it is very sensitive to sample size. (Hair et al., 2010). In this study, the normed chi-square (x^2/df) is used as a complement to the chi-square (x^2).

Accordingly, the GOF indices applied in this study were three absolute fit indices: the chi-square (x^2), the normed chi-square (x^2/df), and the RMSEA; and two incremental fit indices: the CFI and the TLI. Table 3.3 presents the recommended values for the model fit indices used in this study.

Table 3.3. The model goodness-of-fit criteria for this study (Loxton, 2014)

GOF Index	Recommended value
Chi-square (x^2)	$p > 0.05$
Normed chi-square (x^2/df)	$1.0 < x^2/\text{df} < 2.0$
RMSEA	RMSEA < 0.05 PCLOSE > 0.05 LO 90 = 0
CFI	CFI > 0.95
TLI	TLI > 0.95

Regarding the sample size and the model, Hair et al. (2010) assert that the smaller samples and the simpler models should be subject to stricter acceptable GOF levels than larger samples with more complex models. When the model is considered a good fit, it must still meet further criterion for validity, namely construct validity.

Construct validity indicates how well a set of measured items correctly reproduces the theoretical latent constructs of those items they are designed to measure (Hair et al., 2010). There are two components in this validity; convergent validity and discriminant validity. Convergent validity is the level of proportion of the measured items of a particular construct for variance in common, and the discriminant validity is the degree of distinctness of a latent construct from other latent constructs (Hair et al., 2010).

Factor loading, the average variance extracted (AVE) and the construct reliability (CR) are examined in order to evaluate the convergent validity among the measured items (Armentano, Christensen, & Schiaffino, 2015; Teo, 2009). The factor loading should be greater than 0.50, the AVE should equal or exceed 0.5, and the CR should be greater than 0.7 (Fornell & Larcker, 1981). Comparing the square root of the AVE for every construct to all inter factor correlations to evaluate discriminant validity (Fornell & Larcker, 1981).

3.3.4.4.3 Structural models analysis

Once the validity of the measurement model is established, the structural model relationships are specified by transforming the measurement model in the CFA to a structural model (Hair et al., 2010). The transforming process is conducted in two stages, as shown in Figure 3.1. First, the two-headed arrows from CFA are replaced with single-headed arrows, which symbolise a cause-and-effect type relationship. In the second stage, the two-headed curved arrows linking constructs that are not hypothesised to be directly related are removed (Hair et al., 2010).

The structural model was then estimated and assessed by evaluating the model fit and the consistency of the structural relationships with the theoretical expectation. The structural model fit was examined using the GOF indices applied in the CFA (Hair et al., 2010; Teo, 2009). When the structural model was within the acceptable range of fitting, the model was assessed for hypotheses testing.

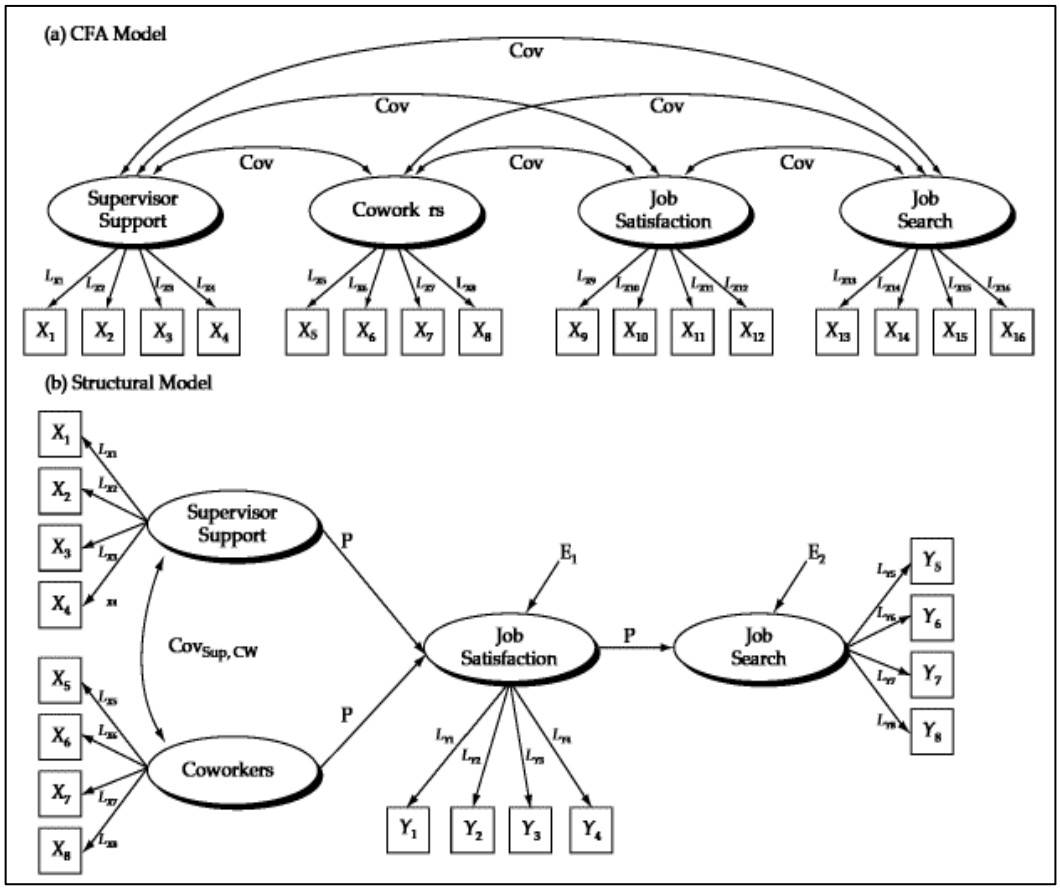

Figure 3.1. Changing a confirmatory factor analysis model to a structural model (Hair et al., 2010)

The details and the results of Stage 4 are provided in Chapter 7.

3.3.5 Stage 5: A model of mobile learning based ICT training for teachers in Indonesia

The model of ICT training was designed based on the findings from Stage 1, the literature review of mobile learning, and the results of Stages 2, 3, and 4, the survey and trial stages in this study. The method for developing the framework is summarised in Figure 3.2.

Figure 3.2. The method used to develop the ICT training model

3.4 Ethical considerations

Ethical issues may arise at every stage of research, particularly research involving human participants. The main ethical issues in research are whether there is a lack of informed consent, potential harm to participants, privacy invasion, and whether deception is involved in the research (Bryman, 2012).

Issues related to informed consent of participants are the ethical issues that might arise in this study. All research involving human subjects should obtain informed consent from participants (Bryman, 2012). In order to ascertain the quality and ethical standards of the research process, the participants were given information about the purposes of the study before starting the questionnaires. Every respondent was also informed that they were free at any time to withdraw from the survey since

their participation in the study was voluntary. All participants in Stage 2 were informed that the return of their completed questionnaire would be assumed to be their consent. In Stages 3 and 4, participants gave their consent by clicking the start survey button as explained in the first section of the survey.

The ethics issues were reviewed by the Flinders University Social and Behavioural Research Ethics Committee and approved; approval project No. 6095 for the survey in Stage 2 and approval project No. 7038 for testing the training prototype and the teachers' acceptance survey (Stages 3 and 4). This study also obtained permission for conducting research from the Regional Government of South Sulawesi Province, Indonesia. These letters of approval were then used to seek consent from the principals of the selected schools to involve their teachers in the study. All letters of approval are shown in the appendices.

3.5 Summary

This chapter provided details of the research approach, the research design, and research methods applied in this study. The chapter presented an explanation of research strategy with a justification of the quantitative approach applied in the study. This chapter comprised sections detailing the research method in each stage of this study and provided further details of the research instrument, data collection and methodologies used for data analysis. Furthermore, this chapter presented details about ethical considerations of this study.

The next chapter presents a review of teachers and mobile phones in the Indonesian context, and explores the prospect of mobile phones as a medium for training.

CHAPTER 4. TEACHERS AND MOBILE PHONES IN THE INDONESIAN CONTEXT

4.1 Overview

This research aimed to develop a framework for mobile-learning-based ICT training for teachers in Indonesia. This chapter describes teacher in Indonesia. It starts with a profile of teachers, and the qualifications and competencies required to teach in Indonesia. Then the chapter discusses ICT and teachers in Indonesia. The discussion is focused on the ICT competency of teachers, ICT training provided for teachers and the challenges for teachers when participating in ICT training programs. The chapter discusses the usage of mobile phones in learning, mobile phones in Indonesia, and finally presents the prospects for mobile phones being used as a medium for teacher training in Indonesia.

4.2 Teachers in Indonesia

The legislation of the National Education System Indonesia defines a teacher as a professional educator with the primary tasks of teaching, educating, guiding, training, directing, evaluating, and assessing students in early childhood education, basic education, secondary education, and formal education (Undang-undang No 20, 2003). According to the Central of Bureau Statistics Indonesia (2015), there were more than 3.5 million teachers in Indonesia in 2014 who were teaching in kindergarten, primary schools, and junior and senior secondary schools throughout Indonesia, including both public and private schools.

Teachers in public schools are civil servants, while teachers in private schools are usually employees of the school's foundation. Some civil servant teachers teach in both public schools and private schools. The comparison between civil servant teachers and non-civil servant teachers can be seen in Figure 4.1.

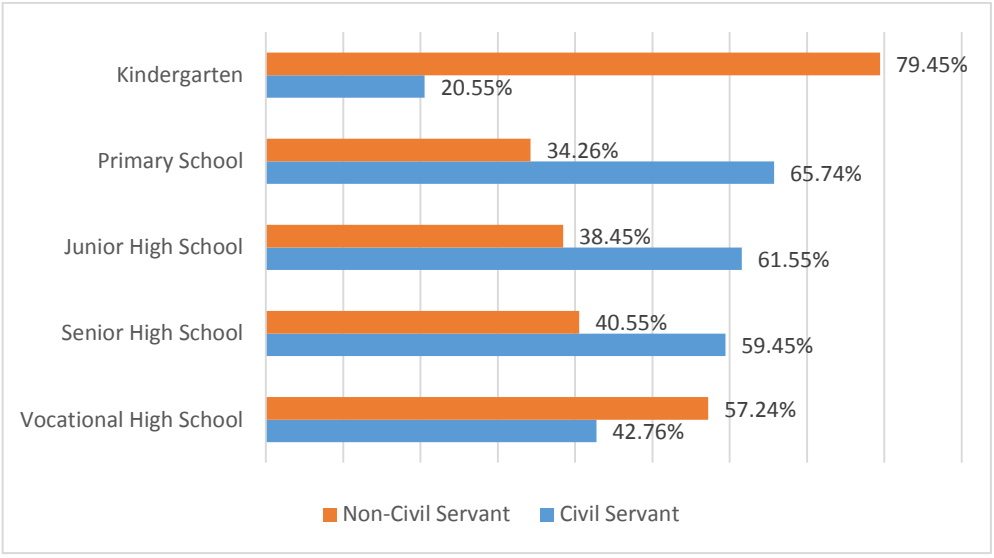

Figure 4.1. The comparison of civil servant and non-civil servant teachers (PGRI, 2011)

Teacher and lecturer legislation in Indonesia states that basic salary and family allowances of civil servant teachers are paid by the regional government of the area in which the school is located and are based on their grade or rank and working period. Teachers in private schools, however, are foundation officers and paid by their school foundation based on their agreement or contract (Undang-undang No 14, 2005).

As well as a basic salary and family allowances, according to Undang-undang No 14 (2005), all teachers in Indonesia are able to receive functional, professional, and special allowances from the government. A functional allowance is for teachers who are active, not on leave or not permitted to teach due to official or legal issues. Teachers who already have educator certificates receive a professional allowance, which is equal to their basic salary. A special allowance is for teachers who work in remote areas or on the border of Indonesia.

Teachers in Indonesia are required to have academic qualifications, competencies, the educator certificate, be healthy both physically and mentally, and have the ability to achieve national education goals, as stated in Undang-undang No 14 (2005). Minimum academic qualification is a degree from an education institution that must have been awarded to the teacher according to the type and level of school to where they are assigned. The minimum level of teacher academic qualification

is a bachelor degree or four-year diploma degree (Peraturan Menteri Pendidikan Nasional No 16, 2007).

Figure 4.2 illustrates Indonesian teachers' academic qualification based on their schools in 2010. It can be seen from Figure 4.2 that only 16.91% of kindergarten teachers and 26.92% of primary school teachers had a bachelor degree. In contrast, more than 75% teachers in secondary schools had a bachelor degree or higher (PGRI, 2011).

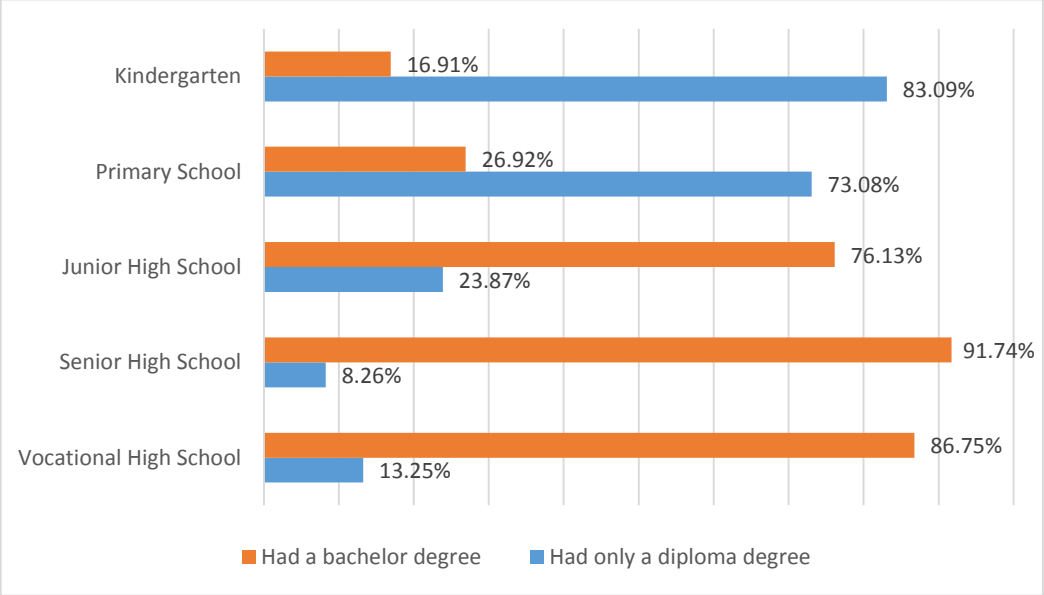

Figure 4.2. The academic qualification of teachers (PGRI, 2011)

The second requirement for teachers in Indonesia is having competencies. Competence is a set of knowledge, skills and behaviours that must be possessed, internalised and mastered by teachers in carrying out their professional duties (Peraturan Pemerintah No 74, 2008). Teachers in Indonesia need to have pedagogical competencies, personal competencies, social competencies and professional competencies, which can be acquired through professional education as mentioned in Undang-undang No 14 (2005).

Pedagogical competency is a teaching competency that requires teachers to be able to understand their students, design and implement learning methods, evaluate study results, and develop professionally (Jalal et al., 2009). Furthermore, teachers must have strength of personality as a mature and outstanding person who sets an

example to be followed by students – personal competency (Jalal et al., 2009). Professional competency requires that teachers comprehensively master the subjects to be taught to students, and use appropriate instructional methodologies and learning strategies (Jalal et al., 2009). Finally, social competency is the ability of the teacher to be part of a social group to communicate effectively and efficiently with students, fellow teachers, students' parents or guardians, and the nearby community (Jalal et al., 2009).

Addressing these competencies, the government presents National Education Standards that can be used by education stakeholders to examine teachers' development including graduate competency, learning content, learning process, equipment and infrastructure, education management, cost and finance, and educational assessment and evaluation (Sari, 2012).

Another requirement as stated in the Legislation is that teachers in Indonesia must have an educator certificate. The main motivation for this certification is to improve teacher quality and welfare. All teachers are required to be certified as an indication that they have achieved the benchmark level of training and practical skill to be effective in the classroom (Hapsariputri, 2010).

The educator certificate is awarded to teachers who meet the requirements and is awarded by the accredited university teacher-training institute appointed by the government (Jalal et al., 2009). Certificated teachers will be paid a professional allowance equal to their basic salary if they fulfil the minimum teaching hours requirement. The minimum teacher workload is 24 teaching hours per week and the maximum workload is 40 teaching hours per week; one teaching hour is equal to 45 minutes (Peraturan Pemerintah No 74, 2008). This means that teachers can work a minimum of 18 and a maximum 30 hours per week.

Civil servant personnel, including teachers, are obligated to work 37.5 hours per week, so teachers working minimum teaching hours use only around half of their working hours for teaching (Hapsariputri, 2010). Teachers, therefore, should have enough time to improve their knowledge or do other activities, such as being a student advisor or student patron. However, teachers mostly spend the time on

preparation and evaluation of their teaching activities (Hapsariputri, 2010). Every teacher has to prepare an annual and daily learning implementation plan before teaching in a class. After the end of teaching the class, they have to evaluate their teaching activities and summarise their teaching.

As a consequence of workload increases, teachers have to reform their self-study time. Teachers should have sufficient self-study time in order to improve their knowledge (Hapsariputri, 2010).

4.2.1 Teachers and ICT

Having ICT skills and knowledge is one of the required competencies for teachers in Indonesia. Based on the Regulation of Ministry of National Education (Peraturan Menteri Pendidikan Nasional No 16, 2007), teachers in Indonesia should have pedagogical, personal, social, and professional competencies. The regulation mandates that ICT is included in pedagogical and professional competencies. In pedagogical competence, teachers are required to use ICT for learning needs, while in professional competence teachers should use ICT for communication and self-development.

UNESCO (2011) has released an ICT competency framework for teachers. The framework has been adapted to form the ICT standards for teachers in many countries including Guyana, Tanzania, and South Korea (UNESCO, 2014). This framework emphasises that teachers should have ICT competencies in order to teach ICT to their students and to help them become creative learners, problem solvers and collaborators by using ICT in order to become members of the workforce and effective citizens. The framework is arranged in three successive stages of a teacher's development as shown in Figure 4.3.

The first stage is technology literacy. In this stage, a teacher is expected to assist their students to use ICT for learning more efficiently (UNESCO, 2011). For this stage, a teacher should be able to use IT devices. In the second stage, knowledge deepening, a teacher should be able to facilitate their students to comprehend their school subjects and enable them to apply the knowledge to real-world problems (UNESCO, 2011). In the third stage, knowledge creation, the teacher is expected to

be able to empower their students, who will become citizens and join the workforce, to establish the new knowledge requisite for a better and successful society (UNESCO, 2011).

	TECHNOLOGY LITERACY	KNOWLEDGE DEEPENING	KNOWLEDGE CREATION
UNDERSTANDING ICT IN EDUCATION	Policy awareness	Policy understanding	Policy innovation
CURRICULUM AND ASSESSMENT	Basic knowledge	Knowledge application	Knowledge society skills
PEDAGOGY	Integrate technology	Complex problem solving	Self-management
ICT	Basic tools	Complex tools	Pervasive tools
ORGANISATION AND ADMINISTRATION	Standard classroom	Collaborative groups	Learning organisations
TEACHER PROFESSIONAL LEARNING	Digital literacy	Manage and guide	Teacher as model learner

Figure 4.3. The UNESCO ICT competency framework for teachers (UNESCO, 2011)

In 2012, the Centre for Information and Communication Technology for Education of the MoEC developed an ICT competency framework based on the Regulation of the Ministry of National Education No. 16 2007 on qualifications and competencies standards for teachers and adapted the UNESCO's ICT competency framework for teachers (Kemendikbud RI, 2012; Pustekkom Kemendiknas, 2012).

The ICT competency framework for teachers in Indonesia focuses on six domains of competency with four stages for mastering the competencies (Pustekkom Kemendiknas, 2012). The six domains of competency are similar to the UNESCO framework; policy, curriculum and assessment, pedagogy, ICT, organisation and administration, and teacher professional development.

The framework contains the three stages for mastering the competencies within the framework of UNESCO – technology literacy, knowledge deepening, and knowledge creation – with the addition of a new stage, knowledge dissemination (Pustekkom Kemendiknas, 2012). The stages are tiered from simple to complex and productive competencies to help teachers master ICT competence gradually.

Therefore, teachers must be capable of using ICT in order to meet the competencies required. Besides that, ICT can support teachers in their teaching activities in areas such as planning, presentation of learning, evaluation and analysis of the results of evaluation as well as their learning activities, such as research and self-development.

Implementation of the new national curriculum – *Kurikulum 13* – in 2013 increased the urgency for ICT skill improvement of teachers. In this curriculum, ICT became a medium of teaching and learning for all subjects in high schools. Therefore, teachers should have appropriate ICT skills to apply in their teaching and learning activities. The low ICT skill level of teachers is one of the obstacles for *Kurikulum 13* implementation (Alawiyah, 2014).

A survey by the Ministry of Information and Communication (MoIC) showed low use of ICT in education. This survey reported that the percentage of teachers applying ICT in their teaching and learning activities was only 0.39% (Tim TIK Indonesia, 2011). One of the reasons why the use of ICT in schools is still far from satisfactory is teachers' resistance to using ICT in the classroom (Harendita, 2013; Surjono & Gafur, 2010). Their hesitation to apply ICT in their teaching and learning activities is mainly because they lack ICT literacy and have limited ability to develop ICT-based learning materials (Clarke Sr & Zagarell, 2012).

The results of the National Examination of Teachers' Competency, which is conducted online annually, showed the low level of ICT skill level of teachers in Indonesia. Based on data from the Human Resource Development Agency of Education and Culture for the examination in 2012 the national average score was only 47.84 whereas the passing grade is 70 (BPSDMPK, 2012). The examination in 2015 did not rise by much with a national average of 48.94 (Maulipaksi, 2016).

Teachers who could not reach the passing grade were not teachers with a lack of knowledge or experience in teaching. They failed simply because they did not have appropriate basic ICT skills. They did not know how to use a mouse and keyboard, how to open the examination's application, or how to answer the online

examination (Fajar, 2012). The online examination is a burden for teachers with a lack of ICT skills (Hasrul, 2015).

4.2.2 ICT training for teachers in Indonesia

To enhance the skills and knowledge of teachers, the MoEC continually implements various activities through the Centre for Development and Empowerment of Educators and Education Personnel (Sari, 2012). The centre periodically provides in-service courses and lectures for teachers, including various training in ICT. The Agency of Education Quality Assurance at the provincial level, in addition to its role in quality assurance, also provides some courses and lectures to assist local teachers in the form of working group training (Sari, 2012).

The MoEC also cooperates with other institutions in providing ICT training for teachers. Working together with PT Telkom Indonesia, an ICT training program for teachers called the IndiLearning program was launched to support teachers to implement the *Kurrikulum 13* (Telkom, 2014). In addition, the MoEC collaborated with Intel Indonesia (BPSDMPK, 2012) and Microsoft (Quah, 2007) in providing ICT training for teachers.

Higher education institutions, through their community service program, provide various ICT training programs for teachers. The training is usually conducted using small groups of teachers and located at the host university or in participants' schools (Arief & Erlina, 2012; Henuhili, Aminatun, & Setianingsih, 2009; Yusri & Goodwin, 2013).

Communities related to the national ICT development, such as ICT-Watch and *Relawan TIK* (ICT Volunteers) also provide a range of ICT training activities for teachers. ICT-Watch conducted ICT training for teachers as a part of its *Internet Sehat* (Healthy Internet) program in 2009 (ICTWatch, 2009). *Relawan TIK*, since 2011, has conducted various ICT training programs for teachers in many places in Indonesia. The training programs were mostly one-day training with topics on word processing and presentation preparation, blogging, internet, and e-learning (Relawan TIK, 2011).

Despite various ICT training programs being provided for teachers by the government and other stakeholders, teachers still face challenges when participating in the training programs. Current problems for teachers include geographical challenges, limited opportunity, and financial and time constraints (Sari, 2012; Yusri & Goodwin, 2013).

Generally, the location and schedule for training programs provided by the MoEC and the stakeholders were determined by the centre or the training committee. The training was usually carried out in the capital city of the country/province or in major cities (Yusri & Goodwin, 2013). They found conducting ICT training more challenging than other types of training because it requires a large space to accommodate all the equipment for the training sessions.

Attending training sessions was challenging for teachers, particularly those who worked in rural and remote areas. Sari (2012) illustrates the problem of teachers in rural areas attending training in terms of time, cost and human resources. In order to attend training, teachers were required to travel to the training location, which took time and needed a budget, and they had to take leave from school. Additionally, taking leave means teachers need to find a substitute teacher for their class

The opportunity for teachers to participate in a training program is limited. Indonesia has over 3.5 million teachers in more than 330,000 schools (Central of Bureau Statistics Indonesia, 2015). Teacher professional development training usually requires schools to send only one or two representatives to the activities (Yusri & Goodwin, 2013). This results in the number of teachers needing training being greater than the number of opportunities to attend training.

To overcome the problems, the MoEC and stakeholders also provided an in-school ICT training program for teachers. Teachers did not have to travel and take leave for training since this training was conducted in their school (Yusri & Goodwin, 2013). The training provider sent a group of tutors, which consisted of two or three people to the school to train the teachers about ICT, commonly over five to seven days. This enabled more teachers in the school to participate in the training. In order

to overcome the problem of limited seats for the training due to insufficient equipment being available in the school, the training was arranged with one computer for two or three teachers.

However, this type of training is not suitable during school days because a number of teachers would be absent from work. Clearly, this would affect the teaching and learning activities in the school. The timing of training is problematic as it is difficult to arrange a time for training that suits both teachers and the tutors (Yusri & Goodwin, 2013).

4.3 Mobile phones in Indonesia

Indonesia is a fast growing market in South-east Asia with around 308.2 million mobile subscriptions (Kemp, 2015). This number was reached because Indonesians tend to have two or three active subscriber identity module (SIM) cards and often own two or three phones. The ownership of multiple SIMs is a unique characteristic of Indonesia's mobile users (Redwing, 2011).

Finding the best quality signal and the cheapest prices to manage their phone usage are the reasons for having multiple SIMs (Redwing, 2013b). Different operators have different coverage areas and they offer different promotion packages. Furthermore, most people use their basic phones for voice call or SMS, while they use their smartphone for data/internet services (Widhyatmoko, 2011). So the number of unique users in Indonesia is actually around 165 million, which means on average each user holds 1.7 active SIM cards (Redwing, 2011).

Redwing (2011) categorises mobile phones available in the Indonesian market into three groups; basic phones, feature phones, and smartphones. A basic phone has a limited proprietary operating system, partial browsing and streaming capability, low-resolution graphics, small screen (50mm), and a price of around USD20 to 150.

Mobile phone manufacturers conceal the difference between basic phones and smartphones by proposing a range of 'challenger' smartphones or feature phones that provide a web browser, social, gaming and messaging applications; App store;

mid-range screen with capacitive touch (90mm); and a price of around USD50 to 200 (Redwing, 2011).

Smartphones are high speed, have rich media capability, high resolution graphics, multi-network connectivity, enterprise application integration, large screen with capacitive touch (120mm) and a price of around USD200 to 500 (Redwing, 2011).

Yusuf (2016) and Putra (2018) state that feature phones still dominate the installed base of mobile phones in Indonesia, despite the rapid growth of smartphones as depicted in Figure 4.4. People tend to choose feature phones, which provide similar features to smartphones but at a cheaper price. In addition, most smartphone users in Indonesia do not optimise the capabilities of their devices (Widhyatmoko, 2011). They mainly use basic voice and messaging services such as SMS and instant messaging. The internet service of their phone is just used to access social media such as Facebook and Twitter.

The consensus forecast was that by 2015 smartphones would represent around 40% of all handsets and would outnumber feature phones by 2017 (Redwing, 2014). By 2013, the price of the cheapest Android smartphone in the market has already fallen to a price easily affordable for Indonesians from the middle to low social classes (Redwing, 2013b).

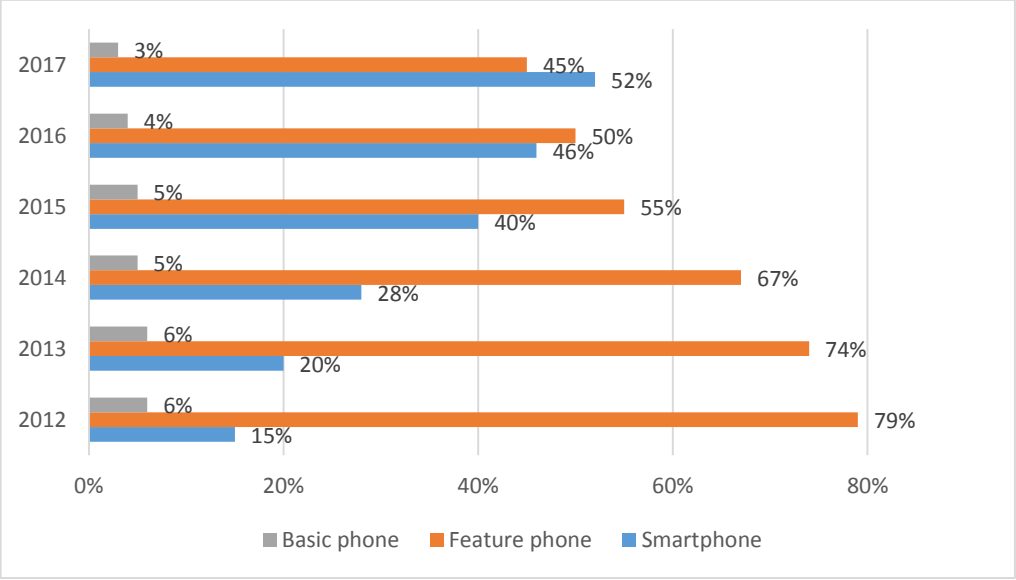

Figure 4.4. The percentage of installed base of mobile phones by type in Indonesia (Redwing, 2013a)

The top five handset manufacturers by shipments are Nokia, Cross, Samsung, Mito and Blackberry (Redwing, 2013b). PT. Samsung Electronics Indonesia continued its leadership of Indonesian mobile phones during 2013, with a 21% retail volume share. The company offers both feature phones and smartphones.

However, for features phones, Nokia (of Nokia Indonesia PT) remained as the leading brand (Euromonitor, 2014). Cross and Mito are local companies that sell mobile phone devices produced by Chinese Original Equipment Manufacturers. These companies have proven their strength in the feature phone market and now are doing expansions into value-priced smartphones market (Redwing, 2013b).

Currently, there are five mobile operators in Indonesia as listed in Table 4.1. These operators provides post-paid and pre-paid products for their customers. All operators, except PT. Smartfren Telecom, provide 2G, 3G and 4G services for their users.

Table 4.1. Cellular operators in Indonesia

Operator	Product	Technology
PT. Telkomsel (Telkomsel, 2014)	Kartu Halo (post-paid) Simpati (pre-paid) Kartu AS (pre-paid)	GSM-900/1800 MHz (GPRS, EDGE) 2100 MHz UMTS, HSPA+ 900/1800 MHz LTE
PT. XL Axiata (XL Axiata, 2014)	XL (Pre-paid and post-paid)	GSM-900/1800 MHz (GPRS, EDGE) 2100 MHz UMTS, HSPA+ 900/1800 MHz LTE
PT. Indosat (Indosat, 2014)	Matrix (post-paid) Mentari (pre-paid) IM3 (pre-paid)	GSM-900/1800 MHz (GPRS, EDGE) 2100 MHz UMTS, DC-HSPA+ 900/1800 MHz LTE
PT. Hutchinson 3 Indonesia (Tri.co.id, 2015)	3 (Pre-paid and post-paid)	GSM-900/1800 MHz (GPRS, EDGE) 2100 MHz UMTS, DC-HSPA+ 900/1800 MHz LTE
PT. Smartfren Telecom (Smartfren, 2014)	Smartfren (Pre-paid and post-paid)	850 MHz LTE 2300 MHz TD-LTE

All CDMA operators in Indonesia withdrew their services in 2014 due to the decreasing number of code-division multiple access (CDMA) subscribers, competition with 3G services, and frequency problems (Burhanuddin, 2014). Even though the CDMA operators had low-quality signals and limited coverage areas, their low-tariff had attracted many customers. However, the 3G tariff then became as cheap as the CDMA tariff with better signal and wider coverage areas (Lukman, 2013). The frequency problem resulted from the implementation of the MoIC Regulation No. 30 of 2014 about the structuring of the 800 MHz radio frequency band for the mobile cellular network (Hasniawati, 2014).

4.4 Mobile phone usage for learning

Mobile phones are the most widely used device for mobile learning (Wu, Hwang, Su, & Huang, 2012). Mobile phones are ready at hand, easy to handle and used frequently in everyday activities, enabling users to really get to know their own devices. Mobile phones are considerably cheaper and widely available compared to other wireless communication devices (Traxler & Kukulska-Julme, 2005).

According to Northwestern University Information Technology (NUIT) (2011), while mobile phones have a number of features in common, there are differences in the form of additional functions or quality of the features provided by the manufacturers. NUIT (2011) lists the general features available in a mobile phone including digital camera, Bluetooth, text messaging, multimedia, recorder, internet, and application such as radio and games.

The features can be used for a variety of learning activities in mobile learning (Schofield et al., 2011). Figure 4.5 illustrates how a mobile phone is used for learning, for example, through recording information. Mobile phones provide some features that enable input of information; a camera, a voice recorder, and a video recorder. Using these features enables learners to develop a series of observations, reflections of progress, personal notes, and collection of evidence (Schofield et al., 2011).

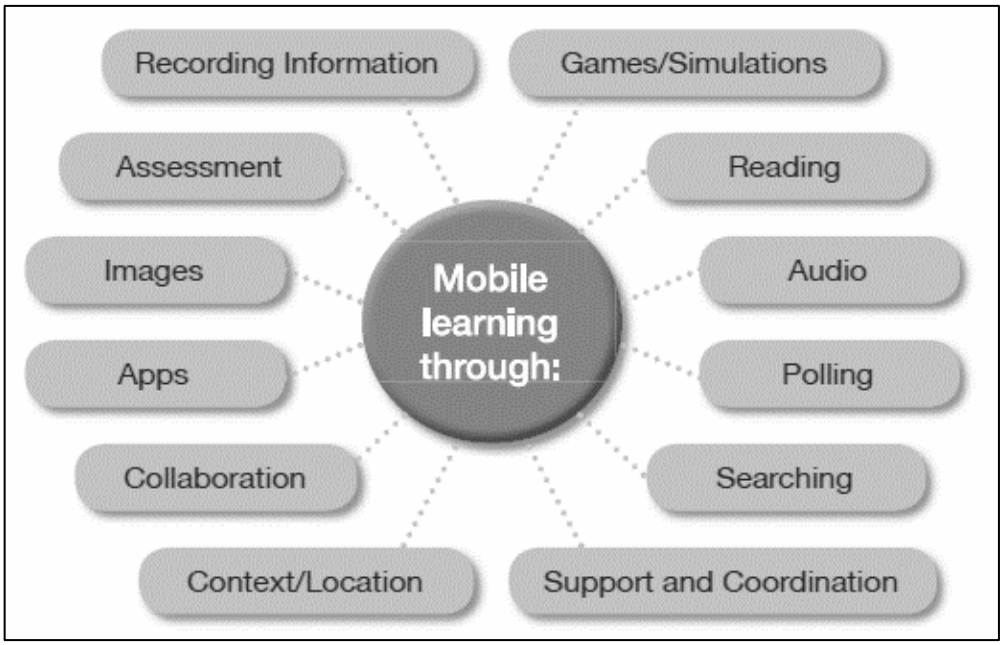

Figure 4.5. How a mobile phone is used for learning (Schofield et al., 2011)

The results of many of the mobile learning projects suggest that mobile phones are best suited to support language learning (Cavus & Ibrahim, 2009; Moura & Carvalho, 2010). Mobile phones can also be applied to support field trip learning programs, such as museum visits (Sharples, Lonsdale, Meek, Rudman, & Vavoula, 2007) and the geo-historian project (Van T Hooft & McNeal, 2010).

A microprocessor course has been redesigned using a low-cost Global System for Mobile communication (GSM) mobile phone to allow bi-directional interaction between the system, the students, and the lecturer (Martinez-Torres, Toral, Barrero, & Gallardo, 2007) The results obtained in this study demonstrate the important role of mobile phones in supporting interactivity and motivating features in a laboratory course.

Mobile phones have also been used in some mobile learning projects for teachers. Teacher training projects for teachers in rural areas used 3G mobile phones as a medium of training (Junqi et al., 2010; Zhang & Li, 2011). Large-scale teacher professional development using mobile phones was conducted in Bangladesh (Walsh et al., 2012), showing that cheap mobile phones provided opportunities for delivery and improving teachers' skill.

4.5 The potential of mobile phones as medium of training in Indonesia

Mobile phones have a greater potential to be used as a medium of training compared to other handheld devices (Jacob & Issac, 2008). This section presents the prospect of mobile phones as a tool for mobile learning for teacher training in Indonesia.

4.5.1 The extensive use of mobile phones

In Indonesia, around 98% of households have access to ICT (Tim Litbang Kominfo, 2013). Access to ICT is identified by the ownership of devices that people use to access information and communication such as radios, televisions, landline phones, computers, mobile phones, and the internet (Central of Bureau Statistics Indonesia, 2015).

Table 4.2 shows household access to ICT in 2014 in percentages. Television was the most widely owned ICT device in Indonesia with around 87.2% of households, followed by mobile phones at 83.2% then computers, internet, and landline phones with 25.2%, 22.2%, and 5.8% respectively (Tim Indikator TIK, 2014).

Table 4.2. The comparison of access to ICT in the main islands in Indonesia (Tim Indikator TIK, 2014)

Island	Television (%)	Mobile phone (%)	Landline phone (%)	Computer (%)	Internet (%)
Sulawesi	84.2	81.7	3.3	20.7	17.1
Bali and Nusa Tenggara	81.7	75.6	8.1	24.0	16.2
Sumatera	90.3	89.3	5.8	25.4	26.2
Jawa	94.6	88.6	8.4	30.4	28.3
Kalimantan	89.0	79.2	5.0	28.6	16.2
Maluku and Papua	66.3	65.2	2.2	16.07	14.1
National	**87.2**	**83.2**	**5.8**	**25.2**	**22.2**

According to the International Telecommunication Union (ITU), voice services and SMS have become the most pervasive ICT services, going beyond past ICTs such as television and radio broadcasting in the world (ITU, 2014). Moreover, mobile phones have replaced fixed phones as the main communication service in the world (Nakamura et al., 2011). This was due to services offered by the mobile phone not

being limited only to voice service but the ability to provide text and data (Watanabe, 2009). The low cost of adding new subscribers to the cellular network and mobility are also advantages (Bhavnani, Chiu, Janakiram, Silarszky, & Bhatia, 2008).

The majority of internet users in Indonesia access the internet through their mobile phones (Kemp, 2015). Using the internet via mobile phones is considered more economical than via a computer because having a package including voice, SMS and internet data is preferable to having a contract for the internet only.

The price of a mobile phone is a determining factor in the rapid adoption of mobile phones in developing countries (Onyango, Ongus, Awuor, & Nyamboga, 2014). Mobile phones are cheaper than other handheld devices. From 2000 to 2010, mobile phone prices in developing countries decreased by 22% (ITU, 2011).

As the prices of handsets continues to fall, the mobile phone has been transformed from a status symbol to a necessity for people at nearly all income levels (Arief, 2011). Additionally, mobile operators continue to innovate their marketing strategies to reach more subscribers (Aker & Mbiti, 2010).

By the end of 2017, there were twice as many mobile-broadband subscriptions per 100 inhabitants in developed countries as in developing countries, and four times as many in developing countries (ITU, 2017a). In Indonesia, mobile phone penetration increased at an exponential rate over the period from 2000 to 2016, from 1.76 to 147.66 cellular phone subscriptions per 100 inhabitants (ITU, 2017b).

Of the 308.2 million mobile subscriptions in Indonesia (Kemp, 2015), 45.62% were connected to Telkomsel (Telkomsel, 2014) and 20.15% were Indosat customers (Indosat, 2014). XL Axiata hold 19.35% of total subscriptions (XL Axiata, 2014) and Smartfren shared 3.86% of the subscriptions (Smartfren, 2014). The proportion of mobile subscription based on mobile service providers is summarised in Figure 4.6.

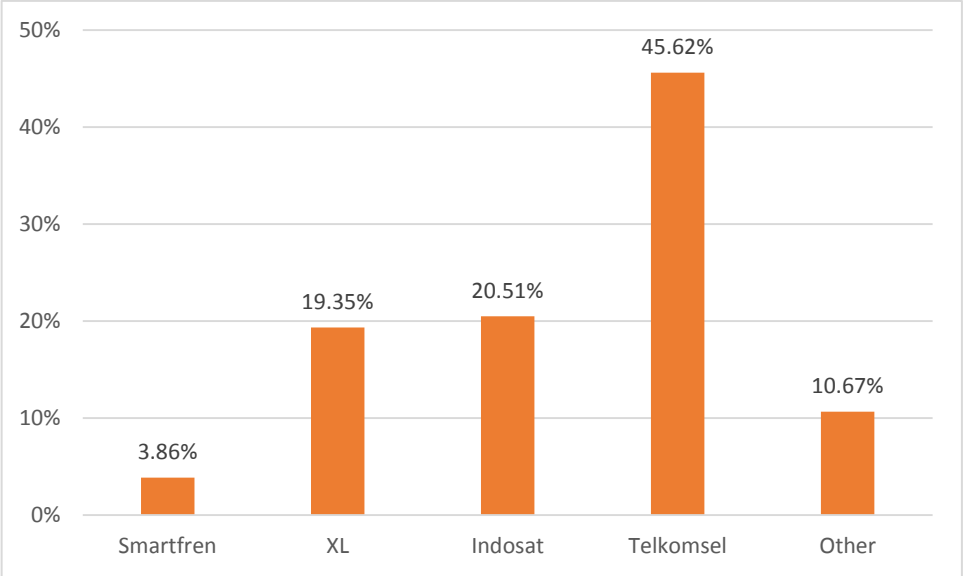

Figure 4.6. Percentages of mobile subscriptions based on mobile service providers

4.5.2 Low-cost services

The price of mobile-cellular services are considered cheap, and have contributed to the widespread adoption of voice services and SMS (ITU, 2014). By the end of 2013, a low-usage pre-paid mobile-cellular service cost on average 1.6% of Gross National Index (GNI) per capita (p.c.) in developed countries, as against 6.2% in developing countries (ITU, 2014) Table 4.3 provides a comparison of mobile-cellular services cost in Indonesia and its neighbouring countries. The price of mobile-cellular services in Indonesia was USD 6.86 (ITU, 2014). Compared to its neighbours, the price in Indonesia is considered low.

Table 4.3. Mobile-cellular services price in Indonesia and its neighbouring countries (ITU, 2014)

Country	Mobile-cellular	
	as % of GNI p.c.	USD
Singapore	0.19	8.74
Brunei Darussalam	0.71	19.65
Malaysia	0.83	7.16
Thailand	1.20	5.36
Indonesia	**2.30**	**6.86**
Philippines	3.72	10.15
Lao P.D.R	5.86	7.13
Cambodia	7.92	6.27

Table 4.3 shows that Indonesian mobile-cellular services cost around 2.30% of its GNI p.c. The price is considered affordable for Indonesians because the percentage of the price cost GNI p.c. is less than the average mobile-cellular service cost in developing countries. In addition, the affordability target set by the Broadband Commission for Digital Development for broadband prices was less than 5 % of GNI p.c. by 2015 (ITU, 2014), and Indonesia has fulfilled the target with only 2.30%.

Moreover, approximately 99% of mobile subscribers in Indonesia use pre-paid cards (Kemp, 2015). The domination of pre-paid cards has led to the beginning of large nationwide distribution channels to sell credit for calling, SMS and internet data (Redwing, 2014). It is easy to recharge phone credit in Indonesia. Pre-paid card users recharge their phone credit at phone kiosks, ATMs, retail stores, or via internet banking with a nominal charge of IDR5,000 to 100,000 (around AUD0.50 to 10). In addition, pre-paid users are able to request or share phone credit with their friends as long as they subscribe to the same operator.

Mobile-cellular service prices in Indonesia vary based on communication time and whether the communication occur between the same or different operators. Using a mobile phone in office hours requires more phone credit than when using it during out-of-office hours. Mobile service providers charge their subscribers a higher tariff to call or send an SMS to a number from other operators.

Furthermore, mobile service providers offer many promotion packages including free minutes, free messages and/or free data-bytes as a bonus for starter packs, recharging, and usage. They also present special rates for certain time periods, such as on the day of celebration of Indonesia Independence Day, Eid Ul-Fitr (festival marking the end of Ramadan), Christmas, and New Year. The packages are a significant factor that influence most people in Indonesia when they are deciding to subscribe to mobile operators (Yunarwanto, Yuniarinto, & Mustajab, 2012).

4.5.3 Wide coverage area of the mobile network

Mobile phones can be used in most places due to the wide coverage area of the mobile network. In 2010, around 90% of the world population had available access to mobile networks, with 80% in rural areas (ITU, 2011), and 95% of the world population was covered by a 2G mobile-cellular network (ITU, 2015).

In order to illustrate the coverage area of cellular operators in Indonesia, the number of base transceiver stations (BTS) owned by operators in 2014 is depicted in Figure 4.7. The number of stations can determine the extent of network coverage. One BTS can usually serve several mobile stations at a distance radius of about five km (Nugroho, 2010).

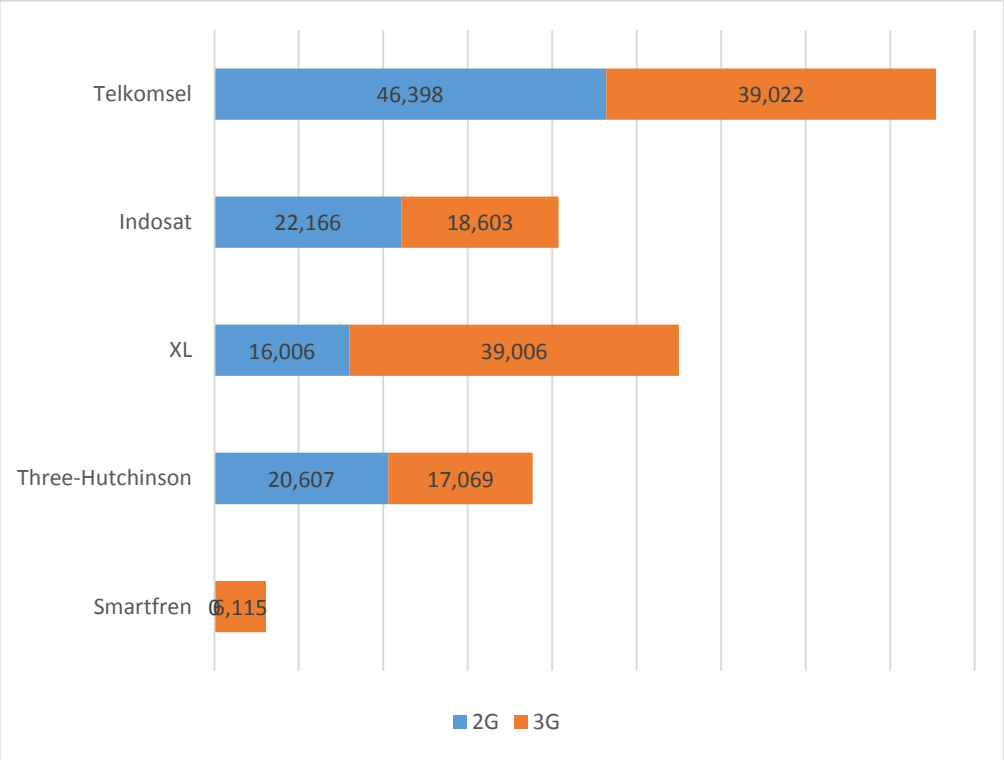

Figure 4.7. The number of base transceiver stations owned by cellular operators in Indonesia

By the middle of 2013, the Telkomsel network was already available in all provinces in Indonesia followed by XL that served 30 provinces; Indosat and three-Hutchinson reached customers in 22 and 21 provinces respectively, and Smartfren was accessible in 13 provinces (Kominfo, 2013).

4.6 Summary and conclusions

This chapter discussed teachers in the context of Indonesia, focusing on the regulations that apply and their ICT skills and training. Furthermore, the chapter revealed the usage of mobile phones in learning, and mobile phones in general in Indonesia. Last, the potential of mobile phones as a medium for training in Indonesia was presented.

Using mobile technologies in learning environments that offer mobility in terms of time and place, and wide communication and interaction, can be a solution for teacher-training problems in Indonesia where challenges include time, location, cost, and limited seat availability.

In Indonesia, mobile phones have more potential to be used as the main tool in mobile learning than other mobile devices. The first reason is that almost all Indonesians have access to mobile phones. Second, the price of mobile phones and services are considered affordable for Indonesians. Last, a mobile phone is the only mobile device that can be used everywhere in Indonesia, including in rural and borderline areas.

The next chapter reports on a survey conducted to investigate the readiness of teachers in Indonesia for mobile learning for training.

CHAPTER 5. TEACHERS' READINESS FOR MOBILE LEARNING - A SURVEY

5.1 Overview

Before developing a mobile learning system, it is important to assess the readiness of learners as mobile learning users (Corbeil & Valdes-Corbeil, 2007). Readiness may be affected by external variables such as personal demographic situation, social atmosphere, or organisational context (Park et al., 2012). Investigating the readiness of teachers for mobile learning was therefore necessary for development and implementation of the mobile learning system.

In this stage of the study, a survey was conducted to investigate the readiness of teachers for mobile learning using a mobile phone. The objectives of this survey were to establish the possibility of using mobile phones for ICT training by exploring the basic and skill readiness, and to view their perception about mobile learning by questioning their psychological and cost readiness. Additionally, the survey assessed teachers' experience in using ICT in their activities and participating in ICT training to ascertain what teachers need.

This chapter reports on the first survey conducted as part of this study. It presents the methodology and the results, and discusses the findings.

5.2 Survey method

The survey was delivered in the first week of July 2013, to the principals of general and vocational high schools in South Sulawesi Province, Indonesia. The survey package included:

- A letter to the principal, including information about the purpose of the study, confidentiality protection and a request to forward the questionnaire to teachers.
- Packages for teachers, containing a letter of introduction, an information sheet about the purpose of the study, confidentiality protection and instructions for completing the questionnaire indicating consent, and the questionnaire.

The package for teachers was handed out to teachers in their school and they were asked to complete the questionnaire. The questionnaire (see Appendix 1) asked participants about their demographic details, their mobile phone and features they used regularly, how they used ICT in their teaching and learning activities, their ICT training experience, and their perception about mobile learning using mobile phones. Teachers required around 15 to 20 minutes to complete the 58 questions in the questionnaire.

The survey was carried out over two months over July and August 2013. The questionnaire was distributed to 350 participants in 25 schools, and 317 responses were received. The response rate of the survey was 90.57%. Nine incomplete questionnaires were discarded. Data were reported from 308 completed questionnaires.

SPSS 20.0 was used to code and analyse the data. Microsoft Excel 2013 was employed to produce tables and graphs for the descriptive analysis of the teachers' responses. Then, the *t*-test and ANOVA were performed to compare the perceptions about mobile learning between teachers based on their demographic profiles. The details of the survey method was presented in Chapter 3 Section 3.3.2.

5.3 Survey results

This section presents the results of the survey. The teachers' responses to the questions are not presented in the same order that the questions were asked. The responses are presented based on the topics covered in the questionnaire; the demographic profile, the readiness of teachers for mobile learning, and the ICT activities and training experience of teachers.

5.3.1 The demographic profiles of participants

This section provides information based on gender, age, academic qualification, types of school, years of service as teachers, teaching subjects, and side-task at school. Figure 5.1 provides information on gender and age of participants.

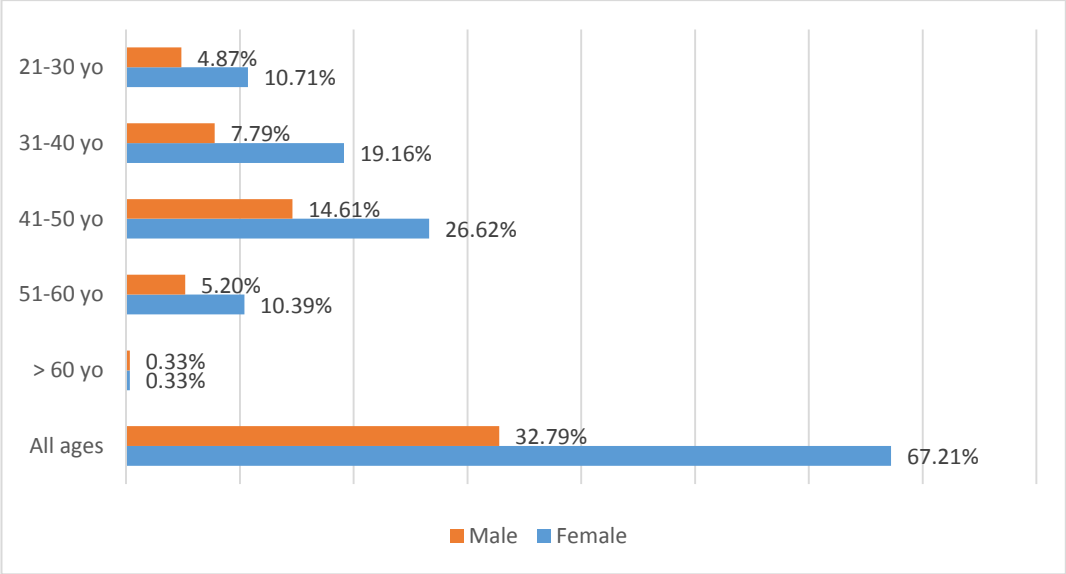

Figure 5.1. Participants based on gender and age

Figure 5.1 shows that there were more female than male teachers in this survey (67.21% compared to 32.79%). The largest age cohort was 41-50 years-old, around 41.23% of the total participants. According to the Indonesia Teachers Association, Indonesia has more female teachers than male teachers, and up to 40% of teachers are 41-50 years-old (PGRI, 2011). Thus, this is a representative group.

Table 5.1. Participants based on academic qualification and types of schools

Type of school	**Academic qualification (%)**				
	Diploma	**Bachelor**	**Master**	**Doctoral**	**Total**
Junior high school	4.87	45.13	6.82	0.00	**56.82**
Senior high school	2.27	14.94	9.74	0.97	**27.92**
Vocational high school	0.65	12.66	1.95	0.00	**15.26**
Total (%)	**7.79**	**72.73**	**18.51**	**0.97**	**100.00**

Table 5.1 presents the profile of participants based on their academic qualification and the type of school in which they were working. In terms of academic qualification, the highest level achieved by the majority of the participants was a bachelor degree (72.73%). The majority (45.13%) of respondents who had a bachelor degree were teaching in junior high school, while 14.94% and 12.66% respectively were teaching in senior and vocational high schools. The group of participants with a master degree (18.51%) consisted of 6.82% junior high school

teachers, 9.74% senior high school teachers, and 1.95% vocational high school teachers.

Most of the participants with a diploma degree were teaching in junior high schools (4.87%), while 2.27% and 0.65 % respectively worked in senior and vocational high schools. Participants with a doctoral degree were only found in the senior high school group (0.97%).

Table 5.2 shows the percentage of participants based on their teaching subject and their years of services as teachers. Overall, there were two distinct groups of respondents according to their years of service as teachers – seven years or less (27.27%) and between 15 and 21 years (25.33%).

Based on their teaching subject, participants were divided into seven groups; mathematics (14.94%), English (10.07%), science (15.91%), social sciences (17.86), Bahasa (10.39%), ICT (6.17%) and other (24.67). The 'other' subjects included religion, local languages, citizenship, arts, physical education, and specialisation subjects.

Table 5.2. Participants based on teaching subject and years of teaching experience

Teaching subject	**Teaching experience (%)**						**Total**
	< = 7 years	**8 - 14 years**	**15 - 21 years**	**22 - 28 years**	**29 - 35 years**	**> 35 years**	
Mathematics	2.92	2.27	5.20	1.62	2.60	0.33	**14.94**
English	3.90	2.27	2.27	0.97	0.65	0.00	**10.07**
Science	4.55	3.57	4.87	1.62	0.65	0.65	**15.91**
Social science	3.25	3.90	3.25	6.17	1.30	0.00	**17.86**
Bahasa	3.25	1.30	2.92	1.95	0.97	0.00	**10.39**
ICT	2.27	1.30	1.30	1.30	0	0.00	**6.17**
Other subjects	7.14	4.55	5.52	5.52	1.62	0.33	**24.67**
Total	**27.27**	**19.16**	**25.33**	**19.16**	**7.79**	**1.30**	**100.00**

Some participants not only taught but were also involved in school administration and student activities. Around 43.18% of participants had side-task as student patron, student advisor, and laboratory staff.

Participants who were also school principal, vice principal, on the teachers' association committee or school curriculum task force, subject coordinator, or head of study program of their school were categorised in the 'other' side-task group (9.74%). A total 47.08% of participants did not have side-task in their school.

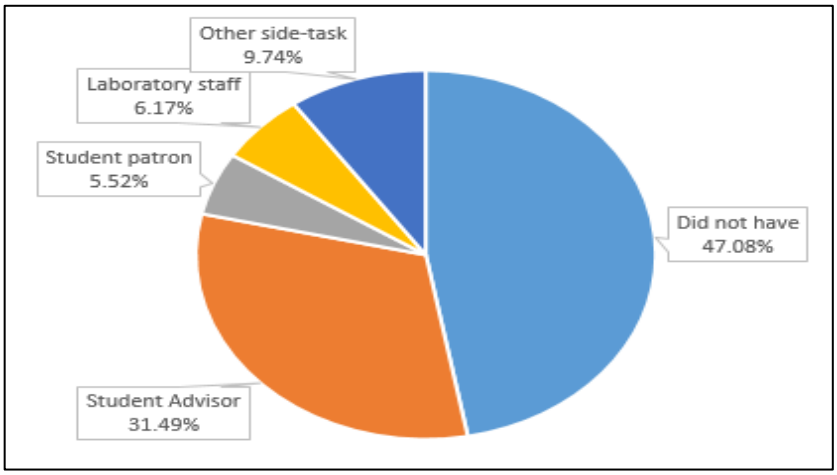

Figure 5.2. Participants based on their side-task in their schools

The demographic data indicate that the largest group of participants in the survey were female, 41-50 years-old, and had at least a bachelor degree. These profiles were similar to the demographic profiles of teachers in Indonesia (PGRI, 2011). Participants' years of service as teachers and teaching subjects were varied. More than half of the participants had side-task in their schools.

5.3.2 The readiness of teachers for using a mobile phone for mobile learning

Mobile learning readiness can be viewed in four areas; basic, skills, psychological, and cost readiness (Hussin et al., 2012). This study attempted to investigate the readiness of teachers for using a mobile phone in these areas.

5.3.2.1 Basic readiness for mobile learning

The survey studied respondents' basic readiness to engage in mobile learning using mobile phones by looking at the mobile phones they had. This section deals with mobile phone variables such as brand, screen size, keyboard, and features. This section also investigates teachers' recognition of their mobile phone features.

All participants in this study had mobile phone devices. Table 5.3 provides information about how long they had owned their mobile phones. Approximately 63.3% of participants respectively had been using their mobile phone for up to three years. Around 19.2% and 17.5% of participants have had their devices for four–six years and more than seven years. Unfortunately, the survey did not ask whether participants had used the same mobile phones for the same period.

Table 5.3. Length of tome of mobile phone ownership

Years	Percentage (%)
<=1	27.3
2	19.8
3	16.2
4–6	19.2
>=7	17.5

When asked about the brand of their current mobile phones, three participants did not know. The responses of 305 participants revealed Nokia as the most popular brand (54.22%). The second was Samsung (14.29%), followed by Blackberry (13.96%) and Nexian (6.82%), as illustrated in Figure 5.3.

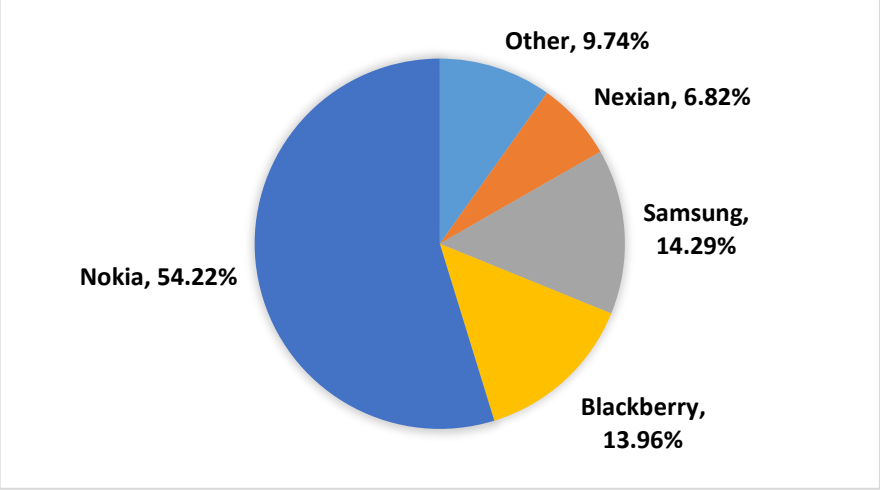

Figure 5.3. The percentage of brands of mobile phone (N = 305)

In terms of screen size, participants' mobile phones were categorised into three groups; small screen (25–60 mm), medium screen (61–89 mm), and large screen (>89 mm).

For the type of keyboard, participants' mobile phones were divided into three categories; standard, QWERTY, and virtual keyboard. A standard phone keyboard consists of the numbers from 0 to 9 and includes the signs '*' and '#'. It is based on the standard ITU E.161, which is also known as ANSI T1.703-1995/1999, and ISO/IEC 9995-8:1994 (Wigdor & Balakrishnan, 2004).

Some mobile phones have QWERTY keyboards. QWERTY is a standard layout for letter keys on text keyboards. It is named from the first six letters on the top row of a standard English keyboard (Clarkson, Clawson, Lyons, & Starner, 2005). Even though this type of keyboard makes typing much easier and faster the keys are small and too close to each other (Clarkson et al., 2005).

Another type of mobile phone keyboard is a virtual keyboard, used on-screen without a physical keyboard (Hanlon, 2004). All basic mobile phones have a standard keyboard. Feature mobile phones and smartphones could have a standard, QWERTY keyboard or virtual keyboard, depending on the brand and the model.

As depicted in Figure 5.4, approximately 35.06% of participants had mobile phones with small screens and standard keyboards, while 10.39% and 3.25% of participants' mobile phones respectively had this screen with QWERTY and virtual keyboard.

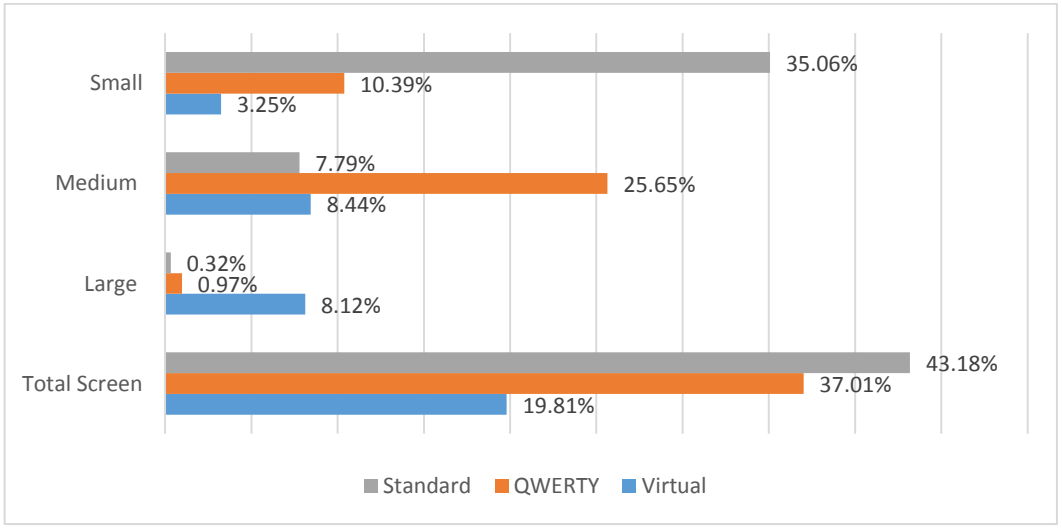

Figure 5.4. The percentage of participants' mobile phones based on screen size and keyboard type

The percentage of participants' mobile phones that had medium size screens with a standard keyboards was 7.79%, a QWERTY keyboard was 25.65%, and a virtual keyboard 8.44%. Only 0.32% of teachers had mobile phones with large screens and standard keyboards, while 0.97% and 8.12% respectively had phones with QWERTY and virtual keyboard.

When asked about the network technology of their mobile phones, the majority of participants (97.40%) were aware their phones used the GSM network. Only 9.1% of participants confirmed their mobile phones used the CDMA network. However, most participants were not sure whether their mobile phone's network was 2G, 3G, 3.5G or 4G. The most popular network provider among participants was Telkomsel, which served 90.6% of teachers. Table 5.4 summarises the responses of participants on the network technology questions.

Table 5.4. The responses to questions about networks technology

Network technology	**Responses of teachers**		
	Yes (%)	**No (%)**	**Not sure (%)**
GSM	97.40	2.27	0.33
CDMA	9.09	87.34	3.57
2G	44.16	7.14	48.70
3G	33.44	9.42	57.14
3.5G	6.49	14.94	78.57
4G	3.90	16.23	79.87

The survey also investigated participants' knowledge about their mobile phone's features. Participants were given 15 common features of mobile phones – camera, game, voice call, video call, radio, SMS, multimedia message service (MMS), Bluetooth, video player, audio player, internet browser, video recorder, voice recorder, instant messenger and memory card.

The survey asked participants whether they knew if their mobile phone had the provided features or not. The responses are presented in Table 5.5. The results indicate that most participants knew that their mobile phones had the given features, except for video call and instant messenger features, of which only 46.43% and 40.26% respectively were sure that their mobile phone had the features.

Table 5.5. Responses of participants to the question: "Does your mobile phones have these following features?"

Mobile phone feature	Responses of *participants* to the question: "Does your mobile phones have these following features?"		
	Yes(%)	No(%)	Not sure(%)
Camera	89.29	10.06	0.65
Game	94.16	4.22	1.62
Voice call	91.88	6.17	1.95
Video call	46.43	37.01	16.56
Radio	91.23	4.87	3.90
SMS	97.73	1.62	0.65
MMS	80.52	13.64	5.84
Bluetooth	85.71	11.36	2.92
Video player	86.69	11.69	1.62
Audio player	86.04	12.01	1.95
Internet browser	82.79	13.64	3.57
Video recorder	85.71	12.34	1.95
Voice recorder	87.01	9.74	3.25
Instant messenger	40.26	47.40	12.34
Memory card	86.69	11.36	1.95

Participants' responses as shown in Table 5.5 were then verified with the actual features of their mobile phones. From 305 participants who knew the brand of their mobile phones (Figure 5.3), only 51.9% (160 participants) mentioned the model of their phones. Hence, only the responses of these 160 participants were verified. The results are summarised in Figure 5.5.

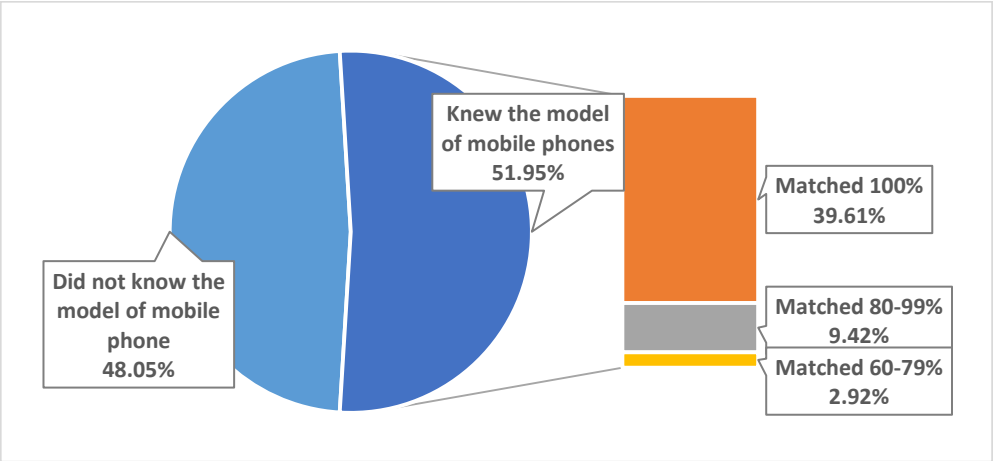

Figure 5.5. Participants' recognition of the model and features of their mobile phone

Figure 5.5 shows that 39.61% of participants responses to the question “Does your mobile phone have these following features?” matched 100% to their actual model of mobile phones. Teachers whose responses matched more than 80% and more than 60% were 9.42% and 2.92%, respectively.

Figure 5.6 shows that the majority of participants claimed that their mobile phones was able to open audio, image, and video files; 88.31%, 85.06% and 76.95%, respectively. In contrast, only around a quarter of participants said that their mobile phones could open word, excel, pdf, and presentation files.

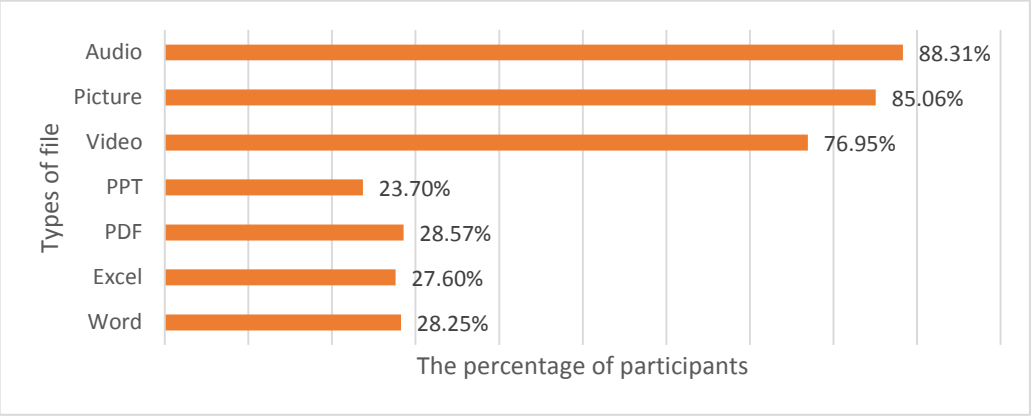

Figure 5.6. Capability of opening file

The results in this section reveal that all participants had mobile phones and the majority had adequate knowledge about their mobile phone. This indicates that participants in the survey had acceptable basic readiness for mobile learning.

5.3.2.2 Skill readiness for mobile learning

The skill readiness of teachers for mobile learning was assessed by their capability in using their mobile phone. In the questionnaire, teachers were questioned about whether they could use the features of their mobile phone.

Figure 5.7 illustrates the capability of participants to utilise the given features of mobile phones. More than 60% of participants claimed that they were capable of using the features, except the video call and instant messenger features, which less than 40% stated they were able to use. This finding corresponds to the results from the previous section that found only around 40% of participants were sure that their mobile phone had video call and instant messenger features.

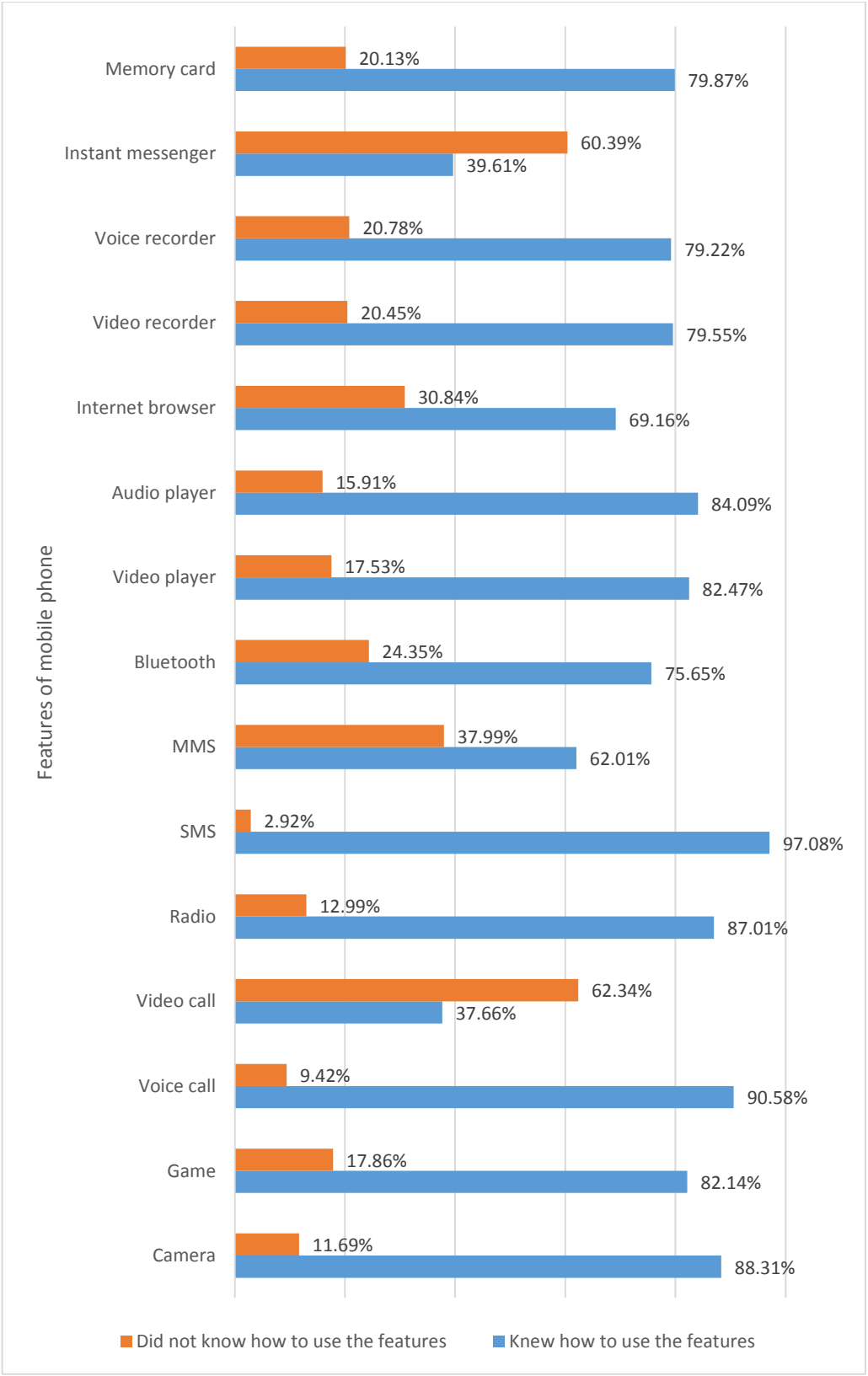

Figure 5.7. The features participants can use on their mobile phones

Furthermore, in order to know how teachers optimised the features of their mobile phones, the data in Table 5.5 and Figure 5.7 were cross-tabulated. The cross-tabulation of the data aimed to assess whether teachers who recognised the features available on their mobile phones were capable of using the features or not. The results of cross-tabulation are shown in Figure 5.8.

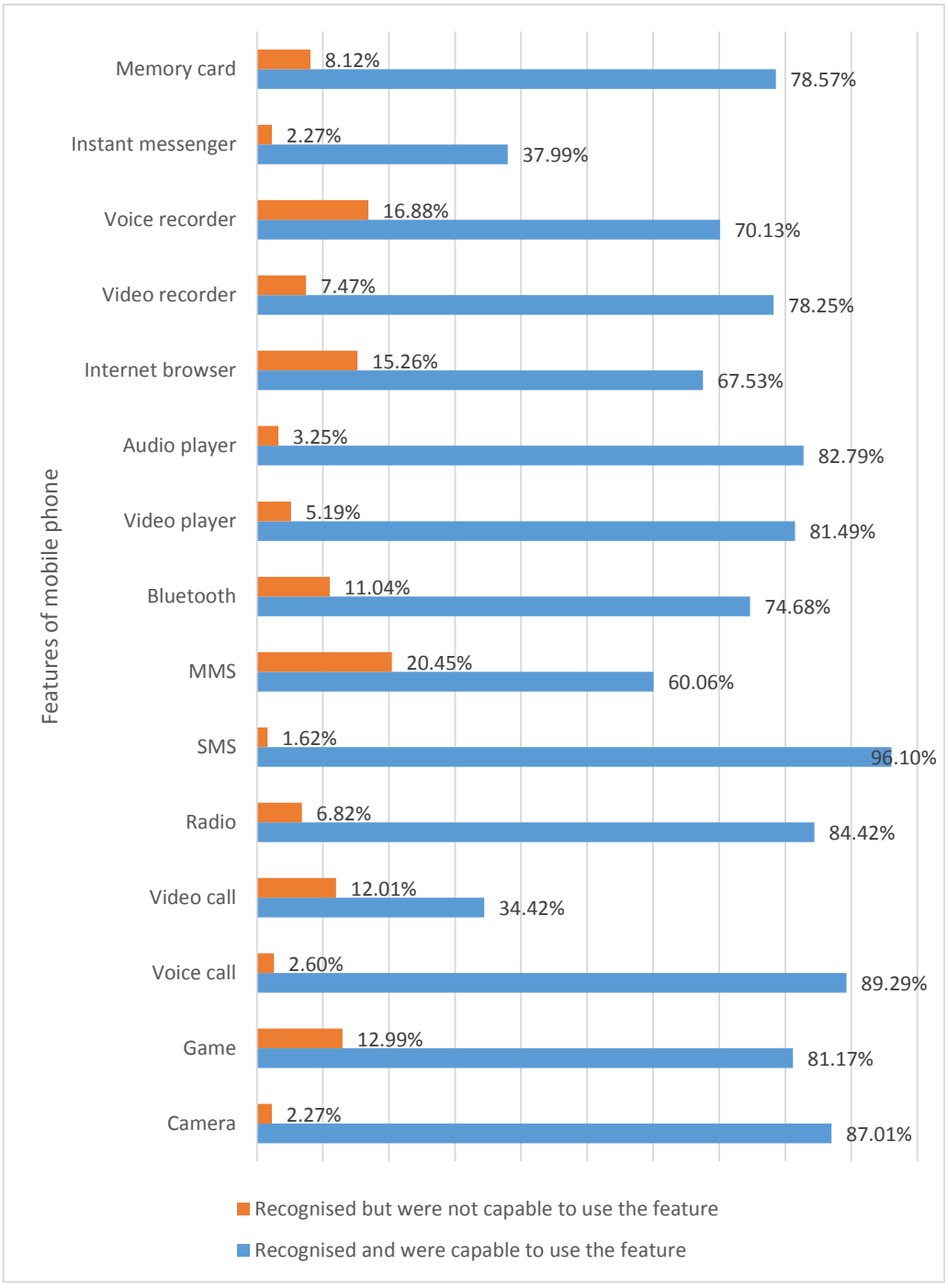

Figure 5.8. The recognised and able-to-use features on mobile phones

Figure 5.8 shows the comparison between participants who recognised and were capable of using the features of the mobile phone and those who recognised the features but were not capable of utilising them. The majority of participants who recognised the features of their mobile phones claimed they were capable of using them.

This survey also investigated the frequency of participants using the features of their mobile phones. Table 5.6 indicates that SMS was the most frequently used feature by participants, with 91.56% of participants communicating via SMS every day. This was followed by voice call, the original function of mobile phones, which 89.29% of participants used every day. In contrast, video call, instant messenger, and MMS features were the most rarely used features by participants with 68.51%, 65.58%, and 52.60% respectively stating that they had never used these features.

Table 5.6. Usage frequency

Mobile phone feature	**Usage frequency (%)**				
	Every day or about every day	**At least once a week**	**At least once a month**	**Just a few times a year**	**Never**
Camera	38.31	35.71	10.06	3.57	12.34
Game	22.73	27.92	11.36	5.19	32.79
Voice call	77.60	7.79	1.30	1.95	11.36
Video call	6.49	7.14	10.06	10.71	65.58
Radio	22.08	29.87	18.51	6.17	23.38
SMS	91.56	3.25	1.62	0.32	3.25
MMS	9.09	11.69	13.31	13.31	52.60
Bluetooth	28.57	25.97	15.91	4.87	24.68
Video player	26.30	32.79	13.64	3.90	23.38
Audio player	56.17	20.78	3.57	1.30	18.18
Internet browser	40.91	15.26	6.49	1.62	35.71
Video recorder	12.34	26.30	25.65	9.42	26.30
Voice recorder	11.04	19.81	27.27	11.04	30.84
Instant messenger	22.73	5.52	2.27	0.97	68.51
Memory card	45.78	8.12	4.87	14.94	26.30

The data in this section reveals that teachers did not underutilise their mobile phones. The majority of teachers claimed they were capable of using the features of mobile phones. Even though some teachers responded negatively to their

capability of using particular features, such as instant messaging and video call, or claimed they never used the features that could have been because the features were not available on their phones.

Furthermore, the findings in this section imply that SMS has the most potential to be used in a mobile learning system since this feature was available on almost all mobile phones owned by participants, and participants recognised and were able to use it. Therefore, SMS was chosen and utilised as the medium for delivery of training content in the trial study of the research (Chapter 6).

5.3.2.3 Teachers' perception about mobile learning

In order to determine the perceptions about teachers on mobile learning for training, the psychological and cost readiness of teachers for mobile learning were investigated.

In the questionnaire, teachers were given 20 statements related to their psychological and cost readiness for mobile learning and were asked to rate the statements using a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Table 5.7 provides the mean and standard deviation (*SD*) of responses from the teachers to the statements. The *SD* values of all responses were not large (0.623–1.138), indicating that participants' responses were relatively similar. Consequently, it was possible to assume that the mean value can be employed as a representative score for each variable in the data.

The first set of statements (A1 - A5) measured the knowledge of participants about mobile learning. The mean score for Statement A1 was 2.83, which is located within the area of disagree and neutral. This result indicates that participants' ideas about mobile learning for training were still unclear. However, the results show that participants wanted to know more about mobile learning with a mean score of 4.14 for Statement A2.

Participants agreed that mobile learning is good for a working adult for self-development, as the mean score for Statement A3 was 4.20. Statement A4, "Mobile learning would make my life difficult" had a mean score at 2.74 indicating slight

disagreement. Correspondingly, participants agreed that mobile learning could save their learning time, with a mean score for Statement A5 of 3.99.

Table 5.7. Mean and standard deviation for each statement

No.	Statements	Mean	Standard Deviation
Knowledge about mobile learning			
A1	I know what mobile learning is about	2.83	1.134
A2	I want to know more about mobile learning	4.14	0.665
A3	I think mobile learning is good for working adults who want to learn new skill for their professional development	4.20	0.679
A4	Mobile learning will make my life difficult.	2.74	0.991
A5	Mobile learning will save my learning time	3.99	0.623
Learning method issues			
B1	I prefer conventional learning than mobile learning	2.83	1.096
B2	I would like my tutor/instructor to integrate mobile learning in my training/course in addition to face-to-face meetings	4.19	0.645
B3	I would like my tutor/instructor to integrate mobile learning besides online forum in my training/course	3.97	0.655
B4	Mobile learning is an alternative to web based learning	3.88	0.705
B5	Mobile learning is an alternative to conventional learning	3.52	1.006
Device issues			
C1	I don't know how to use 3G facilities in my mobile phone	3.29	1.043
C2	I need to learn how to use my mobile phone for mobile learning	4.11	0.666
C3	I will upgrade my mobile phone if mobile learning is going to be implemented in my course	3.76	0.852
C4	I think I am not ready for mobile learning using mobile phone facilities.	2.25	0.964
Cost issues			
D1	I don't mind paying extra money for mobile learning	3.92	0.815
D2	I am afraid I will spend more money on my mobile phone bill because of mobile learning	2.95	1.009
Willingness on mobile learning			
E1	I don't think I want to be involved in mobile learning	2.66	1.138
E2	I am not ready for mobile learning now	3.37	1.049
E3	I will be ready for mobile learning after 2 years	3.91	0.762
E4	I am looking forward to engage in mobile learning	3.99	0.680

Statements B1–B5 measured participants' perception about the learning method of mobile learning for training. Statement B1 had a mean score of 2.83, which is located within the area of disagree and neutral. This result indicates that conventional learning methods were still preferable for participants rather than mobile learning. This result was related to participants' low knowledge about mobile learning (Statement A1).

Mean scores for Statements B2 and B3 were 4.19 and 3.97 respectively. These mean scores indicate that participants agreed with mobile learning being integrated into face-to-face sessions for training (Statement B2) or as an addition to an online forum in the training courses (Statement B3). Participants agreed that mobile learning is an alternative to web-based (Statement B4) and to conventional learning (Statement B5) for training. The mean score for Statement B4 was 3.88, and Statement B5 was 3.52.

In terms of device issues in mobile learning, participants stayed neutral about their capability of using 3G facilities on their mobile phones, as the mean score for Statement C1 was 3.29. However, they agreed to learn how to use it for mobile learning with a mean score of 4.11 for Statement C2 and to upgrade their mobile phones to participate in mobile learning with a mean score of 3.76 for Statement C3. Statement C4 had a mean score of 2.25, indicating the disposition of participants for mobile learning using mobile phones.

Statements D1 and D2 measured the cost readiness of participants for mobile learning. Table 5.7 shows the mean score for these statements was 3.92 and 2.95 respectively, indicating that participants agreed that they did not mind paying extra money for mobile learning and disagreed that they were afraid they would spend more money for their mobile phone bill because of mobile learning. These findings imply that cost issues would not prevent participants engaging in mobile learning using mobile phones.

The last set of statements (E1 - E4) measured the willingness of participants to use mobile learning for training. The mean score for Statement E1 was 2.66, located within the area of disagree and neutral. This result indicates that participants were

slightly in disagreement with the statement "I don't think I want to be involved in mobile learning".

In terms of the implementation time for mobile learning, participants felt that they were not yet ready for mobile learning if it was implemented at the time of the survey, as the mean score for Statement E2 was 3.37. They asked for more time to be ready to participate in a mobile learning course (the mean score for Statement E3 = 3.91). The majority of participants were looking forward to engaging in mobile learning as shown by the mean score of 3.99 for Statement E4.

This section shows that participants had a good perception of mobile learning. Even though they were still uncertain about it, they were interested in knowing more about mobile learning and looking forward to participating in the course. Overall, participants had satisfactory psychological and cost readiness for mobile learning

5.3.2.4 The perception of teachers vs demographic profiles

In order to obtain a deep understanding about teachers' readiness for mobile learning using mobile phones, this study also investigated whether there were difference in teachers' perception of mobile learning based on their demographic profiles.

An independent-sample *t*-test was conducted to compare the mean scores of the perception variables by gender. ANOVAs were conducted to compare the mean scores for those variables among participants, based on their age, academic qualification, years of service, type of school, the teaching subject, and side-task.

The first test investigated how the scores of knowledge, learning method, device issue, cost issue, and willingness for mobile learning compared across female and male teachers. An independent-samples *t*-test was conducted for this comparison. There was a significant difference in scores of the knowledge variable for male teachers (M = 3.677, SD = 0.471) and female teachers (M = 3.534, SD = 0.365; t (160.491) = - 2.679, p = 0.008), as shown in Table 5.8. This finding suggests that the male teachers had better knowledge about mobile learning than the female teachers.

Table 5.8. The *t*-test for perception variables-differences between groups by gender

Perception variables	Female		Male		df	*t*	*Sig.*
	M	SD	M	SD			
Knowledge	3.534	0.365	3.677	0.471	160.491	- 2.679	0.008
Learning method	3.655	0.476	3.733	0.502	306	- 1.319	0.188
Device issue	3.350	0.451	3.354	0.476	306	- 0.067	0.947
Cost issues	3.406	0.566	3.500	0.596	306	- 1.348	0.179
Willingness	3.472	0.425	3.497	0.530	306	- 0.451	0.652

A one-way ANOVA was conducted to explore the effect of age on the level of the readiness variables. Participants were divided into five groups based on their age (Group 1: 21 - 30 years-old, Group 2: 31 - 40 years-old, Group 3: 41 - 50 years-old, Group 4: 51 - 60 years-old, Group 5: >60 years-old).

Before conducting the ANOVA, the Levene test of homogeneity of variance of the perception variables for these age groups was carried out. The assumption of homogeneity among participants based on their ages for all variables was accepted.

Then the ANOVA was performed to compare the mean of the perception variables between the participants' age groups; the result is shown in Table 5.9. ANOVA showed a statistically significant difference at the $p < 0.05$ level in device issues variable scores for the five age groups F (4, 303) = 3.097, p = 0.016. Post-hoc comparisons using the Tukey honestly significant difference (HSD) test indicated that the mean score of the device issues variable for Group 3 (M = 3.417, SD = 0.426) was significantly different from Group 1 (M = 3.151, SD = 0.567).

Table 5.9. The ANOVA for the perception variables differences between groups by age

Variable and source	Sum of square	Mean square	*F* (4,303)	*Sig.*
Knowledge				
Between Groups	0.836	0.209	1.258	0.286
Within Groups	50.295	0.166		
Learning method				
Between Groups	0.980	0.245	1.041	0.386
Within Groups	71.343	0.235		
Device issues				
Between Groups	2.539	0.635	3.097	0.016
Within Groups	62.103	0.205		
Cost issues				
Between Groups	0.738	0.185	0.552	0.698
Within Groups	101.277	0.334		
Willingness				
Between Groups	1.388	0.347	1.643	0.163
Within Groups	63.995	0.211		

These findings suggest that participants' perception of mobile learning related to device issues were different between age groups. Participants belonging to the 41–50-years-old group had more positive perceptions of mobile learning in term of device issues than participants in the 21–30-years-old group.

Subsequently, a comparison of participants based on their academic qualifications on the perception variables was made. There were four groups of participants based on their educational background; diploma, bachelor, master, and doctor.

The variance in scores was the same for each of the four groups, since the significant values for all the perception variables in the homogeneity test were accepted except for the score of the learning method variable. Hence, the robust tests of means equality for this variable using the Welch test had to be performed and resulted in the $p = 0.545$. This means that there was no statistically significant difference in the learning method variable scores for the academic qualification groups.

Table 5.10. The ANOVA for the perception variables differences between groups by academic qualification

Variable and source	Sum of square	Mean square	*F* (3,304)	*Sig.*
Knowledge				
Between Groups	.327	0.109	0.652	0.582
Within Groups	50.804	0.167		
Device issues				
Between Groups	0.435	0.145	0.687	0.561
Within Groups	64.207	0.211		
Cost issues				
Between Groups	0.111	0.037	0.111	0.954
Within Groups	101.904	0.335		
Willingness				
Between Groups	2.529	0.843	4.077	0.007
Within Groups	62.854	0.207		

Table 5.10 presents the result of the ANOVA, and shows a statistically significant difference at $p < 0.05$ level in scores of willingness on the mobile learning variable for the four academic qualification groups: F (3, 304) = 4.077, p = 0.007. These findings reveal that based on participants' academic qualifications, they had a similar level of willingness to participate in mobile learning.

Further, the Tukey HSD test indicated that the mean score of willingness for mobile learning for the doctoral degree group (M = 4.333, SD = 0.382) was significantly different from the diploma degree group (M = 3.500, SD = 0.472), the bachelor degree group (M = 3.453, SD = 0.444), and the master degree group (M = 3.535, SD = 0.490). However, this result cannot be validated as only three participants had doctorates.

The perception of the mobile learning variables were also compared across participants based on their years of experience as a teacher. In this category, participants were divided into six groups; 1–7 years of service, 8–14 years of service, 15–21 years of service, 22–28 years of service, 29–35 years of service, and more than 35 years of service.

The assumption of homogeneity among participants based on their years of experience for all variables was accepted, except for the willingness for mobile

learning variable. Therefore the Welch test was performed for the willingness variable and resulted in $p = 0.535$. This indicates that the scores for this variable for the six groups of teachers was not significantly different.

The ANOVA was then performed to compare the length of service groups. The result of the test is shown in Table 5.11. The mean scores of all variables for these groups of participants did not differ significantly, which means that participants' years of experience as a teacher did not affect their perception of mobile learning.

The differences in mean scores for the perception variables across the three types of schools in which the participants worked - junior, senior, and vocational high schools - were investigated next.

The assumption of homogeneity among participant groups based on the type of school for the device and cost issues variables were accepted, while the knowledge, learning method, and willingness variables were not.

Table 5.11. The ANOVA for the perception variables differences between groups by experience of teaching

Variable and source	Sum of square	Mean square	*F* (5,302)	*Sig.*
Knowledge				
Between Groups	1.138	0.228	1.375	0.234
Within Groups	49.993	0.166		
Learning method				
Between Groups	1.113	0.223	0.944	0.453
Within Groups	71.210	0.236		
Device issues				
Between Groups	1.844	0.369	1.774	0.118
Within Groups	62.797	0.208		
Cost issues				
Between Groups	1.686	0.337	1.015	0.409
Within Groups	100.330	0.332		

The Welch F-test was run for the unaccepted variables. Table 5.12 presents the results. Both learning method and willingness for the mobile learning variables had $p < 0.05$. Hence, it can be concluded that there were significant differences in the scores of these variables for the three types of school groups.

Table 5.12. The Welch F-test for robust tests of equality of means

		Statistic	*Sig.*
Knowledge	Welch	0.662	0.518
	Brown-Forsythe	0.800	0.451
Learning Method	Welch	5.301	0.006
	Brown-Forsythe	6.091	0.003
Willingness	Welch	10.100	0.000
	Brown-Forsythe	11.959	0.000

The ANOVA tests were employed to assess the difference in the device and cost issues variables for the three types of school groups. It can be seen from Table 5.13 that there was a statistically significant difference at $p < 0.05$ the device issues variable scores for the three types of school groups: F (2, 305) = 3.822, p = 0.023.

Table 5.13. ANOVA for the perception variables differences between groups by type of school

Variable and source	Sum of square	Mean square	*F* (2,305)	*Sig.*
Device Issues				
Between Groups	1.580	0.790	3.822	0.023
Within Groups	63.061	0.207		
Cost Issues				
Between Groups	0.343	0.172	0.515	0.598
Within Groups	101.672	0.333		

Post-hoc comparisons using the Tukey HSD test for the learning method, device issue, and willingness variables were then performed and the results are presented in Table 5.14. The results indicate that the mean scores of the learning method variable of the senior high school teachers' group (M = 3.826, SD = 0.546) was significantly different from the junior high school teachers' group (M = 3.639, SD = 0.461) and the vocational high school teachers' group (M = 3.570, SD = 0.398). A similar result was found for the mean scores of the willingness variable.

Table 5.14 also shows that the mean scores of the device issues variable for the senior high school teachers' group was significantly different from the vocational high school teachers' group, whereas the junior high school teachers' group did not differ significantly from either the senior or the vocational high school teachers' groups.

Table 5.14. The Tukey HSD test for learning method, device issue and willingness variables

Dependent variables	(I) School	(J) School	Mean differences (I - J)	Standard error
Learning method	Junior high school	Senior high school	- 0.1872*	0.06293
		Vocational high school	0.06864	0.07850
	Senior high school	Junior high school	0.18672*	0.06293
		Vocational high school	0.25537	0.08668
	Vocational high school	Junior high school	- 0.06864	0.07850
		Senior high school	0.25537*	0.08668
Device issue	Junior high school	Senior high school	- 0.05284	0.05988
		Vocational high school	0.17137	0.07470
	Senior high school	Junior high school	0.05284	0.05988
		Vocational high school	0.22421*	0.08248
	Vocational high school	Junior high school	- 0.17137	0.07470
		Senior high school	0.22421*	0.08248
Willingness	Junior high school	Senior high school	- 0.26018*	0.05871
		Vocational high school	0.06076	0.07325
	Senior high school	Junior high school	0.26018*	0.05871
		Vocational high school	0.32094*	0.08087
	Vocational high school	Junior high school	- 0.06076	0.07325
		Senior high school	0.32094*	0.08087

*Note: * The mean difference is significant at the 0.05 level*

From these findings, it can be assumed that the type of school affected the level of perception of mobile learning related to learning method, device issue, and willingness to participate in mobile learning. Participants who taught in a senior high school had a more positive perception of mobile learning as a learning method than their colleagues in junior and vocational high schools. They also had a greater willingness to join mobile learning for training in comparison to other groups of participants. In addition, the perception of participants in the senior high school teacher group regarding device issues were better than those of the vocational high school teacher group.

The comparison of participants based on their teaching subjects for the perception variables was also examined. There were groups of mathematics, English, science, social science, *Bahasa*, ICT, and 'other subjects' teachers. The variance in scores was the same for each group since there were no significant values for all readiness variables in the homogeneity test.

Table 5.15. The ANOVA test for the perception variables differences between groups by teaching subjects

Variable and source	Sum of square	Mean square	*F* (6,301)	*Sig.*
Knowledge				
Between Groups	0.584	0.097	0.580	0.747
Within Groups	50.547	0.168		
Learning method				
Between Groups	0.534	0.089	0.373	0.896
Within Groups	71.790	0.239		
Device Issues				
Between Groups	1.620	0.270	1.289	0.262
Within Groups	63.022	0.209		
Financial Issues				
Between Groups	0.533	0.089	0.264	0.953
Within Groups	101.482	0.337		
Willingness				
Between Groups	3.609	0.601	2.931	0.009
Within Groups	61.774	0.205		

These variables were then tested by using the ANOVA test. The test results provided in Table 5.15 show that there was a statistically significant difference at $p < 0.05$ level in the willingness for mobile learning scores for the seven teaching subjects-based groups, with F (6, 301) = 2.931, p = 0.009.

The Tukey HSD test for post-hoc comparison, the mean score of the willingness for mobile learning variable for the science teachers' group (M = 3.653, SD = 0.444) was significantly different from the ICT teachers' group (M = 3.2763, SD = 0.513) and other subjects teachers group (M = 3.385, SD = 0.517).

In other words, participants with different teaching subjects had a different level of interest in participating in mobile learning. Science teacher participants were more interested in participating in a mobile learning program than participants who taught ICT and other subjects such as religion, physical education, and arts.

The last comparison was the perception of the mobile learning variables of participants based on their side-task at school. Teachers were divided into five groups; no side-task, student advisors, student patrons, laboratory staff, and other side-task.

The results of the test of homogeneity of variance of the perception variables for these groups indicate that the assumption of homogeneity among participants based on their side-task for device issues was not accepted. Therefore, the Welch test was performed for this variable and the result was $p > 0.05$. The mean scores of the side-task variable for the five groups of teachers were not significantly different.

The variables with the homogeneity assumption accepted were then tested using ANOVA, and the results can be found in Table 5.16. The table shows that $p < 0.05$ was only found in the scores of the learning method variable for the five side-task groups: F (4, 303) = 2.515, p = 0.042.

Table 5.16. The ANOVA test for the perception variables differences between groups by side-task

Variable and Source	**Sum of square**	**Mean Square**	***F* (4,303)**	***Sig.***
Knowledge				
Between Groups	1.384	0.346	2.107	0.080
Within Groups	49.747	0.164		
Learning method				
Between Groups	2.324	0.581	2.515	0.042
Within Groups	69.999	0.231		
Cost issue				
Between Groups	1.038	0.259	0.778	0.540
Within Groups	100.978	0.333		
Willingness				
Between Groups	.813	0.203	0.953	0.433
Within Groups	64.570	0.213		

The Tukey HSD test indicates that the mean score of learning method of mobile learning variable for the group of participants who did not have side-task (M = 3.763, SD = 0.506) was significantly different from the student advisor group of participants with (M = 3.567, SD = 0.430).

This result suggests that having another task in schools also influenced the variation of teachers' perception about mobile learning, especially their view on the method by which the mobile learning is delivered. Participants who did not have side tasks had a better understanding of the learning method for mobile learning than participants who also served as student advisors.

This section presented the investigation of the difference in teachers' perceptions about mobile-learning-based on their demographic profiles. The findings reveal that teachers' perception of mobile learning varied between their demographic profiles. However, cost readiness among teachers was similar across the profiles.

5.3.3 The ICT activities and training experience of teachers

The survey also explored ICT usage of teachers in their teaching and learning activities and their experience in participating in ICT training.

5.3.3.1 ICT for teaching and learning activities

Most participants claimed they used a computer for their teaching activities in class (82.14%) but only 24.03% of participants connected their computers to a projector when delivering their courses. A total of 51.30% of teachers were still using an overhead projector (OHP) in their class. Television and DVD/VCD were also used in class by 57.79% of participants. This information is depicted in Figure 5.9.

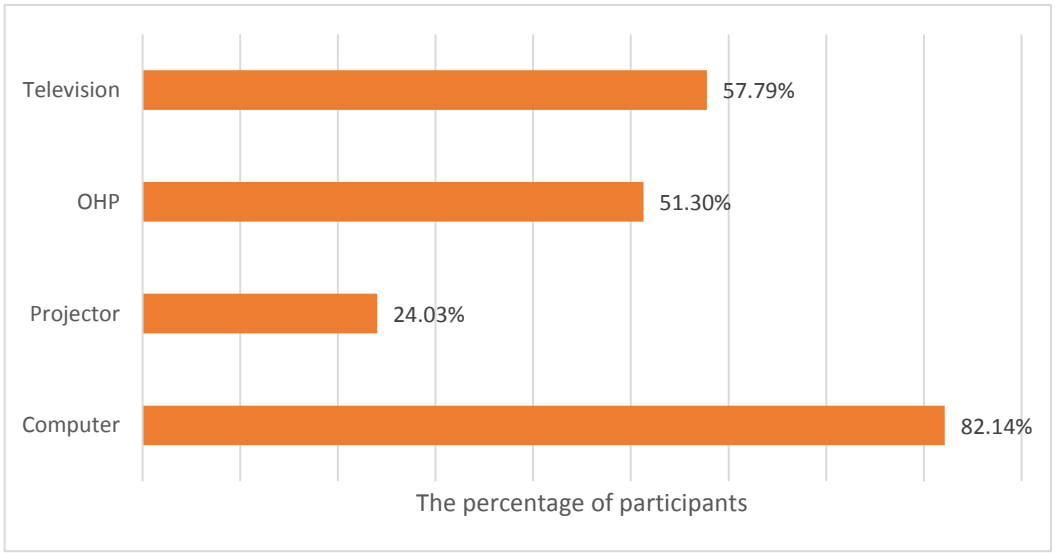

Figure 5.9. The percentage of participants based on devices used in teaching activities

In the questionnaire, teachers were given five learning activities using ICT and were asked how often they did the activities. Table 5.17 presents participants' answers about their learning activities using ICT. The first statement was "Look online for the content or material you think will engage your student". Around 27.30% of participants claimed the activity as a daily activity while 21.80% did so at least once a week. The percentage of participants who rarely did this activity (at least once a

month and just few times a year) and participants who never did the activity were almost equal at 26.90% and 24.00% respectively.

Table 5.17. Learning activities of participants using ICT

Learning activities	Every day (%)	At least once a week (%)	At least once a month (%)	Just a few times a year (%)	Never (%)
Look online for the content or material you think will engage your student	27.30	21.80	15.90	11.00	24.00
Look for material online to help you create lesson plans	10.10	8.10	17.20	40.30	24.30
Interact online with other teachers to get or give advice on handling classroom issues	9.70	5.50	13.00	35.10	36.70
Look online for the latest research in your field or the subjects you teach	14.30	15.30	21.40	30.50	18.50
Using a social networking site, like Facebook, to exchange ideas with other teachers	37.70	14.60	8.10	4.90	34.70

Furthermore, only 10.10% of participants looked for material online to help them create lesson plans. Most participants did that just a few times a year (40.3%). Interaction online with other teachers for sharing advice on handling classroom issues was the activity least performed by participants. Out of 308 participants, 35.1% did that just a few times a year and 36.7% never carried it out, only 9.7% did it as an everyday activity.

Correspondingly, the percentage of participants using ICT every day to obtain up-to-date information regarding education issues on their teaching subject was only 14.30%. There were two distinct groups of respondents according to the frequency of conducting this activity – just a few times a year (30.50%) and at least once a month (21.40%). Around 18.50% of participants claimed they never did this activity. Just 15.30% did it once a week and 14.30 % did it every day.

Social networking sites like Facebook were quite popular among participants with 37.70% of teachers stating that they log in to this application every day to have

discussions with other teachers. However, the percentage of participants who claimed that they never used a social networking site for sharing with other teachers was almost the same (34.70%). Out of 308 participants, 14.60% did this activity once a week, 8.10% once a month, and 4.90% only few times a year.

This survey also questioned teachers about the challenges that prevent them from using ICT. The questions provided five challenge options: general resistance by colleagues in school, time constraints, lack of resources, and/or access to ICT, teachers' lack of ICT knowledge and/or training, and lack of technical support. Then teachers were asked whether the challenges were a major or minor challenge,EHC or not a challenge at all. Figure 5.10 illustrates the findings.

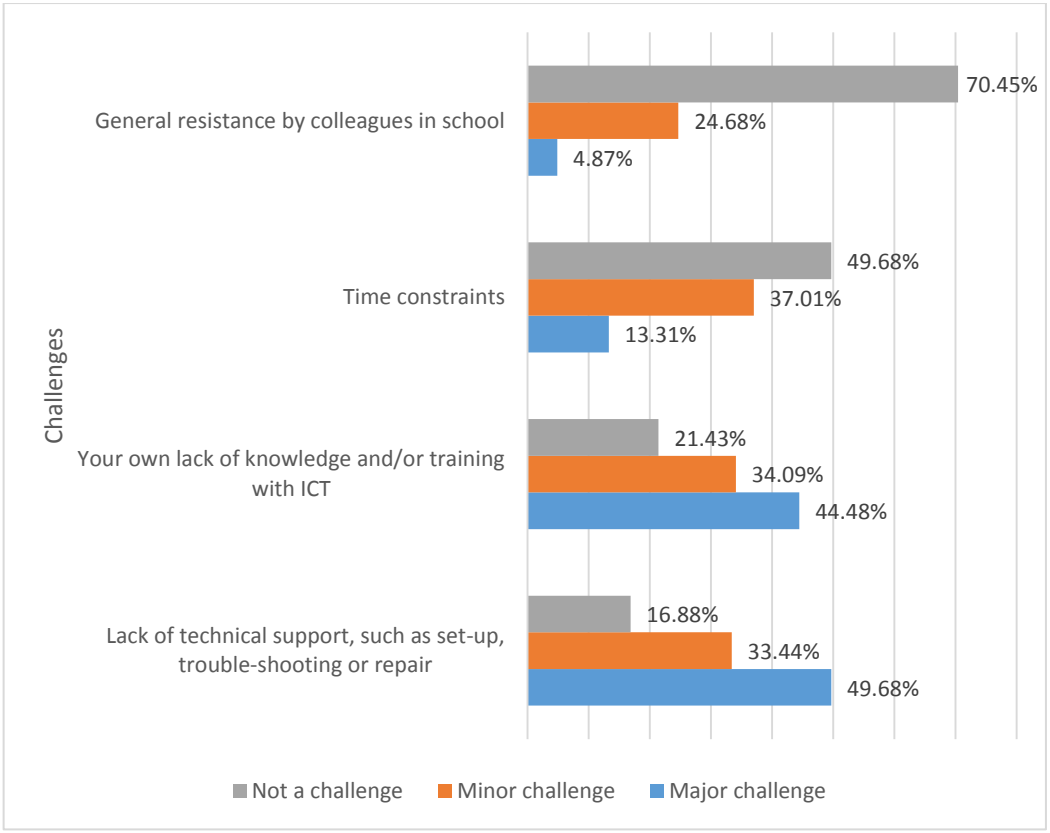

Figure 5.10. Challenges for participants using ICT for teaching and learning activities

There were two main challenges for participants using ICT in their teaching and learning activities. The first was the lack of technical support with 49.68% of teachers considering the lack of technical support as a major challenge and 33.44% seeing it as minor challenge. Most participants only knew how to use the technologies, not how to handle problems when using them.

The second challenge was the lack of ICT knowledge and/or training. More than 44% of participants indicated their lack of ICT knowledge as a major challenge when using ICT while 34% considered it as a minor challenge.

Participants were asked to review their ICT skills and compare them to their colleagues' ICT skills. They were given four categories for the review of their own skills; poor, fair, good, and excellent.

They also had three categories for comparing their ICT skill to their colleagues' skills. Category A contained participants who thought that they knew more about ICT than their colleagues, Category B comprised participants who considered the ICT skills of their colleagues were better than theirs, and Category C consisted of participants who considered their ICT skills equal to the ICT skills of their colleagues. The results of the review are summarised in Table 5.18.

Table 5.18. The self-review of participants ICT skill

Self-evaluation of ICT skills	**Self-comparison of ICT skills**			**Total**
	Category A (%)	**Category B (%)**	**Category C (%)**	
Poor	0.00	7.47	3.25	**10.71**
Fair	3.57	6.49	17.53	**27.60**
Good	11.36	2.27	38.96	**52.60**
Excellent	6.82	0.00	2.27	**9.09**
Total	**21.75**	**16.23**	**62.01**	**100.00**

Only 7.47% admitted they had low ICT skills and acknowledged their colleagues had better ICT skills than they did. Furthermore, 3.25% of teachers considered their ICT skills were poor but were equal to their colleagues. The percentage of teachers who thought their ICT skills were fair but better than their colleagues was 3.57%.

The majority of participants considered their ICT skills were good (52.60%). A total of 11.36% considered their ICT skills good or better than other teachers, while 2.27% and 38.96% respectively with good ICT skills acknowledged their skill to be equal or lower than their colleagues. Only 9.09% participants were confident enough to claim that their ICT skills were excellent.

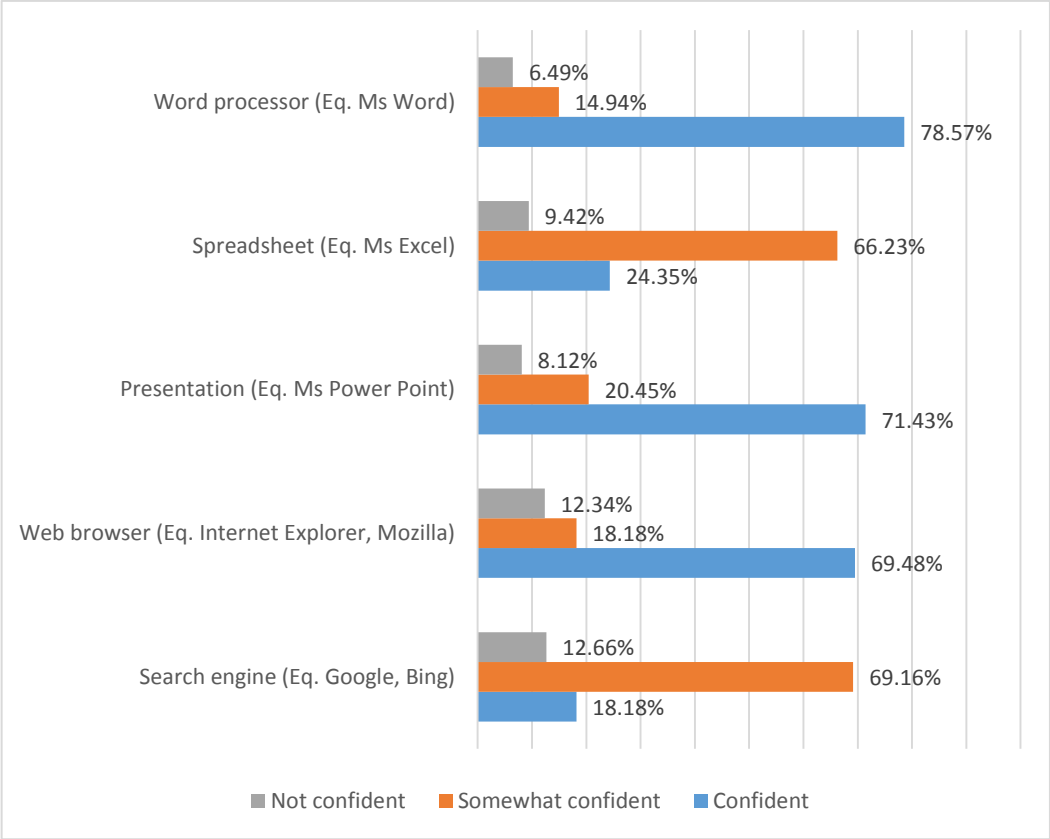

Figure 5.11. Participants' confidence using computer software application

When asked about their confidence in using some basic computer software applications, generally participants felt confident in using a word processor, presentation software, and web browser applications, as shown in Figure 5.11. Most teachers felt only somewhat confident using a spreadsheet and a search engine application.

5.3.3.2 The ICT training experience

Table 5.19 summaries the ICT training experience of the participants. Around 72.4% of participants had participated in ICT training. The type of training was mostly face-to-face and was carried out in a week or less. Participants had not experienced web-based ICT training. However, 4.02 % of teachers had participated in a blended type of ICT training.

More than 55% of participants with ICT training experience stated that they did not have to travel to participate in the training, since the training was conducted in their schools, while 29.02% and 15.63% respectively had to travel to other places in their

city and to another city. A total of 51.79 % participants with ICT training experience claimed that their training did not cover a topic on how to incorporate ICT into teaching and learning activities. All participants considered their ICT skills increased after participating in the training.

Table 5.19. ICT training experience of participants

ICT training (N=224)	Frequency	Percentage (%)
Type of training		
Face to face training	215	95.98
Web based training	0	0.00
Blended (face to face and web based)	9	4.02
Length of training		
=< 1 week	190	84.82
>1 week	34	15.18
Place of training		
School	124	55.36
Other city/province	35	15.63
Other place in same city with school	65	29.02
The training covered topic on how to incorporate ICT in teaching and learning activity		
Yes	108	48.21
No	116	51.79
Skill after training		
Increase	147	65.63
Only slightly increase	77	34.38
No change	0	0.00

Table 5.20 shows the topics provided in ICT training based on participants' experience. Word processor training was the most frequently presented topic in ICT training, followed by spreadsheets, internet browsers, and operating systems. The least common topic delivered in ICT training was how to set up a computer. Beside those topics, ICT training for teachers also covered topics such as how to set up email, e-learning, programming, and multimedia.

Table 5.20. Topics provided in ICT training*

Topic	Frequency	Percentage (%)
How to set up computer	28	12.50
Operating system	171	76.34
Word processor application	212	99.06
Spreadsheet application	195	87.05
Internet browser	182	81.25
Others	25	11.16

Note: *multiple responses

In terms of their ICT skill development, the majority of participants (69.48%) claimed that they had sought their own opportunity to learn more about ICT by practicing ICT at home (28.51%), learning from the internet (34.11%), and asking other people (37.38%) such as friends and relatives. Almost all participants (99.02%) agreed that having good ICT skills and knowledge is important for a teacher, and ICT training is required for teacher professional development. This information is shown in Table 5.21.

Table 5.21. Personal ICT skill development

	Frequency	**Percentage (%)**
Sought out on their own opportunities to learn more about ICT (N = 308)		
Yes	214	69.48
No	94	30.52
How to learn more about ICT (N=214)		
Practicing ICT by self at home	61	28.51
Learning from internet	73	34.11
Asking other people	80	37.38
Having a good ICT skills and knowledge is important for a teacher (N=308)		
Yes	305	99.02
No	3	0.98
Need ICT training for professional development as teacher (N=308)		
Yes	305	99.02
No	3	0.98

The relationship of teachers' ICT training experiences and their willingness to learn more about ICT was investigated. The data concerning the participants with and without ICT training experience were cross-tabulated with data on the participants who learned more about ICT by themselves.

A chi-square test was performed to test the relationship between teachers' ICT training experiences and their willingness to learn more about ICT. The result indicates that there was significant association between teachers with ICT experience and willingness to learn more about ICT by themselves χ^2 (1, n = 308) = 7.510, p = 0.006. This finding reveals that the ICT training experience of teachers increased teachers' interest in learning about ICT.

This section reported on teachers experience in using ICT in teaching and learning activities and participating in ICT training. Teachers had already used ICT in their teaching activities; however, they had not optimally utilised the technology for their learning activities. Lack of ICT skills and lack of technical support were the main reasons for teachers not using ICT. The ICT training was attended by teachers mostly face-to-face, conducted in a week, and located in their schools. It was also found that teachers' interest in learning more about ICT increased after participating in ICT training.

5.4 Discussion

The survey results imply that the teachers had good basic readiness for mobile learning. The results show that teachers had access to a mobile phone. Generally, mobile phones used by teachers were 3G with a small size screen and standard keyboard.

Around 53.24% of teachers' mobile phones were a standard feature phone, and the most popular brand was Nokia. This finding is consistent with the Yusuf (2016) and Putra (2018) who report that feature phones are still the most widely used in Indonesia. This finding should be taken into consideration when developing a mobile learning system.

They had owned their mobile phones for up to three years. This implies familiarisation to the device. The majority of teachers recognised the features in their mobile phones and claimed to know how to use them. This finding reveals the capability of teachers in utilising their mobile phone, hence it could be assumed that teachers had appropriate skill readiness for mobile learning.

In general, teachers' knowledge of mobile learning was at average level but they had a willingness to learn more about mobile learning. Despite their average knowledge about mobile learning, teachers could predict that mobile learning would support them in managing their time. This study also found that male teachers had a better knowledge of mobile learning than female teachers.

Mobile learning for training using mobile phones was still a new concept for teachers, hence they were not really convinced about using mobile learning for training. However, they understood that mobile learning could be complementary to the conventional class-based training, or online training. The teachers' perception of mobile learning relating to the learning method was influenced by the type of school the teachers worked in and their side-task.

Related to device issues on mobile learning, teachers perceived that they had adequate capability in using features on their mobile phones for mobile learning. They were eager to learn how to use it, and ready to upgrade their mobile phones, if necessary, to participate in mobile learning. The findings also reveal that the type of school teachers worked in and their age affected their perception of mobile learning relating to device issues.

Overall, teachers had a great interest in participating in mobile learning for training using mobile phones. In this survey, it was found that teachers' academic qualifications, the type of school they worked in, and their teaching subject affected their willingness to participate in mobile learning for ICT training.

Some studies on readiness for mobile learning maintain that cost could be an obstacle for users in a mobile learning program (Abas et al., 2009; Hussin et al., 2012). In contrast, this study found that cost was not a problem for the teachers to participate in a mobile learning environment. This is because teachers in this study were financially independent, different from pre-service teachers, or university students who were the subject of those previous readiness studies on mobile learning. Additionally, their demographic profiles did not have an effect on their perception of mobile learning related to cost issues.

Teachers ICT experiences were also explored in the survey. In terms of experience in using ICT in teaching activities, the findings obtained from this survey indicate that majority of teachers had already applied some technologies as a medium of teaching, such as a computer. However, in term of learning and research activities, teachers did not utilise ICT optimally. In addition, the number of teachers who used ICT as a medium for collaboration with other teachers was few.

The results of this survey define two main obstacles for teachers in using ICT. The first is the lack of technical support. The lack of technical support became a challenge for teachers because handling technology breakdowns frustrated teachers when using ICT (UNESCO, 2003). Most teachers knew how to use the technologies, but only a limited number of teachers knew how to handle problems when using them. Clarke Sr and Zagarell (2012) propose the lack of technical support as a main barrier for teachers in integrating ICT into their class.

The second obstacle was the lack of ICT knowledge and training. Teachers were still reluctant to use ICT in teaching and learning activities because of their lack of ICT skills, not for pedagogical reasons (Balanskat, Blamire, & Kefala, 2006).

Turning to the teachers' experience in participating in ICT training, typical ICT training required teachers to travel to a training location. Travelling means teachers had to spend money for their transportation and accommodation, and had to sacrifice their time to attend the training (Yusri & Goodwin, 2013). Galanouli, Murphy, and Gardner (2004) argue that training schedules should be adjusted to teachers' schedules and should not exploit their free time.

Teachers who participated in the survey confirmed that their ICT skills increased after participating in ICT training. A similar result was found in the study by Abuhmaid (2011) of ICT training courses for teachers in Jordan. However, most ICT training courses for teachers only focus on ICT skills development and not on ICT's pedagogical aspects, as stated by Balanskat et al. (2006). Some teachers can use ICT fluently for their own personal use, but they are unable to apply these skills to use ICT in the classroom (Jones, 2004).

Further, this survey found that the ICT training experience of teachers was significantly associated with teachers' willingness to learn more about ICT by themselves. Continuation in the field of teacher training is essential, because increased competency encourages a need for more advance competency, and for development of innovative pedagogy (Balanskat et al., 2006).

5.5 Summary and conclusions

This chapter reported on the survey conducted to investigate the readiness of teachers for mobile learning using a mobile phone. The survey asked questions about teachers' mobile phones, ICT activities and training experiences, and the perception of teachers about mobile learning.

Overall, the results of this survey imply that teachers in Indonesia are ready for mobile learning for training. Their basic and skill readiness were acceptable and their perception about mobile learning were positive.

This survey found that teachers in Indonesia were still not utilising ICT optimally in their regular activities. The lack of technical support and their ICT skill were the main barriers for teacher using ICT. Continuous ICT training is essential to help teachers keep up with the development of ICT. Additionally, the results of this survey show that participating in ICT training had a positive impact on teachers' skill, and motivated them to learn more about ICT.

The following chapter reports on the development and testing the prototype of mobile learning using mobile phones.

CHAPTER 6. MOBILE LEARNING PROTOTYPE – A TRIAL STUDY

6.1 Overview

This chapter reports on a trial study of the prototype of mobile-learning-based ICT training and a survey of participants' experience when joining the trial study. In the prototype, the training content was delivered to teachers' mobile phones in the form of SMS.

This trial study and survey aimed to assess the potential of mobile learning using mobile phones to solve the problems of delivering training for teachers in Indonesia by studying the experience of teachers who participated. Some characteristics of mobile learning found in the literature were also assessed.

The system architecture and interface of the training prototype, the trial study scenario, the survey result and the discussion of the findings are presented.

6.2 System architecture and user interface

In Chapter 5, SMS was identified as the most widely used feature of mobile phones used by teachers. Therefore, the prototype system used SMS as the method of learning content delivery.

Susanto, Goodwin, and Calder (2008) propose a six-level model of SMS-based service as shown in Figure 6.1. The model suggests that based on the service that can be offered, SMS-based e-government can be classified into six levels: listen, notification, pull-based information, communication, transaction, and integration. The term 'level' indicates the service being provided, not the direction of the systems' operation (Susanto et al., 2008). Furthermore, each level is not dependent on another level; they can even be complementary to each other (Susanto et al., 2008).

The interaction between training participants and providers was carried out in two modes; one-way and two-way SMS. In one-way SMS, the training provider broadcast the learning materials and reminders to the mobile phones of the training

participants, and the participants were not required to reply. In two-way SMS, participants were expected to reply to the SMS from the training provider.

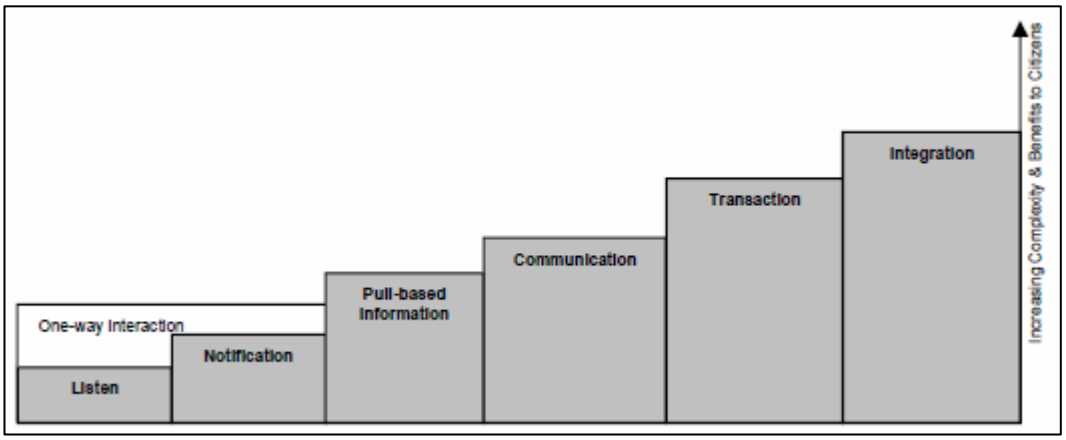

Figure 6.1. A six-level model of SMS-based services (Susanto et al., 2008)

Based on the model of SMS-based services proposed by Susanto et al. (2008), a one-way SMS from the service providers to their users was categorised as the notification level. According to Susanto et al. (2008), services in this level use a push-based mechanism, which sends the messages to the users registered on the server database. Therefore, this training prototype required teachers to register in the system.

The two-way SMS model is categorised as pull-based information (Susanto et al., 2008). However, in the model, the interaction starts from the users and the service provider replies to the SMS, whereas in the training prototype, the two-way SMS was used for training assessment. Thus, the training providers began the interaction by sending an SMS to the participants, then the participants replied to the SMS.

Services in the notification level required a database of users with their mobile phone number and a GSM modem connected to a computer with an SMS server application installed (Susanto, 2012). Alternatively, an available SMS broadcast service could be used. For the two-way SMS service mode, Susanto (2012) suggests using similar technologies as the notification level and added an administrator to operate the system.

The training used an SMS gateway application installed on an SMS server that broadcast messages for the one-way SMS (the notification level services) and processed any incoming messages for the two-way SMS (the communication level services). The SMS gateway is the fastest and most reliable way for mass SMS sending that allows providers to connect their computer with their clients' mobile phones through SMS (Katankar & Thakare, 2010).

The SMS server system was a PC Intel Core i7 CPU 2.67 GHz, RAM 16GB on which Windows XP was installed as the operating system, and MySQL 4.0.25 as the database. A GSM modem, Wavecom Fast track, was connected to an internal Telkomsel mobile SIM card. Figure 6.2 shows the system architecture of the prototype.

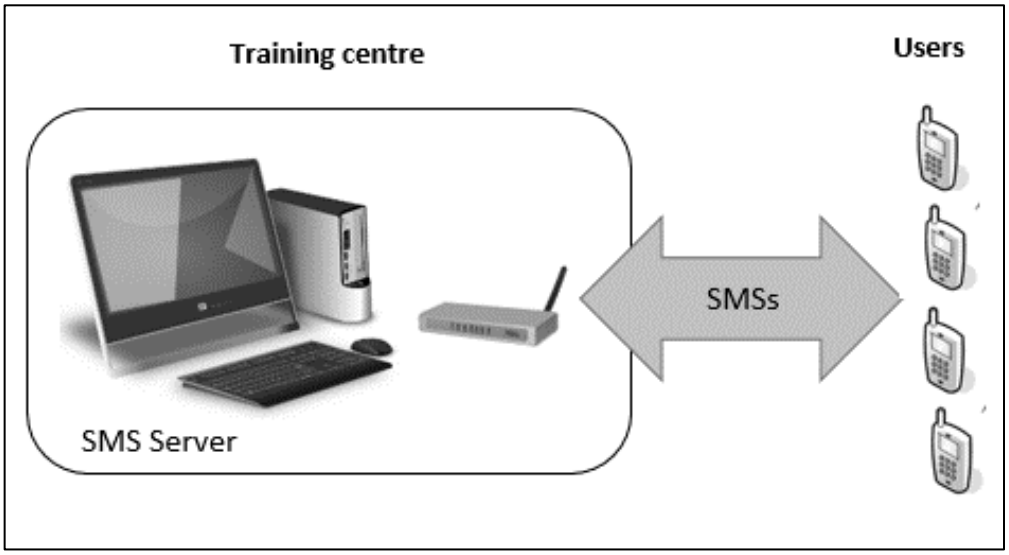

Figure 6.2. System architecture of the prototypes

The SMS gateway application installed in the server was developed using the JAVA programming language. Figure 6.3 shows the user interface of the SMS gateway application. There were 12 menus provided in the application. Single SMS sends a message to a single number (one participant) while Group SMS enables the training administrator to send a message to a group of numbers. All SMSs contained training content and their delivery schedule can be seen in the Schedule SMS menu.

Using the Address book, the administrator can manage the database of mobile numbers registered for receiving the training contents. The administrator set a reply

for incoming messages in the Autoreply SMS tab. The Inbox stores all incoming messages from the participants. The SMS report provides information on the SMSs sent to the participants.

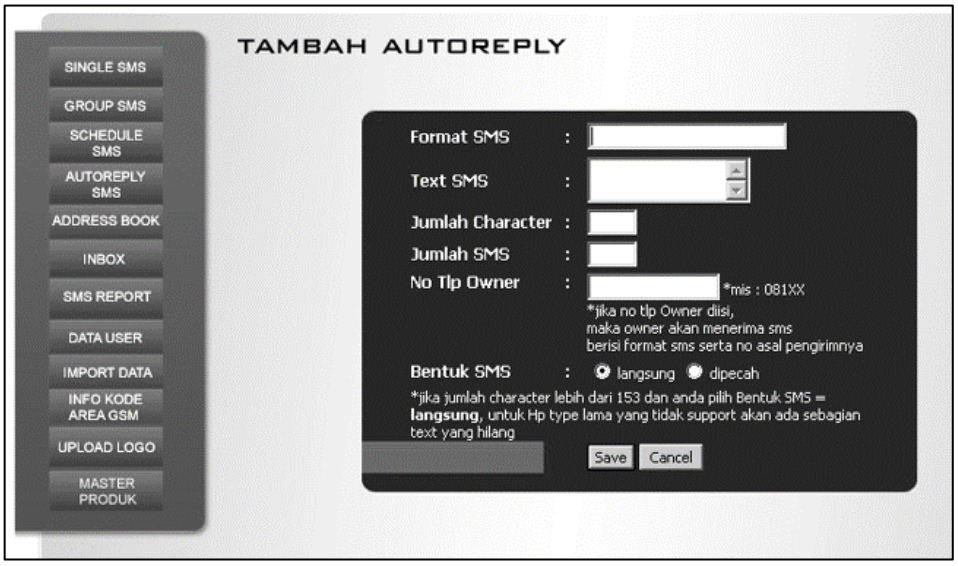

Figure 6.3 The User interface of the SMS gateway application

The training administrator is able to add another administrator through the Data User tab. Using Import Data, the administrator can import data from database to Microsoft Excel and vice versa. The Info Kode Area GSM provides information on the providers and area code of the number. The two last functions; the Upload Logo and the Master Produk, are used respectively to add pictures to the application user interface and to start another usage of the application.

6.3 The trial system process

The implementation of the ICT training prototype consisted of three sequential activities; registration, the ICT training, and online survey as shown in Figure 6.4. The following sections describe each activity in this stage of the study.

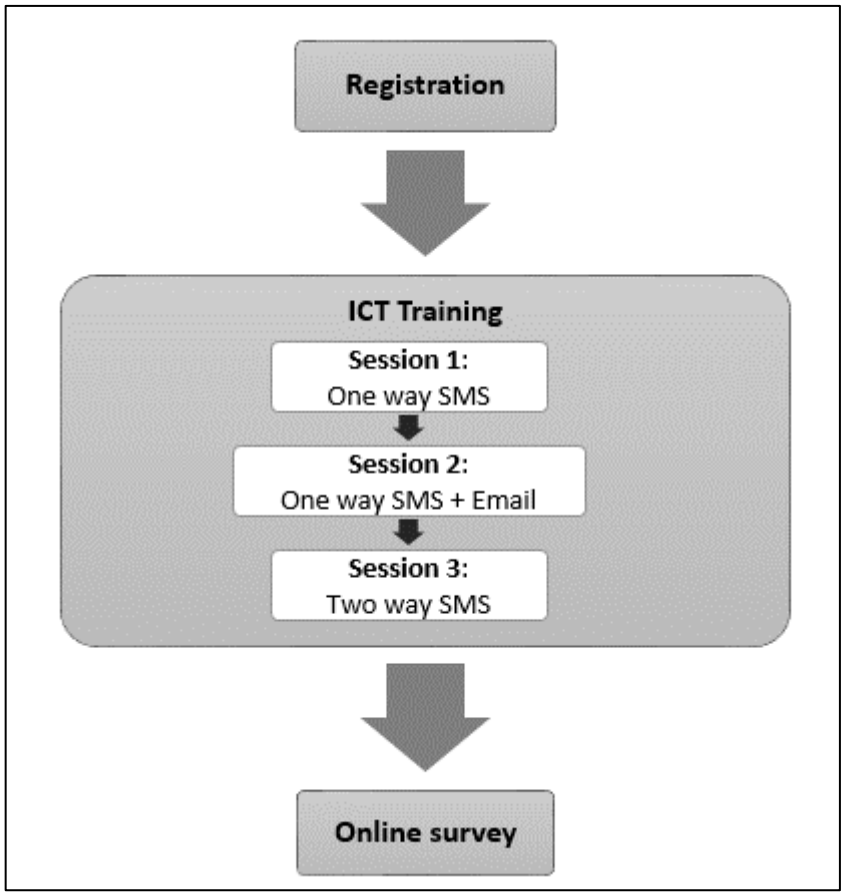

Figure 6.4 The training prototype process

6.3.1 Registration

Teachers who were interested in participating in this trial study were required to register to the training system. For registration, teachers must send a message "*Daftar*" (register) to the training centre number. On receipt, the SMS server sent a reply to confirm the registration and the start date of training.

6.3.2 The training

The training consisted of three sessions. Table 6.1 shows the training activities. Session 1 was a one-way SMS from the training provider to participants. The provider sent SMSs containing the learning material to participants' mobile phones. Participants did not have to reply to the messages, they were just expected to read and store them in their mobile phones. The topic in this session was an introduction to email.

In Session 2, participants received an SMS that guided them to sign up and send an email. This session was also one-way SMS, but required responses from participants. Participants responded by sending an email to the training provider's email. The last session (Session 3) was a two-way SMS between the training provider and participants. The provider sent an SMS containing questions on the previous the session's topics. Participants were required to answer the questions by replying to the SMS.

Table 6.1 The training activities

Session	Topic	SMS content	Time for the session
Session 1	The introduction of email	Information session What is email? Benefit of having email Ethics in email	3 days
Session 2	Using email	Information session Step by step to sign up an email Signing in and logging out Composing email Replying and forwarding email Attachment in email Tasks reminder	7 days
Session 3	Assessment	Information session Questions on Session 1 topic Questions on Session 2 topic Invitation to the survey	4 days

6.3.3 Online survey

At the end of training, participants who had already sent an email to the training provider as part of Session 2 received the link to an online survey in their emails. The survey was intended to collect data on participants' experience in the training by asking about the completion of the training, time and place for training, and their comments and feedback on the training.

6.4 Trial results

The prototype training was carried out over two weeks. The participants were high school teachers in South Sulawesi Province, Indonesia. The participants received an SMS four times a day at 8 am, 11 am, 2 pm and 5 pm. The SMS content varied between learning materials, session information and reminders. The training was carried out in three classes with 45 teachers registered in each class. From 135 teachers registered in the training system, 133 teachers completed the survey. The following sections present the results of the survey on teachers' experience in participating in the training prototype.

6.4.1 The demographic profile of participants

Table 6.2 summarises the respondent profile. There were more female than male teachers in this study (64.7% compared to 35.3%) and the largest group was aged between 41 and 50 years-old, 36.8% of the total. The highest education level achieved by the majority of the participants was a bachelor degree (66.9%) followed by a master degree (24.8%) and a diploma degree (8.3%). No teachers with a doctoral degree participated in this study. More than 30% of participants had up to seven years of experience as a teacher.

Of the participants, 56.4% were teaching in junior high schools, while 29.3% and 14.3% respectively were working in senior high schools and vocational high schools. Around 24% of the participants were from schools located in the capital city of the province. Many participants (56.4%) were from schools located more than 100 kms from the capital city of the province.

The participants taught social sciences (24.8%), science (12.8%), mathematics (15.0%), English (11.3%) and Bahasa (7.5%). Participants who taught subjects including Religion, local languages, citizenships, arts, physical education, and specialization subjects were categorised as 'other' (19.5%). There were 55% who had side-task, such as student advisor, student patron, and laboratory staff, while 44.4% only taught.

The demographic profiles of participants in this trial study were similar to the participants' profile in the first survey of this study (Chapter 5). Additionally, the

majority of teachers who participated in the trial study worked in schools located more than 100 kms from the capital city of the province. This result implies that location was not an obstacle for teachers to participate in the trial.

Table 6.2 The demographic profile of the participants

(N=133)	Frequency	Percentage (%)
Gender		
Female	86	64.7
Male	47	35.3
Age range		
21 - 30 years old	20	15.0
31 - 40 years old	35	26.3
41 - 50 years old	49	36.8
51 - 60 years old	28	21.1
> 60 years old	1	0.8
Academic qualification		
Diploma degree	11	8.3
Bachelor degree	89	66.9
Magister degree	33	24.8
Doctoral degree	0	0
Years of service		
0 - 7 years	44	33.1
8 - 14 years	25	18.8
15 - 21 years	23	17.3
22 - 28 years	21	15.8
29 - 35 years	17	12.8
> 35 years	3	2.3
Type of school		
General high school:		
- Junior high school	75	56.4
- Senior high school	39	29.3
Vocational high school	19	14.3
Location of schools		
In capital city of province	32	24.1
30 – 100 kms from the capital city	26	19.5
More than 100 kms from the capital city	75	56.4
Teaching subject		
Mathematics	20	15.0
English	15	11.3
Science	17	12.8
Social science	33	24.8
Bahasa	10	7.5
ICT	12	9.0
Other subjects	26	19.5
Side-task at school		
Did not have	59	44.4
Student advisor	40	30.1
Student patron	12	9.0
Laboratory staff	8	6.0
Other task/position	14	10.5

6.4.2 The completion of training

Of the 133 participants who completed the survey, 72.18% claimed that they finished all training sessions, while 27.82 % of participants admitted they did not complete the sessions (Figure 6.5). Figure 6.5 also shows that of the 27.82% of participants who did not complete the training, 18.05% and 9.77% respectively did not finish Session 2 and Session 3.

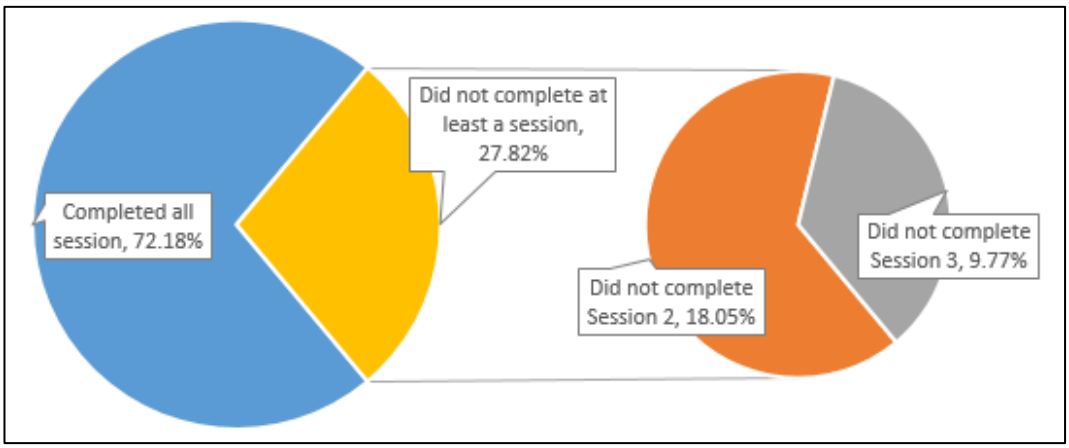

Figure 6.5. Participants' training completion

Figure 6.6 shows the reasons why the participants did not complete the sessions. The main reasons were they forgot (15.04%), did not have time (7.52%), and did not know how (3.76%). Not receiving an SMS was the reason given by 1.5% of participants for unfinished sessions.

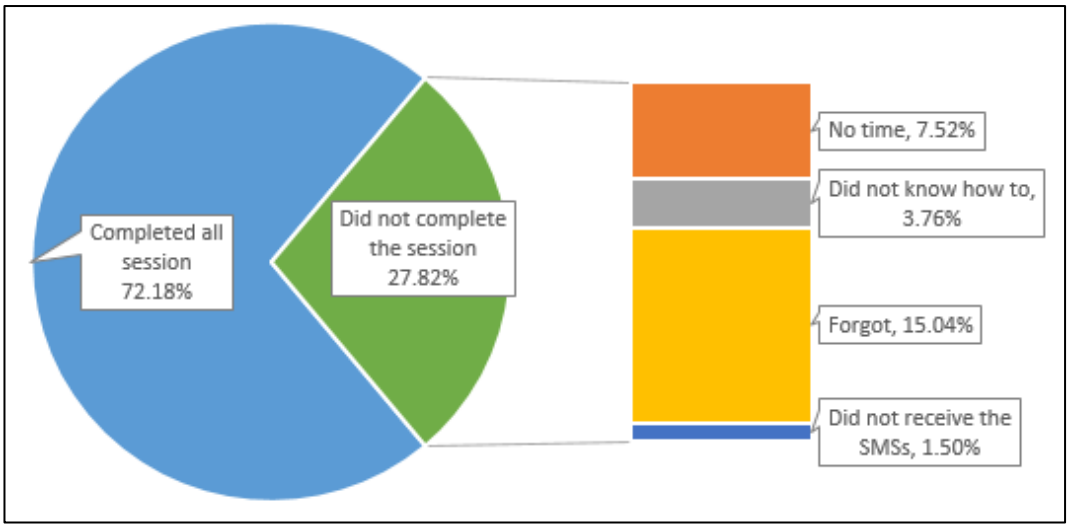

Figure 6.6. Reason for uncompleted sessions

6.4.3 The time and location for the training

Participants' preference of time and location for conducting the training activities is depicted in Figure 6.7. The majority of participants felt it was convenient to conduct the activities during their spare time at school including at lunch time (41.35%), between their classes (22.56%), and before meetings (5.26%).

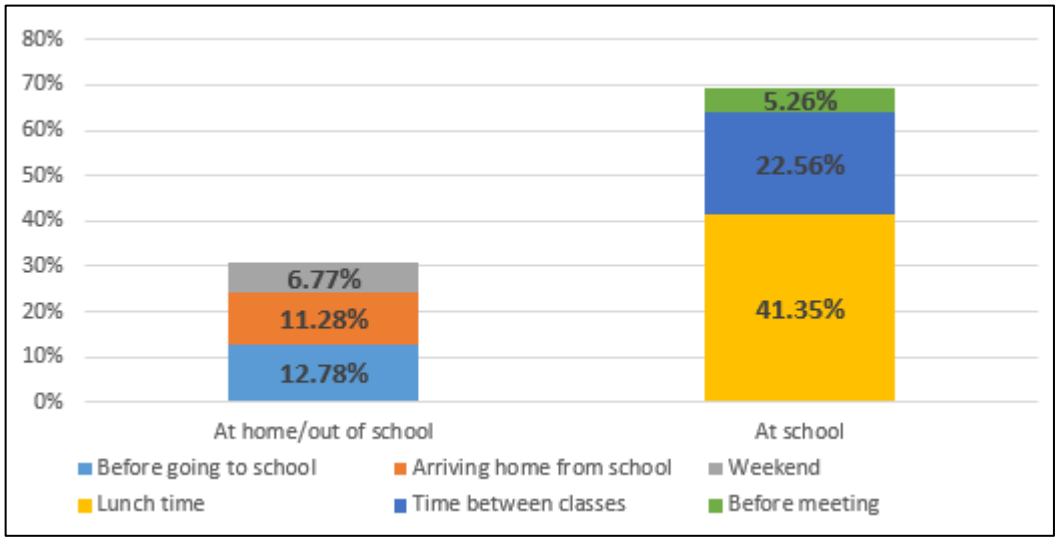

Figure 6.7. Time and location for conducting training

Some teachers preferred to carry out the activities at home or out of school with 12.8% and 11.3% of the teachers respectively doing the activities before and after school, and 6.8% of the teachers doing the tasks on the weekend.

6.4.4 Feedback from the participants

The survey also requested teachers to give comments on the training prototype. The comments were categorised into three themes; revisit and re-use, training, and reminder.

Some teachers admitted that initially they thought the training was hard, but once they tried, they found it was easy. Their initial assumptions came from their unclear idea of what mobile learning is.

In accordance with the time for conducting the activities, some teachers commented that this training allowed them to revisit the material. They stated that they just saved the SMS when they received it. Later they read the SMS carefully and then carried out the activities when they had time.

Other teachers reported that they re-used the SMSs to teach other people such as family and friends. They forwarded the training contents to their friends. They also showed the SMS to others then practised together.

In this training, some reminders of the task completion dates were sent to the participants. Some teachers mentioned that the SMS reminders were useful for them. The reminders helped them to engage in the training. The teachers also asked for more reminders of the tasks' due dates.

6.5 Discussion

The demographic profile of participants showed that the majority of participants lived more than 100 kms from the capital city of South Sulawesi Province, Makassar. The results of this trial show that location was not a barrier for teachers to participate. This finding confirms that mobile learning can provide more access to learning without the challenge of geographic boundaries.

The results show that teachers did not carry out the activities right after they received their SMS. Instead they carried out the tasks at the times and places they felt convenient. This confirms the flexibility of mobile learning, which enables teachers to pursue training according to their own schedule as stated by Valk et al. (2010).

Regarding free time, most participants in this study made use of their free time in schools for conducting the training activities. Even though some participants did the training activities at home or in out-of-schools hours, they also did the activities in their free time. Similar results were found in a study on mobile learning for teachers by Seppälä and Alamäki (2003), who report that teachers could utilise spare time in their working hours effectively for learning because of mobile learning.

The findings also indicate that teachers in this trial study had the freedom to decide where and when to conduct the tasks. This freedom brought teachers to the right time and the right place to learn and gave teachers the experience of the authentic joy of learning (Seppälä & Alamäki, 2003). The freedom confirmed the importance

of mobility for mobile learning. These characteristics enable learners to practise learning anytime and anywhere (Valk et al., 2010; Wang & Ryu, 2009) and is supported by the portability and the features of mobile devices (Naismith et al., 2004).

Even though teachers were free to decide where and when to conduct the training, they showed their commitment to learning. The majority of the teachers claimed that they finished all sessions in this training. However, some participants did not complete the sessions in the trial study due to forgetfulness. This finding shows a limitation of mobile learning from the learners' side (Abu-Al-Aish, 2014). In order to overcome this limitation, a reminder played an important role in the training. The reminder supported learners' progress.

This study also confirms that mobile learning supports asynchronous learning as some participants kept their SMSs and revisited them when they had time to practise. Re-usability of the training content was thus shown in this trial.

6.6 Summary and conclusions

This chapter reported on the trial of the mobile learning prototype that was developed and run to give a mobile learning experience to teachers.

From this trial study, it can be concluded that ICT training in the form of mobile learning solved the teachers' problems of participating in training due to location, time, and limited seat availability. Accordingly, this trial study confirmed the mobility characteristic of mobile learning, which is supported by the portability and features of mobile phones. The mobile learning tagline 'learning anytime and anywhere' was incorporated in this training prototype.

The survey at the end of this trial study also gathered data on teachers' acceptance of mobile learning. The following chapter reports on the investigation of the factors affecting teachers' acceptance of mobile learning.

CHAPTER 7. FACTORS AFFECTING TEACHERS' ACCEPTANCE OF MOBILE LEARNING

7.1 Introduction

At the end of the trial study, an online survey was conducted to assess teachers' experiences and acceptance of mobile learning for ICT training. As reported in Chapter 6, overall the training received good feedback from the participants. The survey found geography and time constraints were no longer boundaries for teachers to participate in training. The assessment of teachers' acceptance of mobile learning is reported in this chapter.

In this stage of the research, the factors influencing teacher's intention to participate in mobile learning and the relationships among the factors were investigated. In addition, this stage also attempted to define which factors are the most important in determining teachers' acceptance of mobile learning. In order to achieve the objectives, a structural model based on the TAM was developed.

This chapter presents a discussion of the research model and the hypotheses developed. The analysis of the data and the results are then presented, followed by a discussion and the chapter's conclusions.

7.2 Research model and hypotheses

TAM is the most widely adopted theoretical framework to study technology acceptance. TAM has been proven to help predict and define the acceptance of users toward information systems (Legris, Ingham, & Collerette, 2003; Park & Kim, 2014). TAM has been validated, extended, and elaborated across varied technologies, situations and tasks, and can successfully predict information system acceptance behaviour (Marangunić & Granić, 2015).

TAM proposes that external factors can influence intention via mediated effects on the constructs of perceived ease of use and perceived usefulness (Park, 2009). In the mobile learning environment, external factors such as characteristics of mobile technology, personal condition, organisational context, and social atmosphere may

affect these TAM constructs (Park et al., 2012). Considering the factors that might affect teachers' acceptance of mobile learning, as discussed in the literature review, this study proposed three constructs as the external variables. The social norm construct was included in the proposed research model as a focus on the organisational setting of teachers in Indonesia and named institutional influence.

In terms of mobile phone characteristics, the study considered perceived mobility value as an external variable. Last, self-efficacy was also included as an external variable in the study in regard to the capability of teachers in using mobile learning. Table 7.1 shows the research variables and their conceptual description.

Table 7.1. The conceptual definition of the research variables

Research variables	Conceptual description	Reference
Behavioural Intention	A teacher's subjective probability that they will use mobile learning	Bagozzi et al. (1991)
Perceived Usefulness	The degree to which a teacher believes that using mobile learning would enhance they job performance	Davis et al. (1989); Venkatesh and Davis (1996)
Perceived Ease of Use	The degree to which a teacher believes that using mobile learning would be free of effort	Davis et al. (1989); Venkatesh and Davis (1996)
Perceived Mobility Value	The degree to which a teacher perceives the value of mobility	Huang et al. (2007)
Self-Efficacy	The degree to which a teacher believes they have capabilities to use mobile learning	Compeau and Higgins (1995)
Institutional Influence	The degree to which the school's management and colleagues influence a teacher's intention to use mobile learning	Venkatesh and Davis (1996)

With TAM as the core model, institutional influence, perceived mobility value, and mobile learning self-efficacy were included to form a composite model to assess teachers' acceptance of mobile learning for ICT training. Figure 7.1 show the research model developed for this study.

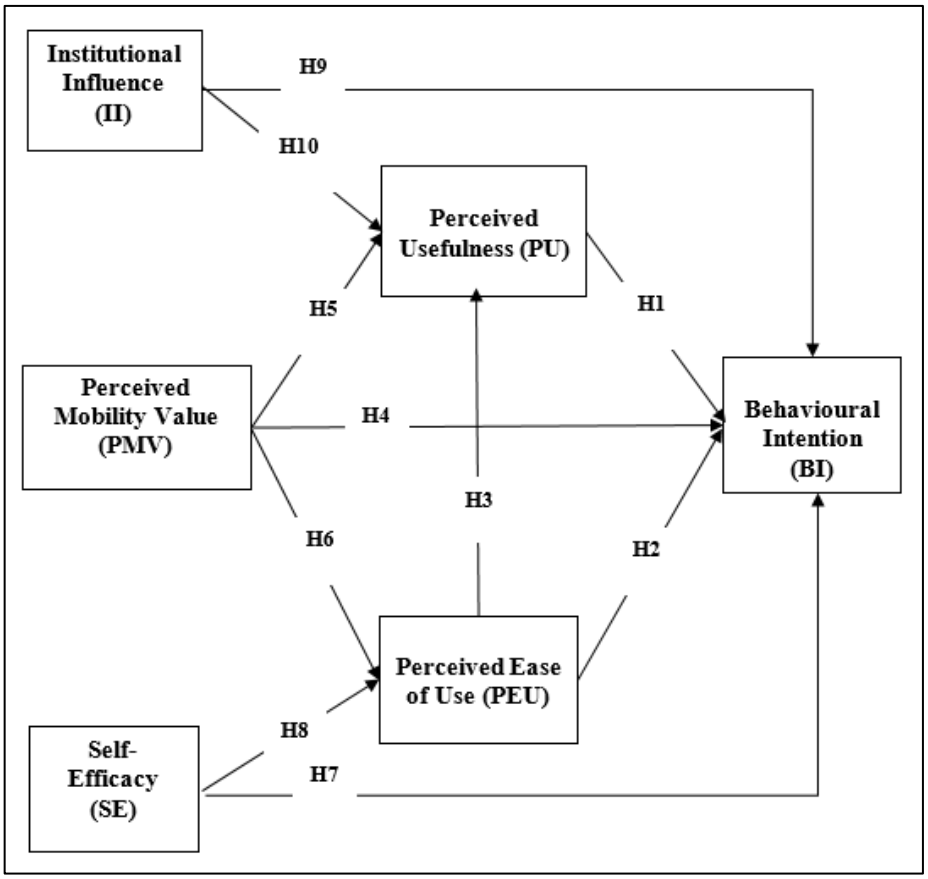

Figure 7.1. Proposed research model

The following section describes in detail all hypotheses concerning the relationships among the constructs in the research model.

7.2.1 Perceived usefulness

Perceived usefulness is a fundamental construct of TAM. In this study, perceived usefulness is defined as the extent to which a teacher believes using mobile learning for ICT training would increase their learning performance. Perceived usefulness was hypothesised to be a determinant of intention to use the technology, and hence, the behaviour of acceptance to the technology by the individual (Polancic, Hericko, & Rozman, 2010; Yuen & Ma, 2002). Therefore, this study hypothesised:

H1: Perceived usefulness has a positive effect on intention to accept mobile learning for training.

7.2.2 Perceived ease of use

Similar to perceived usefulness, perceived ease of use is also an important construct of TAM. Perceived ease of use in the study refers to the degree to which the teachers believe that using mobile learning for ICT training would be free of effort. This was hypothesised to be a fundamental determinant of intention. The result of studies by Wang et al. (2009) and Polancic et al. (2010) show that perceived ease of use has a direct positive effect on the behavioural intention to use a particular technology. Thus, it was hypothesised that:

H2: Perceived ease of use has positive effect on intention to accept mobile learning for training.

A study by Karahanna and Straub (1999) verified that perceived usefulness was affected by perceived ease of use. Therefore, the same relationship was expected in this study and led to the hypothesis that:

H3: Perceived ease of use has a positive effect on perceived usefulness of mobile learning for training.

7.2.3 Perceived mobility value

Perceived mobility value was first proposed as an external variable in a technology acceptance study by Huang et al. (2007). It signifies the awareness of an individual to the mobility characteristics of mobile learning. Previous research states that mobile users appreciate the main advantages of mobile learning; efficiency and availability, and these advantages are a result of the mobility characteristics of a mobile device (Chen, Kao, & Sheu, 2003; Hill & Roldan, 2005). Park, Baek, Ohm, and Chang (2014) applied perceived mobility value to determine the acceptance of a mobile social network game, while Park and Kim (2014) used perceived mobility value for research on mobile cloud services.

Mobility is the main characteristic of mobile learning that allows users to access learning anywhere and anytime through mobile devices. Because of the mobility, learners are able to obtain guidance and support in learning situations when and where it is necessary (Huang et al., 2007). Therefore, perceived mobility value was

hypothesised as a significant factor affecting a user's behavioural intention in using mobile learning.

H4: Perceived mobility value has a positive effect on intention to accept mobile learning for training.

Furthermore, users who perceived the value of mobility will understand the uniqueness of mobile learning and have a strong perception of its usefulness and ease of use (Huang et al., 2007). This led to the following hypotheses:

H5: Perceived mobility value has a positive effect on perceived usefulness of mobile learning for training.

H6: Perceived mobility value has a positive effect on perceived ease of use of mobile learning for training.

7.2.4 Self-efficacy

Self-efficacy was derived from the general concept of self-efficacy by Bandura (1982), who defines it as an individual's judgements of their capabilities to organise and perform actions required to accomplish selected types of performances.

Venkatesh and Davis (1996) propose self-efficacy as an antecedent of perceived ease of use. Studies by Compeau and Higgins (1995), and Park and Chen (2007) on the adoption and acceptance of technologies found that self-efficacy has a significant effect on perceived ease of use and intention to use. A mobile learning acceptance study conducted by Lu and Viehland (2008) also found a significant effect of self-efficacy on perceived ease of use and behavioural intention. Therefore, the study hypothesised that:

H7: Self-efficacy has a positive effect on intention to accept mobile learning for training.

H8: Self-efficacy has a positive effect on perceived ease of use of mobile learning for training.

7.2.5 Institutional influence

The third external variable in this study is institutional influence. This variable was derived from the subjective norm in TPB, which is the decision of a person to perform a behaviour depending on the opinion of other people who are important to them (Ajzen, 1991). Some research indicates that the subjective norm has a direct effect on the behavioural intention of an individual to use new technology (Thompson, Higgins, & Howell, 1991; Venkatesh & Davis, 2000).

The rationale for the direct effect of the subjective norm on intention is that a person may perform a particular behaviour only because of encouragement or order from another person without seeing what the benefit or consequences of the behaviour are on themselves (Venkatesh & Davis, 2000).

H9: *Institution influence has a positive effect on intention to accept mobile learning for training.*

The subjective norm, or the institutional influence in this study, was comprised of two dimensions: *superior influence* and *social or peer influence*. Superior influence indicates the degree of an individual's immediate supervisors in encouraging their subordinates to use mobile learning services (Taylor & Todd, 1995). Some research supports the hypothesis of a supervisor's influence on individual acceptance in terms of usage (Igbaria, Parasuraman, & Baroudi, 1996; Karahanna & Straub, 1999), and in terms of persuasive communication (Leonard-Barton & Deschamps, 1988).

In this study, superior influence is represented as *school management influence*, which indicates the extent that immediate school management members directly encourage or stimulate their teachers to use mobile learning services.

The behavioural intention of users also can be affected by their peers' advice and the popularity of the technology among their peers (Karahanna & Straub, 1999; Taylor & Todd, 1995). The influence of peer usage can also come from noticing and watching their peers use the technology (Thompson et al., 1991). Witnessing

the extensive use of mobile learning services by their colleagues can influence a teacher's opinion about its usefulness.

H10: *Institution influence has a positive effect on perceived usefulness of mobile learning for training.*

Table 7.2 summarises the hypotheses in the study.

Table 7.2. The descriptions of the research hypotheses

Hypotheses	Description	Path
H1	Perceived usefulness has a positive effect on intention to accept mobile learning for training.	PU → BI
H2	Perceived ease of use has a positive effect on perceived usefulness of mobile learning for training.	PEU → BI
H3	Perceived ease of use has a positive effect on intention to accept mobile learning for training.	PEU → PU
H4	Perceived mobility value has a positive effect on intention to accept mobile learning for training.	PMV → BI
H5	Perceived mobility value has a positive effect on perceived usefulness of mobile learning for training	PMV → PU
H6	Perceived mobility value has a positive effect on perceived ease of use of mobile learning for training	PMV → PEU
H7	Self-efficacy has a positive effect on intention to accept mobile learning for training.	SE → BI
H8	Self-efficacy has a positive effect on perceived ease of use of mobile learning for training.	SE → PEU
H9	Perception on institution influence has a positive effect on intention to accept mobile learning for training.	II → BI
H10	Institution influence has a positive effect on perceived usefulness of mobile learning for training.	II → PU

Note: PU = perceived usefulness; PEU = perceived ease of use; PMV = perceived mobility value; SE = self-efficacy; II = institutional influence; BI = behavioural intention

7.3 Survey method

In order to test the hypotheses, a questionnaire was developed, consisting of 18 items to measure the six research variables. The items asked questions about perceived mobility value, self-efficacy, institutional influence, perceived ease of use, perceived usefulness, and behavioural intention of teachers on mobile learning for ICT training

Table 7.3. The operational definitions of the research variables

Research variables	Operational definition		Adapted from
Behavioural Intention (BI)	BIa	I intend to use mobile learning for training when it becomes available.	Bagozzi et al. (1991)
	BIb	I predict that I would use mobile learning frequently	
	BIc	I would recommend my colleague to use mobile learning for training.	
Perceived Usefulness (PU)	PUa	Using mobile learning would save me much time.	Davis et al. (1989); Venkatesh and Davis (1996)
	PUb	Mobile learning would enhance my effectiveness in learning.	
	PUc	Overall, mobile learning would be useful.	
Perceived Ease of use (PEU)	PEUa	Learning to use mobile learning was easy for me.	Davis et al. (1989); Venkatesh and Davis (1996)
	PEUb	My interaction with mobile learning was clear and understandable.	
	PEUc	Overall, I found mobile learning easy to use.	
Perceived Mobility Value (PMV)	PMVa	I know that mobile devices are the medium for mobile learning.	Huang et al. (2007)
	PMVb	It is convenient to access mobile learning anywhere at any time.	
	PMVc	Mobility is an outstanding advantage of mobile learning for training.	
Self-Efficacy (SE)	SEa	I could complete the task in mobile learning if I had the manuals for reference.	Compeau and Higgins (1995)
	SEb	I could complete the task in mobile learning if I had seen someone else using it before trying myself.	
	SEc	I could complete the task in mobile learning if I had someone who showed me how to do it.	
Institutional Influence (II)	IIa	I would like participate in mobile learning for training if my institution asked me to.	Venkatesh and Davis (1996)
	IIb	I would like to participate in mobile learning training if a certificate of training completion was provided.	
	IIc	I would like to participate in mobile learning for training if my colleagues also want to participate.	

Operational definitions of the study instruments are shown in Table 7.3. For each variable, a multiple-item scale was developed where each item was measured based on a 5-point Likert scale, ranging from 1 (*completely disagree*) to 5 (*completely agree*). The items used in the questionnaire were adapted from research into mobile learning in a teacher training context as shown in Table 7.3.

Similar to the previous survey, the questionnaire was in Bahasa Indonesia. The questionnaire was attached to the questionnaire assessing teachers' experience in participating in the trial study (Chapter 6). The questionnaires were combined into a survey and delivered, to teachers who participated in the trial study via email.

The detail of the participants and instrument used in the survey were explained in Chapter 4 Section 4.3.4.

7.4 Analysis and results

In this study, SEM using ML estimation was used to test the hypotheses. This study applied the two-step SEM approach as suggested by Kline (2005) and Hair et al. (2010).

The analysis started with a descriptive statistics analysis, followed by the analysis of the measurement model (EFA and CFA) and the analysis of structural model (hypotheses testing and effect measurement). SPSS 20.0 was the software used for the descriptive analysis and EFA, while AMOS 20 was the software used to assess the measurement and the structural model.

7.4.1 Descriptive statistics

Descriptive analysis was conducted to check the normality of the data. Kline (2005) recommends the data should have a skewness value of <2 and a kurtosis value of <7 to be regarded as normal data for the purposes of SEM.

Table 7.4 presents the mean, SD, skewness and kurtosis for each item in the questionnaire. All means are above the midpoint of 3.00. The *SD* ranged from 0.437 to 0.671 indicating a narrow spread around the mean. Most items had negative skewness values, which ranged from - 1.407 to 0.391, indicating the clustering of

scores was at the high end. The kurtosis value of the items ranged from 0.755 to 3.397, indicating the distribution of scores had heavier tails and higher peaks than the normal distribution.

Table 7.4. The descriptive statistics of the items

Item	*M*	*SD*	Skewness	Kurtosis
PMVa	4.11	0.487	0.281	0.973
PMVb	4.08	0.585	- 0.470	1.799
PMVc	4.10	0.549	- 0.222	1.532
SEa	3.98	0.603	- 1.047	3.302
SEb	3.97	0.563	- 0.784	2.883
SEc	3.97	0.550	- 0.296	1.362
IIa	4.26	0.586	- 0.343	0.755
IIb	4.12	0.565	- 0.232	1.216
IIc	4.06	0.671	- 0.832	1.867
PUa	4.20	0.600	- 0.750	2.688
PUb	4.26	0.635	- 0.812	1.998
PUc	4.14	0.566	- 0.488	2.365
PEUa	4.08	0.437	0.391	2.101
PEUb	3.98	0.577	- 0.961	3.397
PEUc	4.04	0.608	- 0.838	2.744
BIa	4.08	0.445	0.390	1.892
BIb	3.98	0.507	- 0.318	2.385
BIc	4.14	0.489	0.319	0.793

Note: PUx = perceived usefulness x; PEUx = perceived ease of use x; PMVx = perceived mobility value x; SEx = self-efficacy x; IIx = institutional influence x; BIx = behavioural intention x

The data indicate that the skewness value of the items were within the range of - 2 and +2 while the kurtosis values were below 7. Therefore, the data was regarded as normal and acceptable to be analysed using SEM.

7.4.1.1 The demographic profiles and the factors affecting teachers' acceptance of mobile learning

In order to better understand teachers' acceptance of mobile learning using a mobile phone, this study also investigated whether there were differences in the perceived mobility value, institutional influence, self-efficacy, perceived usefulness, perceived ease of use, and behavioural intention scores for participants based on their demographic profiles. The demographic profiles of the participants in the study was presented in Chapter 6 Section 6.4.1.

An independent-sample *t*-test was conducted to compare the mean scores of the factors by gender. ANOVA tests were conducted to compare the mean score of the factors based on participants' age, academic qualification, years of service, type of school, location of school, the teaching subject, and side-task.

The first test investigated how the scores of perceived mobility value, self-efficacy, institutional influence, perceived usefulness, perceived ease of use, and behavioural intention compared between female and male teachers. An independent-samples *t*-test was conducted for this comparison, resulting in no significant difference in the scores for female and male teachers.

This finding suggests that difference in gender did not affect teachers' perceived mobility value, institutional influence, self-efficacy, perceived ease of use, perceived usefulness, and behavioural intention of mobile learning.

A one-way ANOVA was conducted to explore the effect of age on the acceptance variables. Participants were divided into five groups based on their age (Group 1: 21–30 years-old, Group 2: 31–40 years-old, Group 3: 41–50 years-old, Group 4: 51–60 years-old, Group 5: >60 years-old).

The assumption of homogeneity among teachers based on their age for all variables was accepted. Then a one-way ANOVA was performed to compare the scores of acceptance factors for the teachers' age groups. The result of the ANOVA test showed that the scores of all variables for these groups of teachers did not differ significantly. These findings indicate that teachers' age did not affect their perceived mobility value, institutional influence, self-efficacy, perceived ease of use, perceived usefulness, and behavioural intention of mobile learning.

Subsequently, the comparison of teachers based on their academic qualifications on the acceptance variables was performed. Since there were no participants with a doctoral degree, teachers were divided into three groups based on their academic qualification of diploma, bachelor, and master.

The assumption of homogeneity among teachers based on their academic qualifications for all acceptance variables was accepted. The result of the ANOVA

test to compare the acceptance factors between the teachers' academic qualification groups showed that there was no significant difference in the scores of acceptance variables for the three teacher groups.

These findings reveal that teachers' perceived mobility value, institutional influence, self-efficacy, perceived ease of use, perceived usefulness, and behavioural intention for mobile learning were not affected by their academic qualification.

The acceptance of the mobile learning variables was also compared across teachers based on their years of experience as a teacher. Teachers were divided into six groups; 1–7 years of service, 8–14 years of service, 15–21 years of service, 22–28 years of service, 29–35 years of service, and more than 35 years of service.

The assumption of homogeneity among teachers based on their years of experience for all acceptance factors was accepted. The ANOVA test was performed to compare the acceptance of mobile learning variables by teachers based on their lengths of service. It was found that the scores of all variables for these groups of teachers did not differ significantly which means that participants' years of experience as teacher did not affect their perception of mobile learning.

The comparison of teachers based on their type of school for the acceptance variables was also performed for the three types of school the participants worked in; junior, senior, and vocational high schools.

The assumption of homogeneity among teacher groups based on their type of school for all variables was accepted, except for the behavioural intention variable. Therefore the Welch test was performed for this variable and resulted in $p = 0.244$. This means that the scores of this variable for the six groups of teachers was not significantly different.

ANOVA tests were employed to assess the difference in the acceptance factors, except for the behavioural intention variable, for the three types of school groups. Table 7.5 shows a statistically significant difference at the $p < 0.05$ level in

perceived usefulness scores for the three types of school groups: F (2, 130) = 9.079, p = 0.000.

Table 7.5. ANOVA test for the acceptance variables differences between groups by type of school

Variable and source		Sum of square	Mean square	*F* (2,130)	*Sig.*
PMV					
	Between Groups	0.143	0.072	0.315	0.730
	Within Groups	29.537	0.227		
SE					
	Between Groups	1.088	0.544	2.155	0.120
	Within Groups	32.831	0.253		
II					
	Between Groups	0.414	0.207	0.710	0.494
	Within Groups	37.884	0.291		
PU					
	Between Groups	4.465	2.233	9.079	0.000
	Within Groups	31.968	.246		
PEU					
	Between Groups	1.180	0.590	2.685	0.072
	Within Groups	28.274	0.220		

Post-hoc comparisons for the perceived usefulness variable was performed and the results are presented in Table 7.6. The results indicate that the mean scores of the perceived usefulness variable for the vocational high school teachers group (M = 4.650, SD = 0.392) was significantly different from the junior high school teachers' group (M = 4.129, SD = 0.561) and the senior high school teachers' group (M = 4.120, SD = 0.394).

Table 7.6. The post hoc comparison for perceived usefulness variables

Dependent variable	(I) School	(J) School	Mean differences (I - J)	Standard error
Perceived usefulness	Junior high school	Senior high school	0.0092	0.0904
		Vocational high school	- 0.5203*	0.1109
	Senior high school	Junior high school	- 0.00092	0.0904
		Vocational high school	- 0.5295*	0.1099
	Vocational high school	Junior high school	0.5203*	0.1109
		Senior high school	0.5295*	0.1099

** The mean difference is significant at the .05 level*

These findings imply that the type of school affected teachers' perception about the usefulness of mobile learning. Teachers who taught in vocational high schools had a higher level of perceived usefulness about mobile learning than their colleagues in junior and senior high schools.

The acceptance of mobile learning variables was also compared across teachers based on school location. In this category, teachers were divided into three groups; in the capital city of the province, 30 - 100 kms from the capital city of the province, and more than 100 kms from the capital city.

The assumption of homogeneity among teachers based on their school's location for all variables were accepted, except for self-efficacy. Therefore the Welch test was performed for this variable, resulting in $p = 0.736$. The mean score on this variable for the three groups of teachers was not significantly different.

The ANOVA test was also performed to compare the acceptance of mobile learning variables by teachers based on the location of their schools. It was found that the scores of all variables for school location groups did not differ significantly, which means that the location of teachers' schools did not affect their perceived mobility value, self-efficacy, institutional influence, perceived ease of use, perceived usefulness, and behavioural intention for mobile-learning-based training.

A comparison of teachers based on their teaching subject and the acceptance variables was also examined. There were group of mathematics, English, science, social science, Bahasa, ICT, and other subjects teachers. The variance in scores was the same for each group, with no the significant values for all acceptance variables in the homogeneity test.

These variables were then tested using the ANOVA test, showing that there was no significant difference at the $p < 0.05$ level in the scores for all acceptance variables for the seven subjects taught by the teachers. This means that teaching subject also did not influence teachers' acceptance of mobile learning.

The last comparison of teachers' acceptance was based on their side-task at school. The groups were the did not have side task group, student advisor group, student patron group, laboratory staff group, and other side-task group.

The result of the test of homogeneity of variance of the readiness variables for these groups showed that the assumption of homogeneity among teachers based on their side tasks for self-efficacy and behavioural intention were not accepted. Therefore, the Welch test was performed for these variables resulting in the scores for the five groups of teachers based on their side-task not being significantly different.

The variables with the homogeneity assumption accepted (perceived mobility value, institutional influence, perceived ease of use, and perceived usefulness) were then tested using ANOVA test, with no significant value found in the scores of all variables. This implies that teachers' side-task in schools did not affect any of variables.

This section presented the investigation of the difference in teachers' perceived mobility value, self-efficacy, institutional influence, perceived ease of use, perceived usefulness, and behavioural intention for mobile learning using a mobile phone based on their demographic profiles. The findings reveal that factors affecting teachers' acceptance of mobile learning were not affected by their gender, age, academic qualification, years of service as teachers, location of schools, teaching subject, and side-task in schools. However, teachers' perceived usefulness of mobile learning was influenced by the type of school the teachers worked in.

7.4.2 The measurement model

This section explains the development and validity assessment of the measurement model in the study. To determine the factors that forms the measurement model, an EFA was conducted. After the measurement model was developed, validity was then assessed by performing a CFA.

7.4.2.1 Exploratory factor analysis

EFA was conducted to explore the data to identify potential factors among the variables. The results of the EFA were then used to develop a measurement model

in SEM. The 18 items of the teachers' acceptance of mobile learning were subjected to EFA using SPSS version 20.

For the EFA, this study used the ML method to extract factors, Kaiser' criteria, (eigenvalue > 1.00), to determine the retained factors for rotation, and varimax for the rotation method. ML extraction allows for the computation of GOF measures and the testing of the significance of loadings and correlation between factors (Loxton, 2014). However, ML requires the assumption of data normality. Kline (2005) recommends a skewness value of <2 and a kurtosis value of <7 for normality. The skewness and kurtosis values of the items of the study can be found in Table 7.1. The result shows that ML can be used as the method for factor extraction.

In order to be suitable for factor analysis, the data should meet the requirements of sample size, the adequacy of the relationship between variables, and the significant difference of the correlation matrix and the identity matrix. This study adapted the sample to variable ratio (*N:p* ratio) recommendation for the sample size. For factor analysis, the ratio should be within the range 3:1 to 20:1 (Hair et al., 2010). The questionnaire in this study consisted of 18 variables and the number of participants was 133. The sample size ratio for this study was 133:18 or 7.39:1. Therefore, it can be assumed that the sample size of the study was within an acceptable ratio.

The adequacy of the relationship between variables was tested using the KMO test and the significant difference of the correlation matrix and the identity matrix was assessed using the Bartlett test. The KMO index ranges from 0 to 1, with a recommended minimum value of 0.50 and the Bartlett's test should be significant ($p < 0.05$) for factor analysis to be appropriate (Hair et al., 2010; Tabachnick & Fidell, 2007).

The KMO value of 0.854 exceeded the minimum recommended value of 0.5 and the Bartlett test reached statistical significance, supporting the factorability of the correlation matrix.

After confirming that the data fulfilled the requirements of sample size and the adequacy of the relationship between variables, the significant difference of the correlation matrix and the identity matrix was assessed by extracting the data. Data extraction is used to reduce a large number of items into factors (Williams et al., 2012).

Since the ML extraction was used, a GOF test for the adequacy of the factor model can be obtained. If there are only small differences between the observed sample correlations and reproduced correlations then x^2 would be small with a corresponding large significant level ($p > 0.05$) (Loxton, 2014).

The GOF test resulted in x^2 of 56.665 with $df = 60$ at $p = 0.598$. This result indicates that the factor model is a good representation of the relationships between the observed variables.

ML analysis revealed the presence of six components with eigenvalues exceeding 1, explaining a total of 78.375% of the variance, as shown in Table 7.7. The finding indicates that six factors adequately describe the 18 items in the questionnaire.

Table 7.7. Eigenvalues, Percentages of Variance, and Cumulative Percentages for factors of the 18 items in the questionnaire

Factor	Eigenvalue	% of variance	Cumulative %
1	6.974	38.747	38.747
2	2.086	11.586	50.333
3	1.532	8.512	58.845
4	1.396	7.754	66.599
5	1.085	6.028	72.627
6	1.035	5.748	78.375

In order to aid in the understanding these six components, varimax rotation was performed. The rotated solution indicated the presence of a simple structure with all components having several strong loadings and all variables loading significantly on only one component (Hair et al., 2010).

Table 7.8. Factor loadings from ML with varimax

Items	Factor loading						R^2
	1	2	3	4	5	6	
PMVa	0.197	**0.787**	0.128	0.073	0.069	0.111	0.697
PMVb	0.090	**0.739**	0.165	0.090	0.173	0.198	0.659

PMVc	0.082	**0.712**	0.147	0.226	0.175	0.207	0.660
SEa	0.276	0.202	**0.708**	0.131	0.146	0.156	0.681
SEb	0.148	0.201	**0.735**	0.115	0.103	0.199	0.666
SEc	0.193	0.074	**0.861**	0.069	0.046	- 0.043	0.794
IIa	**0.730**	0.179	0.166	0.114	0.042	0.101	0.618
IIb	**0.809**	0.063	0.222	0.027	0.152	0.190	0.769
IIc	**0.740**	0.137	0.218	0.200	0.145	0.190	0.710
PUa	0.057	0.198	0.079	**0.734**	0.242	0.158	0.671
PUb	0.171	0.159	0.083	**0.780**	0.181	0.236	0.758
PUc	0.108	0.032	0.132	**0.685**	0.231	0.092	0.562
PEUa	0.216	0.122	0.070	0.190	**0.641**	0.176	0.544
PEUb	0.076	0.176	0.099	0.301	**0.649**	0.228	0.610
PEUc	0.061	0.146	0.124	0.244	**0.878**	0.124	0.886
BIa	0.238	0.303	0.165	0.142	0.137	**0.593**	0.565
BIb	0.080	0.153	0.177	0.260	0.245	**0.736**	0.730
BIc	0.263	0.190	- 0.005	0.156	0.177	**0.702**	0.654

As presented in Table 7.8, the factor loadings of the 18 variables were significant and well above the 0.40 threshold level, without being loaded equally highly on more than one factor. These factors adequately represent the measured variables.

7.4.2.2 Confirmatory factor analysis

The factors extracted from the EFA were then used to develop the measurement model. A CFA was performed to confirm the measurement model by assessing model validity. In the assessment, both the model fit and the criteria for construct validity were examined. The CFA/measurement model can be seen in Figure 7.2.

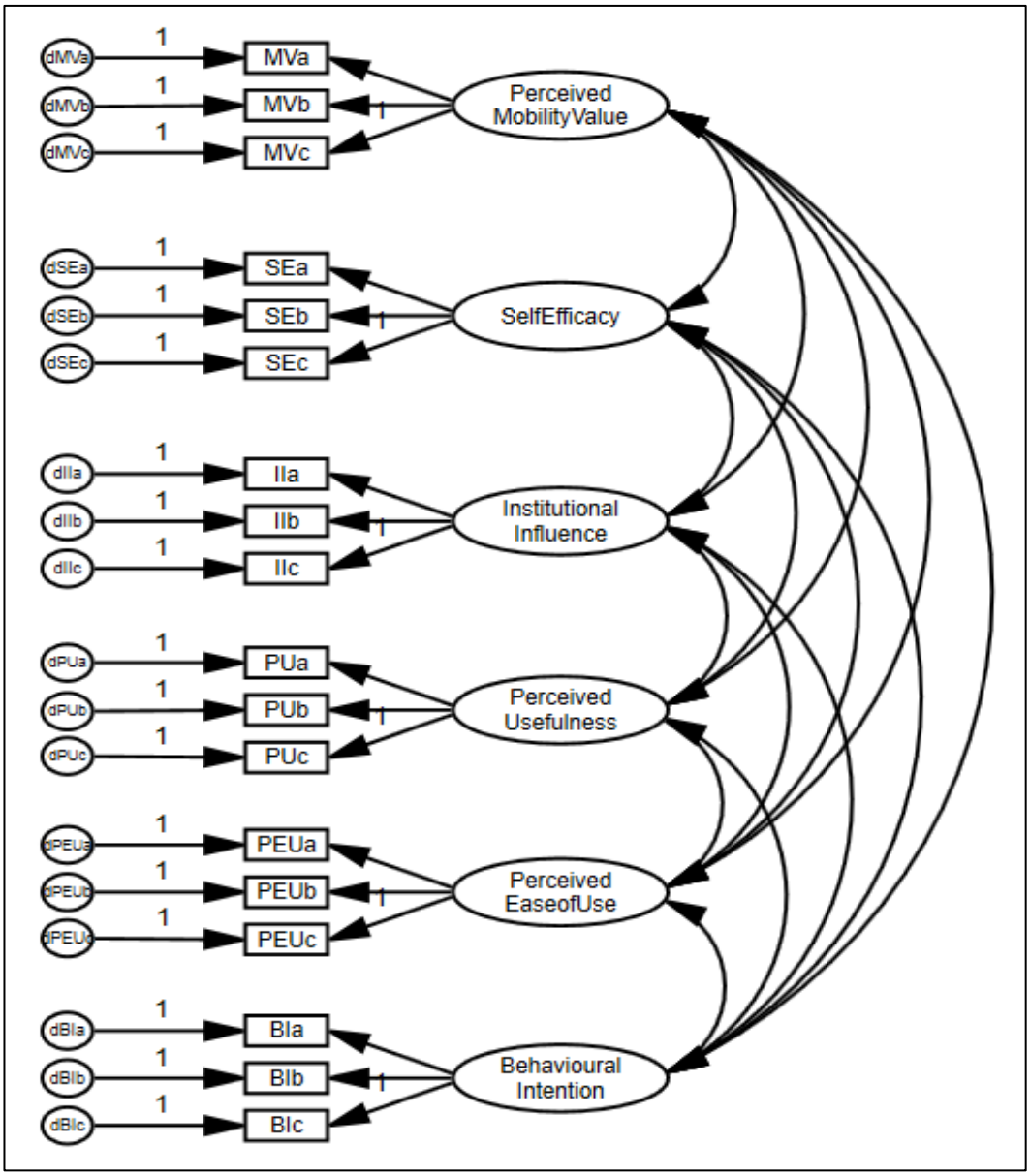

Figure 7.2. The confirmatory factor analysis/measurement model

The CFA output includes many fit indices. The GOF indices applied in this study were four absolute fit indices: the chi-square (x^2), the normed chi-square (x^2/df), the RMSEA, and the SRMR; and two incremental fit indices: the CFI and the TLI. Table 7.9 presents the selected GOF statistics from the CFA result and the recommended values of the GOF.

Table 7.9 The confirmatory factor analysis/measurement model GOF statistics

Goodness-of-Fit Index	Recommended value (Loxton, 2014)	Measurement model
Chi-square (x^2)	$p > 0.05$	146.802 and $p = 0.049$
Normed chi-square (x^2/df)	$1.0 < x^2/df < 2.0$	1.223
RMSEA	Value < 0.05 with PCLOSE > 0.05 and LO 90 = 0	0.041 with PCLOSE = 0.732 and LO 90 = 0.003
SRMR	Value <0 .06	0.0536
CFI	Value > 0.95	0.978
TLI	Value > 0.95	0.973

Table 7.9 shows that the overall model x^2 was 146.802 with the *p*-value associated with this result being 0.049. The chi-square (x^2) of the GOF statistics does not show that the observed covariance matrix fits the estimated covariance matrix within sampling variance. However, other GOF statistics of the measurement model presented different results.

It can been from the Table 7.9 that the normed chi-square (x^2/df) of the measurement model value was between 1.0 and 2.0; 1.223. This result suggests an acceptable fit for the CFA model. The RMSEA value of the measurement model also fell within the range of its recommended value. The RMSEA then provided additional support for model fit.

Similarly, the SRMR of the measurement model is 0.0536. The recommended value for the SRMR is less than 0.06, this residual suggests the data fit well to the model. Moving to the incremental fit indices, both the TLI and the CFI are greater than 0.95, also suggesting that the model is a good fit.

The CFA results suggest the measurement model indicated a good fit with the data collected. Thus it was appropriate to proceed to further examination of the measurement model in terms of convergent validity, discriminant validity, and reliability.

In order to assess the convergent validity among item measures, factor loadings, AVE, and CR were examined. Fornell and Larcker (1981) recommend the factor

loading should greater than 0.50, the AVE should equal or exceed 0.5, and the CR should be greater than 0.7 to indicate adequate convergent validity.

Table 7.10. Factor loadings and individual item reliability

Item	Factor loading (> 0.7)	R^2 (> 0.5)
PMVa	0.781	0.611
PMVb	0.822	0.676
PMVc	0.820	0.672
SEa	0.853	0.728
SEb	0.811	0.658
SEc	0.801	0.641
IIa	0.765	0.585
IIb	0.842	0.710
IIc	0.862	0.743
PUa	0.817	0.668
PUb	0.860	0.740
PUc	0.734	0.538
PEUa	0.735	0.540
PEUb	0.799	0.639
PEUc	0.890	0.792
BIa	0.756	0.571
BIb	0.819	0.670
BIc	0.775	0.601

The complete factor loadings for the observed variables are presented in Table 7.10. The factor loadings of all items in the study exceeded the recommended value of factor loading, 0.7. A squared multiple correlation (SMC) or R^2 depicts individual item reliability. An item reliability of >0.5 indicates that the item is a good measure of the construct (Loxton, 2014). All items in this study had an SMC or R^2 value greater than 0.5.

Table 7.11 presents the AVE, the CR, and the square root of the AVE value of the measurement model. The AVE values of the constructs lay around 0.6, exceeding the 0.5 rule of thumb (Hair et al., 2010). The CR values of the constructs were greater than 0.7, indicating high internal consistency of the latent constructs. These results indicate that the convergent validity of the measurement model in this study was acceptable.

Table 7.11. Analysis if variance, construct reliability, and square root of the analysis of variance

Construct	AVE	CR	PMV	SE	II	PU	PEU	BI
PMV	0.653	0.849	**0.808**					
SE	0.676	0.862	0.463	**0.822**				
II	0.679	0.864	0.406	0.559	**0.824**			
PU	0.649	0.846	0.447	0.357	0.398	**0.805**		
PEU	0.657	0.851	0.461	0.368	0.383	0.614	**0.810**	
BI	0.614	0.827	0.576	0.429	0.535	0.576	0.558	**0.784**

Inspection of the standardised residuals and modification indices did not suggest the inclusion of other paths that would significantly improve the fit of the model. At this point, it can be assumed that the measures behave as they should in terms of the uni-dimensionality of the six measures and in the way the constructs relate to other measures.

The results of CFA reveal that the measurement model fitted well with the data collected and met the requirements of construct validity. These findings imply that the data were acceptable for the SEM.

7.4.3 Structural model

With the construct measures obtained, a structural model was assessed to establish an empirical measure of the hypothesised relationships among the research variables and constructs. Figure 7.3 shows the structural model in the study. Several changes were made in transforming the CFA measurement model into the structural model.

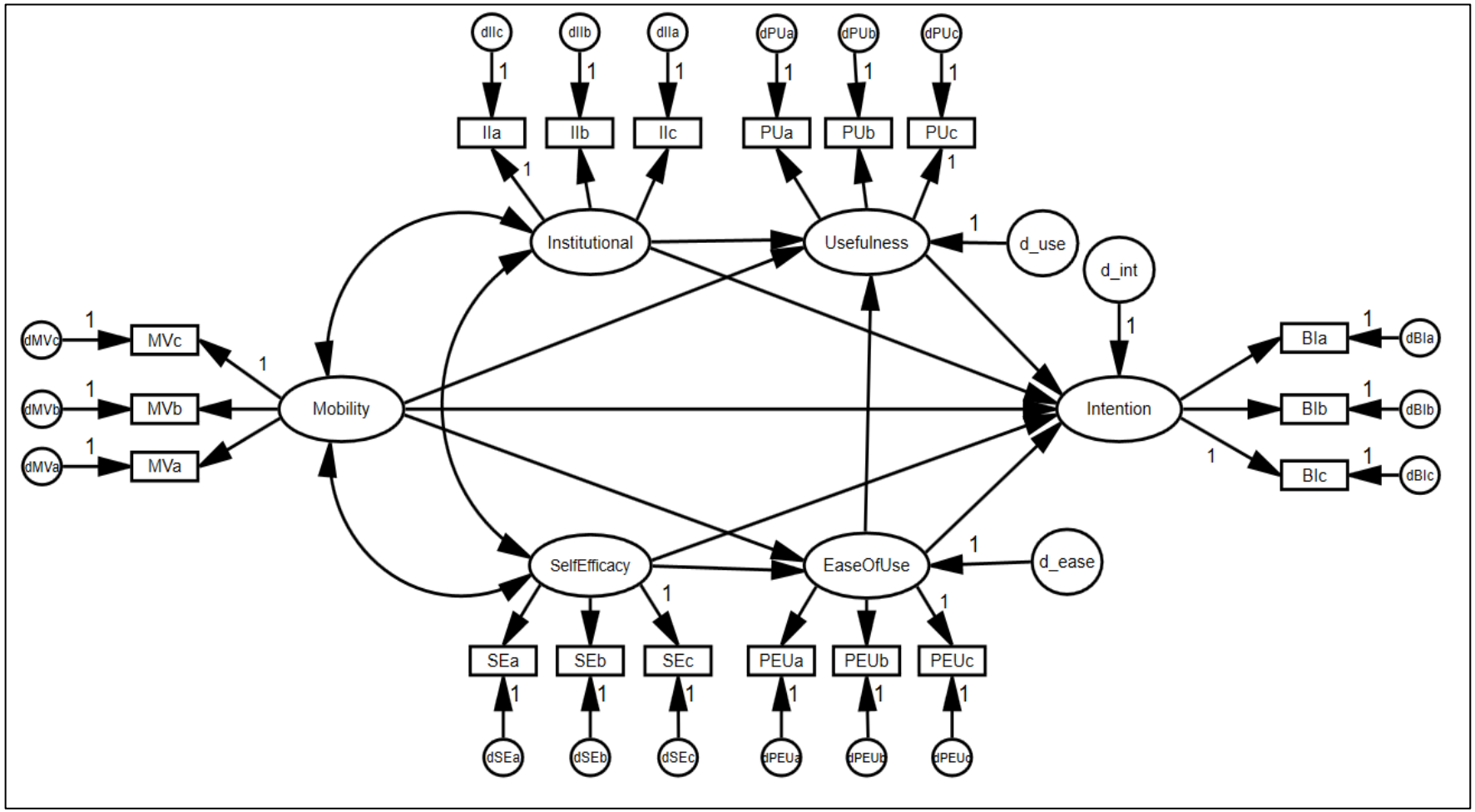

Figure 7.3. The structural model based on hypotheses

In the structural model, there were three exogenous constructs and three endogenous constructs. Perceived mobility value, self-efficacy, and institutional influence were the exogenous constructs while perceived ease of use, perceived usefulness, and behavioural intention were endogenous constructs.

A similar set of GOF indices for the measurement model was used to test the structural model. All the fit indices were compared to their corresponding recommended values, and the results show evidence of a good model fit as presented in Table 7.12.

Table 7.12. Goodness-of-Fit comparison of the measurement and the structural model

GOF index	Recommended value (Loxton, 2014)	Measurement model	Structural model
Chi-square (x^2)	$p > 0.05$	146.802 and $p = 0.049$	149.369 and $p = 0.047$
Normed chi-square (x^2/df)	$1.0 < x^2/df < 2.0$	1.223	1.224
RMSEA	Value < 0.05 with PCLOSE > 0.05 and LO 90 = 0	0.041 with PCLOSE = 0.732 and LO 90 = 0.003	0.041 with PCLOSE = 0.732 and LO 90 = 0.005
SRMR	Value < 0.06	0.0536	0.0577
CFI	Value > 0.95	0.978	0.978
TLI	Value > 0.95	0.973	0.972

Table 7.12 shows that the value of x^2 for the structural model was similar to the measurement model. The normed chi-square (x^2/df) was 1.224. The RMSEA value, PCLOSE value, and the SRMR value of the structural model were the same the measurement model. For the incremental fit indices, the CFI value of the structural model was 0.978 and the TLI value was 0.972

Table 7.12 also shows that overall the structural model fit changed very little from the CFA/measurement model. The only substantive differences were the normed chi-square (x^2/df) value and the TLI value of the model fit but all the values were in the range of recommended value. This implies that the structural model explains the data as well as the CFA model.

The path coefficients and loading estimates of the structural model were examined in order to make sure they had not changed substantially from the measurement

model. The factor loading estimates of the structural model only changed a little from the CFA results as shown in Table 7.13. This indicates parameter stability among the measured items and supports the validity of the hypothesised model.

Table 7.13. Factor loadings comparisons of the measurement and the structural model

Item	Factor loading (> 0.7) of the measurement model	Factor loading (> 0.7) of the structural model
PMVa	0.781	0.781
PMVb	0.822	0.821
PMVc	0.820	0.820
SEa	0.853	0.855
SEb	0.811	0.810
SEc	0.801	0.798
IIa	0.765	0.769
IIb	0.842	0.842
IIc	0.862	0.860
PUa	0.817	0.816
PUb	0.860	0.859
PUc	0.734	0.731
PEUa	0.735	0.731
PEUb	0.799	0.798
PEUc	0.890	0.895
BIa	0.756	0.754
BIb	0.819	0.817
BIc	0.775	0.773

7.4.3.1 Hypotheses testing

Hypotheses were examined by confirming the presence of a statistically significant relationship in the predicted direction. The results of hypotheses testing, based on the structural model and shown in Table 7.14 indicate that four out of ten hypotheses were not supported with significant path estimates.

Table 7.14 Hypotheses testing

Hypothesis	Path	Path coefficients (ß)	Critical ratio (*t*-value)	*p*-value
H1	PU → BI	0.212	2.008	0.045
H2	PEU → BI	0.133	1.685	0.092
H3	PEU → PU	0.367	4.458	***
H4	PMV → BI	0.234	2.575	0.010
H5	PMV → PU	0.150	1.527	0.127
H6	PMV → PEU	0.445	3.354	***
H7	SE → BI	0.004	0.042	0.967
H8	SE → PEU	0.259	1.963	0.050
H9	II → BI	0.215	2.366	0.018
H10	II → PU	0.145	1.661	0.097

As predicted, perceived usefulness exerted a positive effect on behavioural intention (H1; $ß = 0.212$, $t = 2.008$, $p < 0.05$). Hence, Hypothesis 1: *Perceived usefulness has a positive effect on intention to accept mobile learning for training* was accepted.

The effect of perceived ease of use on behavioural intention was not significant (H2; $ß = 0.133$, $t = 1.685$, $p > 0.05$). As a result, Hypothesis 2: *Perceived ease of use has a positive effect on intention to accept mobile learning for training* was rejected. However, the effect of perceived ease of use on perceived usefulness was positive and significant (H3; $ß = 0.367$, $t = 4.458$, $p < 0.001$). Hypothesis 3: *Perceived ease of use has a positive effect on perceived usefulness of mobile learning for training* was accepted.

Hypothesis 4: *Perceived mobility value has a positive effect on intention to accept mobile learning for training* was accepted as the data indicated that perceived mobility value contributed positively to behavioural intention (H4; $ß = 0.234$, $t = 2.575$, $p < 0.05$).

The effects of perceived mobility value on perceived usefulness were not significant (H5; $ß = 0.150$, $t = 1.527$, $p > 0.05$), hence Hypothesis 5: *Perceived mobility value has a positive effect on perceived usefulness of mobile learning for training* was not accepted. Conversely, perceived ease of use was positively affected by perceived mobility value (H6; $ß = 0.445$, $t = 3.354$, $p < 0.001$) and Hypothesis 6: *Perceived*

mobility value has a positive effect on perceived ease of use of mobile learning for training were accepted.

The data imply that the effect of self-efficacy on behavioural intention was not significant (H7; *ß* = 0.004, *t* = 0.042, *p* > 0.05). So, Hypothesis 7: *Self-efficacy has a positive effect on intention to accept mobile learning for training* was rejected. However, the data also show that self-efficacy has a positive impact on perceived ease of use (H8; *ß* = 0.259, *t* = 1.963, *p* = 0.05), hence Hypothesis 8: *Mobile learning self-efficacy has a positive effect on perceived ease of use of mobile learning for training* was accepted.

Hypothesis 9: *Perception on institutional influence has a positive effect on intention to accept mobile learning for training* was accepted because the data shows the positive effect of institutional influence on behavioural intention (H9; *ß* = 0.215, *t* = 2.366, *p* < 0.05). However, the effect of institutional influence on perceived usefulness was not significant (H10; *ß* = 0.145, *t* = 1.661, *p* > 0.05). Thus, the last hypothesis, Hypothesis 10: *Perception on institutional influence has a positive effect on perceived usefulness of mobile learning for training* was rejected. Table 7.15 summarises the result of the hypotheses test.

These findings reveal that the behavioural intention of teachers in using mobile learning for ICT training was affected by perceived usefulness, perceived mobility value, and institutional influence. The intention was not influenced by self-efficacy. The TAM construct, perceived usefulness, had a significant relationship with perceived ease of use. Another TAM construct, perceived ease of use, was influenced by the perceived mobility value and self-efficacy of teachers.

Table 7.15. The result of the hypotheses test.

Hypotheses	Description	Path	Accepted/ Rejected
H1	Perceived usefulness has a positive effect on intention to accept mobile learning for training.	PU → BI	Accepted
H2	Perceived ease of use has a positive effect on perceived usefulness of mobile learning for training.	PEU → BI	Rejected
H3	Perceived ease of use has a positive effect on intention to accept mobile learning for training.	PEU → PU	Accepted
H4	Perceived mobility value has a positive effect on intention to accept mobile learning for training.	PMV → BI	Accepted
H5	Perceived mobility value has a positive effect on perceived usefulness of mobile learning for training	PMV → PU	Rejected
H6	Perceived mobility value has a positive effect on perceived ease of use of mobile learning for training	PMV → PEU	Accepted
H7	Self-efficacy has a positive effect on intention to accept mobile learning for training.	SE → BI	Rejected
H8	Self-efficacy has a positive effect on perceived ease of use of mobile learning for training.	SE → PEU	Accepted
H9	Perception on institutional influence has a positive effect on intention to accept mobile learning for training.	II → BI	Accepted
H10	Institutional influence has a positive effect on perceived usefulness of mobile learning for training.	II → PU	Rejected

Figure 7.4 shows the path diagram with the standardised structural parameter estimates included on the paths. The structural model accounted for 53% of teachers' behavioural intention to use mobile learning for ICT training.

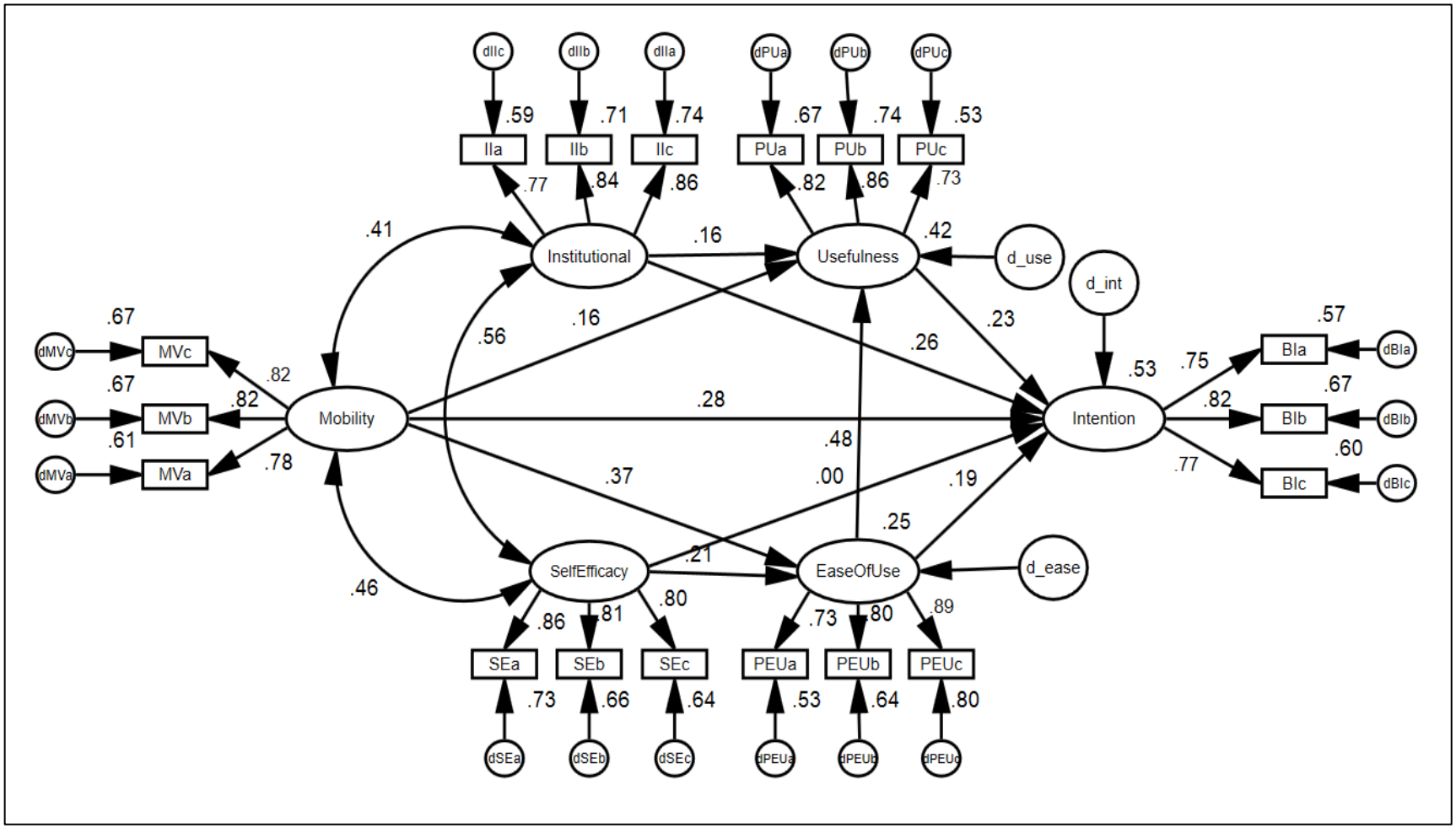

Figure 7.4. Path diagram with the standardised structural parameter estimates

7.4.3.2 Total, direct and indirect effects

Most research on technology acceptance tends to focus just on the direct effect in the path analysis (Park et al., 2012). The possible associations among the variables should be identified by the examination of direct and indirect effect since one variable could be affected by another variable directly and/or indirectly (Kline, 2005).

Table 7.16 shows the direct, indirect, and total effect of one variable in the model on another. The total effects are the sum of all direct and indirect effects of one variable on another variable (Kline, 2005). In addition, Cohen (2013) recommends that standardised path coefficients with values less than 0.1 are considered small, around 0.3 are medium, and more than 0.5 are large.

Table 7.16. Direct, indirect, and total effects between variables

Causal variables		Endogenous variables		
		Perceived ease of use	**Perceived usefulness**	**Behavioural intention**
Perceived mobility value				
	Direct effect	0.445	0.150	0.234
	Indirect effects	-	0.163	0.125
	Total effect	**0.445 (M)**	**0.313 (M)**	**0.360 (M)**
Mobile learning self-efficacy				
	Direct effect	0.259	-	0.004
	Indirect effects	-	0.095	0.055
	Total effect	**0.259 (M)**	**0.095 (S)**	**0.059 (S)**
Institutional influence				
	Direct effect	-	0.145	0.215
	Indirect effects	-	-	0.031
	Total effect	-	**0.145 (M)**	**0.246 (M)**
Perceived ease of use				
	Direct effect	-	0.367	0.133
	Indirect effects	-	-	0.078
	Total effect	-	**0.367 (M)**	**0.210 (M)**
Perceived usefulness				
	Direct effect	-	-	0.212
	Indirect effects	-	-	-
	Total effect	-	-	**0.212 (M)**

Note: S = Small; M = Medium

Perceived usefulness only had a direct effect on behavioural intention of 0.212 and the effect was considered a medium effect. Perceived usefulness was thus directly affected by perceived ease of use with medium effect (0.367).

Perceived ease of use also had a medium effect on behavioural intention (0.133) and small indirect effect through perceived usefulness, which was 0.078. As a result, the total effect of perceived ease of use on behavioural intention was 0.210 and can be categorised as a medium effect. These results suggest that perceived ease of use could be considered as a factor affecting intention, even though it did not have a significant direct effect on behavioural intention.

Institutional influence had a medium direct effect (0.215) and a small indirect effect (0.031) on behavioural intention. The indirect effect of institutional influence on behavioural intention was via perceived usefulness. The total effect of institutional influence on behavioural intention was 0.246, and it could be considered as a medium effect. Institutional influence only had a direct medium effect on perceived usefulness, which was 0.145.

Self-efficacy had an effect on all endogenous variables in the model. It had a medium direct effect on perceived ease of use (0.259). It also had a small indirect effects of 0.095 on perceived usefulness and 0.055 on behavioural intention. Self-efficacy influenced perceived ease of use but not perceived usefulness and behavioural intention.

Each of the endogenous variables in the model was also affected by perceived mobility value, and the effects were considered medium. The perceived mobility value affected perceived ease of use directly (0.445) and affected perceived usefulness directly (0.150) and indirectly (0.163). In the same way, perceived mobility value directly affected the intention to use mobile learning with 0.234 and indirectly with an effect of 0.125 resulting in a total effect of 0.360. The results reveal that perceived mobility value was the most important variable in influencing teachers' intention to use mobile learning.

7.5 Discussion

The purpose of this stage of the study was to investigate the factors influencing teachers' acceptance of mobile learning for ICT training. This study extended the use of TAM in the mobile learning for teacher-training context by adding three constructs in the model as external variables; perceived mobility value, institutional influence, and self-efficacy.

This stage of the study reveal that teachers who were teaching in vocational high schools had a higher level of perceived usefulness of the acceptance of mobile learning than their colleagues in general high schools.

Based on TAM, the study then examined how behavioural intention, perceived usefulness, perceived ease of use, perceived mobility value, institutional influence, and self-efficacy applied together in the research model to predict teachers acceptance of mobile learning for ICT training via a mobile phone. As shown in Table 7.7 the overall GOF of the TAM-based model was verified with six fitness measures, and the model-fit-indices exceeded the recommended value of each measure. The results indicate that the data fitted the TAM-based model. Therefore, the TAM-based model clearly explains the teachers' acceptance of mobile learning.

The results of this study confirm the role of perceived usefulness and ease of use on teachers' acceptance of mobile learning for training. These two factors were found to have a positive effect on teachers' intention to use mobile learning for ICT training. However, teachers' perceived ease of use did not have a direct effect on their intention to use mobile learning. Similarly, some studies have shown that perceived ease of use does not have a direct effect on behavioural intention (Akour, 2009; Armentano et al., 2015; Mac Callum & Jeffrey, 2014). This study indicates that perceived ease of use affected the behavioural intention indirectly through perceived usefulness.

According to Mac Callum and Jeffrey (2014), users perceive the benefit of technology by how much effort they feel is required to use it. As presented in Chapter 6, the trial mobile-learning-based ICT training utilised SMS as the medium of training. It could be assumed that teachers who participated in this study found

it was convenient to use SMS for training. This study shows perceived ease of use had a direct effect on perceived usefulness.

These findings indicate that the development of a mobile learning for ICT training system for teachers should focus on ease of use and expose the benefits of mobile learning. Teachers need to feel that mobile learning for ICT training is easy to use and beneficial to their professional development.

This study added three external variables to the TAM structure; perceived mobility value, institutional influence, and self-efficacy. Perceived mobility value was confirmed to have an effect on behavioural intention, perceived usefulness, and perceived ease of use. Institutional influence affected teachers' intention to use mobile learning. Self-efficacy did not have an effect on behavioural intention but it had a significant relationship with perceived ease of use. The significant link between self-efficacy and perceived ease of use ($t = 1.964$) implies that teachers who are confident of their capability of using mobile learning for ICT training would find it easy to use.

Perceived mobility value was found as the most important predictor of teachers' acceptance of mobile learning. The perceived mobility value significantly increases a teacher's intention to use mobile learning. The more a teacher appreciates the value of mobility, the more they will intend to use mobile learning. The advantages of a mobile learning system were based on its natural characteristic; mobility (Chen et al., 2003; Huang et al., 2007; Ting, 2005). Moreover, the significant direct effect of perceived mobility value on perceived ease of use indicates appreciation of the value of mobility resulting in the perception that mobile learning is easy to use.

Huang et al. (2007) imply that perceived mobility value has a significant effect on perceived usefulness. This study found the opposite result. Even though perceived mobility value did not have a significant link to perceived usefulness, the size of the total effect of this construct to perceived usefulness can be categorised as a medium effect based on Cohen's (2013) recommendation. Therefore, perceived mobility value still had an influence on perceived usefulness. Teachers who

comprehend the mobility characteristic of mobile learning tended to be aware of the benefit of mobile learning.

Following perceived mobility value, institutional influence was also an important predictor of teachers' acceptance of mobile learning. Teachers are highly likely to use mobile learning for training if it is ordered by the school management and if their colleagues also participate in the training. Sari and Lim (2012) carried out a study on teacher professional development in Indonesia and found that the decision of teachers in Indonesia to participate in training was mostly influenced by their school principals.

7.6 Summary and conclusions

This chapter reported on a survey conducted to investigate the factors influencing teachers' acceptance of mobile learning. This chapter presented the use of TAM to explain and predict teachers' acceptance of mobile learning. The data obtained from the survey fitted well to the TAM-based model. Together with three external variables – perceived mobility value, institutional influence, and self-efficacy – the TAM construct of perceived usefulness and perceived ease of use, affected 53% of teachers' intention to use mobile learning.

Of the factors investigated, perceived mobility value was the strongest factor affecting teachers' acceptance of mobile learning for ICT training, followed by institutional influence, and perceived usefulness. Perceived ease of use and self-efficacy did not have direct effect on teachers' intention to use mobile learning.

The results of the survey confirm the role of perceived usefulness, perceived mobility value, and institutional influence on the teachers' acceptance of mobile learning. This means that teachers, who understand the mobility characteristics of mobile learning, have it recommended by their schools' management and/or colleagues and believe mobile learning for training would increase their learning performance, have the strongest intention to use mobile learning for ICT training.

The demographic profiles of teachers did not have an effect on their perceived mobility value, self-efficacy, institutional influence, perceived ease of use, and

behavioural intention to use mobile learning. The type of school where teachers worked was found to have an effect on their perception of the usefulness of mobile learning

The following chapter presents a discussion of key findings in this study and a model of mobile-learning-based ICT training for teachers in Indonesia.

CHAPTER 8. GENERAL DISCUSSION

8.1 Overview

This chapter discusses the key findings of this study with commentary in light of other published literature to answer the research questions. Furthermore, the chapter presents a framework of mobile-learning-based ICT training for teachers in Indonesia, which was developed based on the findings of this study.

8.2 Using a mobile phone for mobile-learning-based teacher training

The first research question of this study was "Is it possible to use a mobile phone for mobile learning for teachers in Indonesia?" Stages 1 and 2 investigated the potential of a mobile phone for use as a medium of training for teachers.

The review in Stage 1 confirm the possibility that a mobile phone could be used in a mobile learning program in Indonesia rather than other mobile devices. The results of Stage 1 showed that the mobile phone is the most extensive mobile device used in Indonesia, is affordable, and has service availability. This finding is in line with Traxler & Kukulska-Julme (2005), Lu (2008) and Wu et al. (2012) who cite the extensive use and low cost of mobile phones as the main reasons for many mobile learning programs using a mobile phone as the main device. Additionally, the wide coverage area of the mobile network in Indonesia also motivates the use of mobile phones in mobile learning programs in Indonesia.

The results in Stage 2 show that a mobile phone is a common mobile device owned and used by teachers. This finding supported the finding of Stage 1 that the mobile phone is the most widely used mobile device in Indonesia. The finding obtained in Stage 2 reveal that teachers recognised the features available in their mobile phones and are capable of using them. These findings imply that a mobile phone can be used for mobile learning for teachers in Indonesia.

In addition, the results in Stage 2 also indicate the potential for SMS features to be applied in a mobile learning training system for teachers, since SMS was the most

frequently used feature by teachers. SMS is also the cheapest service offered by network providers. Some studies on mobile learning applied SMS as their method of content delivery (Cavus & Ibrahim, 2009; Petrova, 2005; Uzunboylu et al., 2009).

Correspondingly, the most rarely used features of mobile phones were video calls, MMS, and instant messenger. Network providers have higher charges for video calls and MMS than for other mobile phone services like SMS and voice call. Therefore, teachers were not really interested in using these features.

Although instant messenger was one of the mobile phone features seldom used by teachers, the increase in the popularity of instant messenger applications in Indonesia today (Kemp, 2015) such as WhatsApp, Telegram, and Line, and supported by the willingness of teachers to learn as well as the affordable price of internet data services from network providers, means this feature is expected to become popular among teachers. Thus, it has potential to be applied in mobile learning programs.

8.3 Teachers' readiness for mobile learning for training

Stage 2 was also conducted to answer the second research question in this study: "What is the level of teachers' readiness for mobile learning for training?" This study confirmed that teachers in Indonesia had acceptable readiness for training using mobile learning.

The results of Stage 2 indicate that teachers in Indonesia had acceptable basic and skill readiness for mobile learning. It shows that teachers had access to a mobile phone and they had the necessary skills for engagement in mobile learning. These findings are consistent with Hussin et al. (2012) and Vicente (2013), who state user readiness for mobile learning can be established by whether users have access and the skills to use their device for mobile learning.

According to Shaqour (2014), good basic and skill readiness leads to positive perceptions about mobile learning. Participants in this study had good basic and skill readiness, hence their perceptions about mobile learning were also positive.

Stage 2 of this study reveals that even though the concept of mobile learning for training was still unclear for most teachers, they were enthusiastic to learn more about mobile learning. Studies of mobile learning user perception by Abdall and Hegazi (2014) and Mahat et al. (2012) obtained similar findings. Interestingly, despite their limited knowledge about mobile learning, this study found that teachers perceived that mobile learning can support them in managing their time. This finding is in line with studies by Abas et al. (2009), and Abdall and Hegazi (2014).

The survey also found that teachers still preferred the conventional method of training rather than mobile learning. This may be a result of their unclear idea about mobile learning. A mobile learning study by Hussin et al. (2012) obtained a similar result. However, the participants in this study accepted the idea of integrating mobile learning and conventional learning. Shaqour (2014) reports that participants in his study had similar responses to this idea.

These findings together imply that overall teachers in Indonesia have positive perceptions about mobile learning for training.

8.3.1 Cost issue

Some studies on the readiness for mobile learning maintain that cost could be an obstacle for users in a mobile learning program (Ismail, Gunasegaran, Koh, & Idrus, 2010; Lam, Yau, & Cheung, 2010; Lim, Fadzil, & Mansor, 2011), with the cost of mobile phone services for participating in mobile learning a burden for participants.

In contrast, the results of the survey in this study reveal that the cost of the mobile phone services required for mobile learning did not prevent teachers from participating in a mobile learning environment. Teachers focused more on the usefulness and impact of mobile learning to their career than the financial issue.

8.3.2 Teachers' demographic profiles as factors for mobile learning readiness

This study found that the demographic profile of teachers somewhat affected their readiness for mobile learning. The results of the survey reveal that teachers who were working in senior high schools had greater interest in joining the mobile

learning program compared to teachers who were teaching in junior and vocational high schools. Teachers' educational background, as well as their teaching subject, affected their willingness to participate in mobile learning for ICT training. This finding is supported by Park et al. (2012) who claim user readiness can be influenced by their demographic profile.

8.4 Teachers and their ICT experiences

This study also asked about the ICT experiences of teachers and presented RQ 3: "What are teachers' experiences in using ICT and participating in ICT training?" Answers to this research question were obtained from the results of Stages 1 and 2.

The review on teachers in Indonesia (Stage 1) identified the low use of ICT by teachers due to the low level of their ICT skills. Furthermore, the survey in Stage 2 reveals that teachers in Indonesia used ICT mostly for teaching activities, with only a few using ICT for self-development. Similar conditions were found for teachers in Malaysia (Mahmud & Ismail, 2010), in Jordan (Abuhmaid, 2011), and in Norway (Wikan & Molster, 2011).

The survey reveals two obstacles that prevent teachers in Indonesia using ICT. The first obstacle was the lack of technical support. Other studies have also found that lack of technical support was the main obstacle for teachers in using ICT (Jones, 2004; Korte & Hüsing, 2006; Pelgrum, 2001).

The second obstacle was the lack of ICT knowledge and training. Many studies agree that a lack of ICT skill is a serious obstacle for teachers in many countries to integrate ICT into their activities (Albirini, 2006; Bingimlas, 2009; Mahmud & Ismail, 2010; Wikan & Molster, 2011). Their lack of ICT skills made teachers reluctant to use ICT in teaching and learning activities, and reflected their lack of confidence in using ICT.

The review in Stage 1 presented typical methods of ICT training for teachers in Indonesia; face-to-face, web-based, blended, or in-house training. However, these types of ICT training present challenges for teachers' participation, with the review finding location, time, budget, and limited seats available in training sessions. Sari

(2012) also recognises location and cost as problems for teachers in Indonesia attending training.

Studies of ICT training courses for teachers in Jordan (Abuhmaid, 2011) and Malaysia (Mahmud & Ismail, 2010) confirm that training experience affects teachers' attitude about ICT. Similarly, the result of this survey show the ICT training experience of teachers was significantly associated with teachers' willingness to learn more about ICT. In other words, their experience participating in ICT training increased their motivation in learning about ICT.

8.5 Mobile learning: A solution to problems in teachers training

This study conducted a trial study to answer the RQ 4: "Is mobile learning a solution to teacher problems for participating in training?" The review in Stage 1 presented the main problems for teachers in Indonesia participating in training; location, time, and limited seats available in a training session. A trial of a mobile learning prototype (Stage 3) was performed in order to answer this research question. This study confirmed that mobile learning is a solution for teacher training problems in Indonesia.

Location was not a problem for teachers to participate in the mobile-learning-based ICT training prototype, as shown by the various locations of the participants in this study. Teachers did not have to travel or take leave to participate in the trial. This finding is in line with some studies of mobile learning for distance education (Corbeil & Valdes-Corbeil, 2007; Koole, McQuilkin, & Ally, 2010; Yousuf, 2007) that showed mobile learning overcame the location problems of learners.

The second main problem for teachers attending training is time. The trial study indicated that time was not an obstacle for teachers to carry out the activities in the training trial. They carried out the training tasks at the times and places they felt convenient, and most of them made use of their free time at school. This finding is similar to the result of a study on mobile learning for teachers by Seppälä and Alamäki (2003) that reports the use of spare time in schools by teachers who participated in mobile learning. This finding is also in accordance with Valk et al.

(2010) who conclude that mobile learning enabled learners to arrange their learning activities based on their own schedules.

Participation of teachers in the trial was not limited by the available seat and equipment provided by the training providers. Having a mobile phone was the main requirement to participate in the training, which was easy for teachers to fulfil. Vicente (2013) states that the main requirement for participation in mobile learning is their ownership and capability in using a mobile phone. Using a mobile phone as the method for content delivery in the training has been confirmed as extending the opportunity for teachers to participate in training.

8.6 The effect of variables on teachers' acceptance of mobile learning

RQ 5 of this study was "Do perceptions of mobility value, institutional influence, self-efficacy, ease of use, and usefulness significantly affect teachers' acceptance of mobile learning for training?" This question was answered through Stage 4.

The results of Stage 4 confirm the role of perceived mobility value, institutional influence, and perceived usefulness on teachers' acceptance of mobile learning. However, perceived ease of use and self-efficacy did not have influence on teachers' acceptance.

Perceived mobility value was confirmed as the most important predictor of teachers' acceptance of mobile learning. This acceptance is because the advantages of the mobile learning system were based on its natural characteristic – mobility (Chen et al., 2003; Huang et al., 2007; Park et al., 2014; Ting, 2005). Perceived mobility value significantly increases a teacher's intention to use mobile learning. Hence, this study supports the argument that perceived mobility value has a significant effect on user perceptions of learning, which is consistent with the works of Chen et al. (2003), Ting (2005), Huang et al. (2007), and (Park et al., 2014).

The second factor that significantly predicts teachers' intention to participate in ICT-based training via mobile phone was institutional influence. This factor was derived from the subjective norm in TPB, which is defined as a person's perception

that the decision of performing a behaviour is dependent on other's opinions (Ajzen, 1991). Institutional influence in the study includes the influence of school management, colleagues, and official reward from the school or teacher-training institution.

Teachers are highly likely to use mobile learning for training if it is ordered by school management and if their colleagues also participate in the training. This finding is consistent with the results of a study on teacher professional development in Indonesia carried out by Sari and Lim (2012) that found that the decision of teachers in Indonesia to participate in training was mostly influenced by their school principal.

The third factor was perceived usefulness, a fundamental construct of TAM defined as the extent to which a teacher believes using a mobile-learning-based ICT training would increase their learning performance. According to TAM, perceived usefulness is a significant predictor of intention (Davis, 1986). This study shows that teachers' perceived usefulness significantly affected their intention to use mobile learning. The significant relationship between perceived usefulness and behavioural intention is consistent with prior studies on user acceptance of mobile learning (Huang et al., 2007; Liu et al., 2010; Lu & Viehland, 2008; Park et al., 2012).

In contrast to some mobile learning acceptance studies (Chong et al., 2011; Huang et al., 2007; Lu & Viehland, 2008), this study found that teachers' perceived ease of use did not have significant influence on their intention to use mobile learning. This finding is confirmed by some other studies (Akour, 2009; Liu et al., 2010; Mac Callum & Jeffrey, 2014).

Liu et al. (2010) and (Park et al., 2012) imply that perceived ease of use becomes an insignificant predictor for mobile learning intention when the ease of use is perceived broadly among users. Hence, this finding indicates that the participants in the study used their mobile phones in the trial conveniently.

In the original TAM, perceived ease of use is not hypothesised to directly affect intention, but rather, indirectly through perceived usefulness (Davis, 1986). This study reveals perceived ease of use had an effect on behavioural intention indirectly through perceived usefulness. Based on the effect size categorisation by Cohen (2013), the effect can be categorised as a medium effect. This finding implies that even though the effect of perceived ease of use on behavioural intention was indirect, it could still be considered as a predictor of behavioural intention.

This study agreed with Park et al. (2012) that learners' self-efficacy did not affect their intention to use mobile learning. However, studies by Lu and Viehland (2008), and Park and Chen (2007) show a different result. These studies found that self-efficacy had significant effect on behavioural intention. According to Lu & Viehland (2008), learners with mobile learning experience had good self-efficacy for mobile learning. The trial study (Stage 3) was the first mobile learning experience of the participants in this study. The participants did not have good self-efficacy for mobile learning because of their limited experience in mobile learning. Consequently, their self-efficacy for mobile learning was not enough to influence their intention.

A significant relationship was found between teachers' perceived ease of use and self-efficacy in this study. A similar result was also found in studies by Lu and Viehland (2008), Park et al. (2012), and Park and Chen (2007).

Additionally, this study found that the demographic profiles of teachers did not have an effect on their perceived mobility value, institutional influence, perceived ease of use, and self-efficacy toward their intention to use mobile learning. The exception was only on perceived usefulness of mobile learning, which was affected by the type of school where teachers worked.

This study used TAM to predict teachers' acceptance of mobile learning in the teacher-training context by adding three constructs to the TAM model as external variables; perceived mobility value, institutional influence, and self-efficacy. The TAM-based model developed in the study explains 53% of the variance in *behavioural intention* to participate in a mobile-learning-based ICT training. This

finding is consistent with technology acceptance studies by Samaradiwakara and Gunawardena (2014) and Harby, Qahwaji, and Kamala (2013) that stated TAM can describe around 40% - 53% of the variance in user intention to use a technology. This imply that the TAM-based model clearly explains the teachers' acceptance of mobile learning.

8.7 The model of mobile learning based ICT training for teachers

The last research question in this study, RQ6 was "What are the key issues in developing mobile learning for teachers training using mobile phones?" Stage 5 of this study was conducted to answer this question.

This stage presented a model of mobile-learning-based ICT training for teacher in Indonesia that illustrate five important issues in developing mobile learning. The training model design was based on the findings of Stages 1–4, presented in previous sections in this chapter. The detail of the model development method used in this study was presented in Chapter 6.

The model of mobile-learning-based ICT training for teachers developed in the research consists of five components; mobile phone, training curriculum, activities, support and reward, and promotion. The training model is depicted in Figure 8.1.

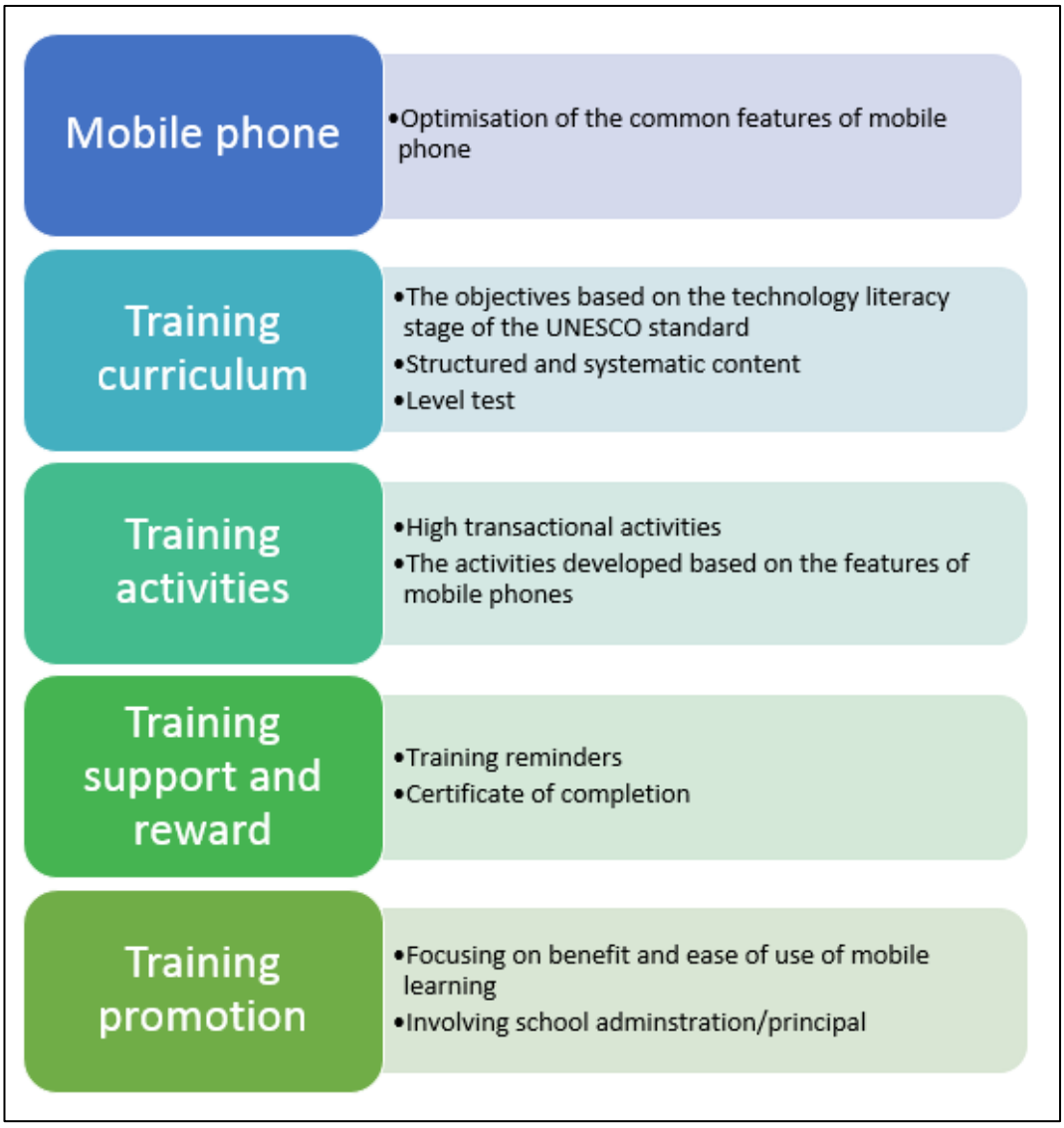

Figure 8.1.The model of mobile-learning-based ICT training via mobile phone for teachers in Indonesia

8.7.1 Mobile phone

The first component of the model is the mobile phone. It is the main tool in mobile-learning-based ICT training. However, using a mobile phone for mobile learning introduces a problem the technical limitations of mobile phones. The types and brands of mobile phones among teachers differ. This means that the platforms, screen sizes, types of keyboard, and features available also vary. Research suggests that these differences became a problem not only for mobile learning participants but also for training providers (Koole et al., 2010).

Some mobile learning projects required their participants to use a particular type or brand of mobile phone (Cushing, 2011; Ferry, 2008; Seppälä & Alamäki, 2002). However, defining specific devices and expecting participants to have those devices is simply not economically realistic for a mobile learning program (Caudill, 2007) and undermines the flexibility of mobile learning (Koole et al., 2010).

In order to overcome that problem, in this training model, the optimisation of the features available in common mobile phones was proposed. A mobile phone can be used for learning by using the features available (Schofield et al., 2011). The training providers should utilise these available features in developing mobile-learning-based ICT training. By optimising the utilisation of mobile phone features, the different platforms of teachers' mobile phones are no longer a problem. Hence, all teachers have equal opportunity to participate and are not limited by the type of mobile phone they have.

8.7.2 Training curriculum

The second component of the training framework is the training curriculum. According to Tight (2002), curriculum for a training program is concerned with the aims, processes and outcomes of training provision. Parsons et al. (2007) proposes a learning experience as one of the perspectives that should be considered in mobile learning design. Learning experience in Parsons et al's (2007) framework is a depiction of the curriculum. It consists of content, outcome, goals, and objectives. The literature review on the application of mobile learning in the teacher-training environment (Chapter 2) showed that the mobile learning project for teachers did not have definite training objectives and competencies.

This training model focused on the technology literacy stage of the ICT standard competency for teachers released by UNESCO (2011). This stage is the first stage in development of teachers' ICT competency. The success of other stages depends on the success of this stage.

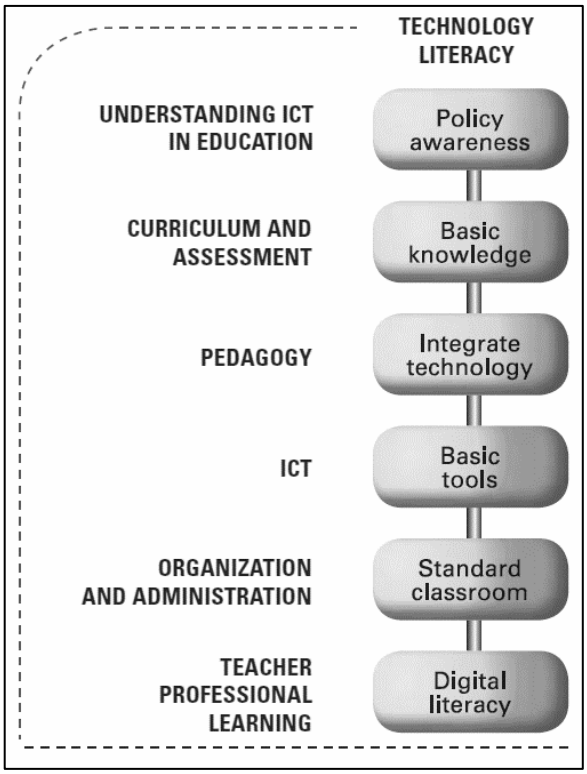

Figure 8.2. Technology literacy stage (UNESCO, 2011)

Hence, the objectives of the ICT training model proposed were based on the standard ICT competency for teachers in the UNESCO technology literacy stage. The objectives of training are to help teachers:

1. gain knowledge and judgement to be able to select and evaluate ICT resources that are suitable for their subject
2. be able to judge when and how to integrate ICT into their lesson
3. be able to evaluate the effects of ICT on their teaching and on their students' learning
4. be able to perform basic troubleshooting for common problems in using ICT.

After participating in the training, teachers will be expected to have competence in using and applying ICT appropriately for teaching, developing resource material and content for teaching, and working collaboratively to improve the quality of ICT-enriched resources.

The content of this training model should be developed to support teachers meet the competencies for technology literacy based on the standard. Killilea (2012)

suggests that when designing a mobile learning course, the course should have clear objectives and structured content. The training model in this research had clear training objectives.

To accommodate the different levels of ICT skills among teachers, structuring the training into levels from basic to advanced in regard to the objectives of the training was proposed. When a participant had completed a level, they would have access to the next level. A test level was also recommended in the training model to enable a teacher with good ICT skills to skip a level that they already had mastered. Accordingly, the content developed for this ICT training should not only be structured but also systematic to allow training participants to navigate and follow the content consistently and easily.

8.7.3 Training activities

After the training content is developed, training activities are created. The training activities are the third component of the ICT training model. The training activities should be designed based on the training content and take into account the features of the mobile phone that will be used in the activities.

The proposed mobile-learning-based ICT training model applies the highly transactional individualised and socialised mobile learning activities proposed by Park (2011). The components of training activities in this training model include the objectives, scenarios, and questions for assessment. These were determined as priority activities. Teachers as individual learners will receive tightly structured and systematic content and resources through their mobile phones. The control of the training process resides in teachers with the interactions mainly occuring between teachers and the content. The transactional individualised activities enable teachers to fit the training into their mobile lifestyle and be mostly influenced by the context regarding the mobile learning tagline; anywhere and anytime.

The group activities are determined by training providers preceding the activities, but the interactions mainly occur between the participants, and the training instructor only has minimal involvement in the activities.

Additionally, all the activities in the training have a time frame. Providing an exact time frame for each activity in the training enables participants to set and manage their time for carrying out the training activities. Information about the allocated time for the activities should be provided to the participants prior to the training. In designing the training activities, the time frame for each activity should be realistic and relevant to participants' flexibility in conducting the activities at their own pace (Killilea, 2012).

8.7.4 Training support and reward

This training model pointed out training support and reward as an important issue in developing mobile learning for teacher training. According to Liao, Shen, and Chu (2009), giving a reward is a strategy to attract target audiences and the reward should be something important to them.

The finding in Stage 3 of this study indicates that teachers need support in the form of training reminders to help them keep up with the time line of the training. For this reason, this study recommends training support for training participants in the form of training reminders that are sent regularly.

Once participants have completed a level of the training course and passed the examination, they can obtain a certificate of training completion from the training provider. The certificate can encourage teachers to participate as it will support their career development. They need the certificate as a supporting document for upgrading their level or their application for an educator certificate (Hapsariputri, 2010). Additionally, teachers will also feel appreciated for their efforts in completing self-ICT-training.

The availability of support and rewards in the training would be disseminated through training promotion.

8.7.5 Training promotion

The last component of the mobile-learning-based ICT training model is training promotion. A promotion in the training model aimed to introduce mobile learning for training, since this type of training is still new for teachers in Indonesia. As Belch and Belch (2003) state, promotion is an important strategy to communicate and attract the target audience. Liao et al. (2009) state the interest of someone in a product can be influenced by the product promotion because they can learn about the strength and weaknesses of the product from the promotion.

The findings of Stage 2 indicate that teachers in Indonesia still do not comprehend the concept of mobile learning for training. Therefore, this study points out the importance of mobile learning promotion prior to implementation.

The results of investigation on factors influencing teachers' acceptance of mobile learning (Stage 4) imply that perceived mobility value and perceived usefulness had a direct effect on teachers' intention to use mobile learning. Hence, the promotion should explain the advantages of mobile learning and the benefits of mobile learning for teachers' professional development to influence their intention to participate in the training. The promotion should give teachers good comprehension on the concept of mobility in mobile learning and the benefit of mobile learning for ICT training.

Another factor affecting teachers' acceptance was institutional influence. Therefore, involving school management or the principal in the promotion will help to convince teachers to participate in the mobile-learning-based ICT training. This is supported by Sari and Lim (2012) who state that participation of a teacher in training was mostly influenced by their school principal.

8.8 Summary

This chapter discussed the findings of this study to answer the research questions, and presented a model of mobile-learning-based ICT training for teachers as the answer to the last research question (RQ 6).

This study confirms the possibility of using a mobile phone for mobile learning for teachers in Indonesia. Mobile learning could be used as a method of teacher training in Indonesia because teachers have appropriate readiness for mobile learning. This study also reveals the need for continuous ICT training for teachers.

Perceived mobility value, institutional influence, and perceived usefulness were found to have a direct effect on teachers' acceptance of mobile learning, while perceived ease of use and self-efficacy did not.

Finally, this chapter presented the model of mobile learning based ICT training for teachers via mobile phone. The model consists of five components; mobile phone, training curriculum, activities, support and reward, and promotion. The study suggests the mobile phone as the main tool in the training and that optimisation of its features be used in the training. The training curriculum is based on UNESCO's ICT standard competency for teachers. The training activities are in the form of individualised and socialised high transactional distance mobile learning. The training should provide a training reminder to support teachers to keep up with the training and a certificate of training completion to increase their interest in the training. The last component of the model is training promotion to help teachers understand more about mobile learning. In the promotion, school management and/or the principal are involved.

The following chapter provides the conclusions of the study.

CHAPTER 9. CONCLUSIONS

9.1 Overview

This chapter provides an overview of the research aim and objectives. Following that, the summary of thesis findings and the contributions of the research are presented. Finally, the limitations of the research are discussed and recommendations for future research related to the limitations are proposed.

9.2 Revisiting the research aim and objectives

The aim of this study was to develop a model of mobile-learning-based ICT training via mobile phone for teacher training. The training model was developed to solve problems for teachers in Indonesia participating in ICT training. Chapter 8 combined all finding from the previous chapter to achieve this aim. The training model was developed as a guideline for teacher-training providers to develop and implement a mobile learning system for ICT training for teachers.

In pursuing this aim, this study had six objectives. The first objective was to explore the possibility of using a mobile phone as the medium of ICT training for teachers in Indonesia. This objective was achieved by conducting a literature review on mobile phone use in the Indonesian context (Chapter 4) and a survey on teachers' readiness for mobile learning (Chapter 5). The literature review on mobile phone use in Indonesia showed the potential of the mobile phone for use in mobile learning program in Indonesia. Part of the survey assessed teachers' basic and skill readiness for mobile learning. These results supported the use of mobile phone for mobile learning for teacher training in Indonesia.

The second objective of this study was to investigate teachers' readiness for mobile learning via mobile phone, and the third objective was to explore ICT experiences of teachers in Indonesia. These objectives were reached by conducting a survey to explore the readiness of teachers to undertake training using mobile learning (Chapter 5). The survey also investigated teachers' ICT experiences in term of using ICT in daily activities and participating in ICT training.

The fourth objective of this study was to evaluate whether mobile learning can solve participation problems of teachers in Indonesia. To attain this objective, this study developed and ran a prototype of mobile-learning-based ICT training via mobile phone for teachers. Chapter 6 reported on the accomplishment of this objective.

The fifth objective was to assess teachers' acceptance of mobile learning. Chapter 7 reported on the accomplishment of this objective. For this assessment, this study developed hypotheses based on the TAM that were statistically tested and proven, resulting in the finding that three factors significantly influenced teachers' acceptance; perceived mobility value, institutional influence, and perceived usefulness.

9.3 Summary of thesis findings

This research developed a model of mobile learning based ICT training for teachers in Indonesia. The literature review in this study revealed the research gaps in the studies of mobile learning training for teachers. Mobile learning for teachers had mostly consisted of how to use the mobile learning system for teaching, not for teacher professional development. Particularly in Indonesia, the review found that mobile learning for teacher training had not yet been implemented.

The implementation of mobile learning for teacher training will support teachers' professional development, without being limited by location, time, and opportunity. Implementation can start immediately because teachers in Indonesia are ready to participate in a mobile learning system.

Teachers' intention to participate in mobile learning for teacher training was determined by their appreciation of mobility value, comprehension of the benefit of mobile learning, and the role of their principals and colleagues.

Additionally, the readiness for, and perceived usefulness of mobile learning were influenced by their demographic profiles; however, their perceived mobility value, institutional influence, self-efficacy, and perceived ease of use were not affected.

Finally, this study developed a model of a mobile learning system for ICT training for teachers in Indonesia. This model will act as a road map to guide teacher-training providers toward the development of mobile learning for teacher ICT training.

9.4 Contribution of the research

This study has academic value in the proposition of an evaluation of teachers' readiness and acceptance of mobile learning and a model of mobile-learning-based ICT training program for teachers. Based on the literature review, this study explored teachers' readiness and acceptance of mobile learning for training. The readiness and acceptance of teachers as mobile learning users have not to date been investigated in the teacher-training context, nor in the Indonesian context.

With regard to the theoretical contribution, the study developed, and assessed, a TAM-based acceptance model in the mobile learning context. The model evaluates the effects of perceived ease of use, perceived usefulness, perceived mobility value, institutional influence, and mobile learning self-efficacy on behavioural intention to use mobile learning. All of these aspects need to be considered when designing and developing mobile-learning-based ICT training for teachers in Indonesia.

The outcome of the study is a model of mobile-learning-based ICT training via mobile phones for teachers in Indonesia that had not yet been explored. The model presents some key elements that need to be addressed in the development of a mobile learning system using mobile phones in the teacher-training environment. The model is proposed as a road map for the development of a mobile learning project in teacher training in Indonesia. This model provides guidelines for the issues that should be addressed in developing mobile learning for teacher training. Teacher-training providers can use this model as a reference to build their mobile-learning-based training program.

This study contributes to teacher professional development in Indonesia by proposing a mobile-learning-based ICT training model. This contribution is important, as the motivation for developing the training model is to solve the

problems that prevent teachers from participating in ICT training; time, location, and limited seat available. The implementation of the training model provides wider opportunities for teachers to participate in training, particularly those who have limited time for training due to work commitments and workplaces located in geographically challenged areas.

9.5 Limitations and future research directions

Several aspects of this study limit the degree to which the findings can be generalised.

First, the participants of this study were from one province in Indonesia – South Sulawesi Province. Thus the results cannot be generalised to all parts of Indonesia. To obtain a more generalisable result, samples in future research should include other provinces in Indonesia. Another way to address this limitation is for future research to conduct comparable studies in other provinces in Indonesia to assess the extent to which the study findings are reflected in other settings.

Second, this study was a cross-sectional study, which collected data on intentions and perceptions at a single point in time. However, intentions and perceptions may change over time due to individual experiences and training. Future research should collect longitudinal data to observe whether the acceptance factors are consistent over time.

Third, in developing the training prototype this study only used SMS as the method of content delivery. Future research could develop a training prototype using other mobile phone features to examine how the features can be used for learning. This future research may result in a comprehensive model of mobile learning using mobile phones.

A further limitation of this study is regarding the sample size. The sample size of teachers with mobile learning experience is relatively small. A further study of teachers' acceptance of mobile learning will need more respondents.

Furthermore, the factors presented in the research affected 53% of teachers' intention to use mobile-learning-based ICT training. Further research should explore and investigate other factors that could affect teachers' acceptance of mobile learning for ICT training.

The training model produced in this study was developed based on the perspective of teachers as the potential users of mobile-learning-based training. Other stakeholders such as teacher educators, teacher training providers, and school management, should be involved in future studies, particularly to evaluate and refine the proposed training model.

Finally, the training model developed in the study is intended to be applied in ICT training. Future research could apply this model to provide training in other areas besides ICT, for example language training.

This study began in the hope that it can lead to improvements of teachers, thus leading to improvements in the education system in Indonesia. This study was conducted to fulfil the need for more studies on mobile learning for teacher training, particularly in the context of teachers in Indonesia.

The outcomes of this study provide a guideline for mobile learning implementation for teacher training in Indonesia to support teacher professional development and ICT integration into education in Indonesia.

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Appendix 1. Questionnaire of Survey 1 (English version)

Research Questionnaire

Flinders UNIVERSITY ADELAIDE + AUSTRALIA

Title:
The readiness of teachers in Indonesia for mobile learning for training

A. Respondent's profile

1. Gender: Female ☐ Male ☐
2. Age: _____ Years
3. Educational Background: Diploma ☐ Bachelor ☐ Master ☐ PhD ☐
4. For how many years have you been teaching? _____ years
5. Do you currently teach at: Junior High School ☐ Senior High School ☐
6. Your school is: Public School ☐ Private School ☐
7. What is your school's type? General School ☐ Vocational School ☐
8. What is your current subject of teaching? _____
9. Which grade level(s) do you currently teach? In which Study Program: (*if any*)
   Grade 1 ☐ Grade 2 ☐ Grade 3 ☐ _____
10. Do you have any other task/position in your school? Yes ☐ No ☐
    If YES, what is the position? _____

B. Mobile phone

1. Do you have a mobile phone? Yes ☐ No ☐

If YES, please answer the next questions; If NO, please go to Section C

2. How long have you been using your current mobile phone? _____ months _____ years
3. What is the brand of your mobile phone?
   Nokia ☐ Blackberry ☐ Mito ☐ Nexian ☐ Samsung ☐ Other _____
4. What is the model of your mobile phone? (*Example: E71 or Bold*) _____
5. What is the size of your mobile phone screen? Small (1.0 to 2.4 inches/2.54 to 6,1 cm) ☐ Large (>3.6 inches/ 9.1 cm) ☐ Medium (2.5 to 3.5 inches / 6.35 to 8.9 cm) ☐
6. The keyboard of your mobile phone is:
   Standard ☐ QWERTY ☐ Virtual Keyboard ☐



7. Your current mobile phone is:

		Yes	No	Not Sure
a.	GSM			
b.	CDMA			
c.	2G compatible			
d.	3G compatible			
e.	3.5G compatible			
f.	4G compatible			

8. What is your current mobile network provider?
   Telkomsel ☐ IM3 ☐ XL ☐ Three ☐ Smart ☐ Other _____

9. Does your mobile phone have following features?

		Yes	No	Not Sure
a.	Camera			
b.	Game			
c.	Voice call			
d.	Video call			
e.	Radio			
f.	Text messaging/SMS			
g.	Multimedia messaging/MMS			
h.	Bluetooth			
i.	Video player			
j.	Audio player			
k.	Internet browser			
l.	Video recorder			
m.	Voice recorder			
n.	Instant messaging			
o.	Memory card			

10. For the features that provided in your mobile phones, do you know how to use them?

		Yes	No
a.	Camera		
b.	Game		
c.	Voice call		
d.	Video call		
e.	Radio		
f.	Text messaging/SMS		
g.	Multimedia messaging/MMS		
h.	Bluetooth		
i.	Video player		
j.	Audio player/MP3		
k.	Internet browser		
l.	Video recorder		
m.	Audio recorder		
n.	Instant messaging		
o.	Memory card		

11. If you know how to use them, how often do you use those features in your mobile phone?

		Every day or almost everyday	At least once a week	At least once a month	Just a few times a year	Never
a.	Camera					
b.	Game					
c.	Voice call					
d.	Video call					
e.	Radio					
f.	Text messaging/SMS					
g.	Multimedia messaging/MMS					
h.	Bluetooth					
i.	Video player					
j.	Audio player/MP3					
k.	Internet browser					
l.	Video recorder					
m	Audio recorder					
n.	Instant messaging					
o.	Memory card					

12. Can your mobile phones read/open the following files?

		Yes	No	Not Sure
a.	Word document			
b.	Excel document			
c.	PDF document			
d.	Power Point document			
e.	Video files			
f.	Picture/graphic files			
g.	Audio files			

C. Using ICT in teaching and learning activity

1. Have you ever use any following technologies as media of teaching?

		Yes	No
a.	Computer/Laptop		
b.	Projector attached to computer		
c.	Over Head Projector (OHP)		
d.	Television and video/DVD/CD player		

2. How often do you do the following?

		Every day or almost everyday	At least once a week	At least once a month	Just a few times a year	Never
a.	Look online for the content or material you think will engage your student					
b.	Look for material online to help you create lesson plans					
c.	Interact online with other teachers to get or give advice on handling classroom issues					
d.	Look online for the latest research in your field or the subjects you teach					
e.	Using a social networking site like facebook to exchange ideas with other teachers					

3. Do you think any following statements as challenge for you in incorporating ICT into your teaching and learning activity?

		Major Challenge	Minor challenge	Not a challenge at all
a.	General resistance by colleagues in school			
b.	Time constraints			
c.	Lack of resources and/or access to ICT			
d.	Your own lack of knowledge or training with ICT			
e.	Lack of technical support, such as set-up, trouble-shooting or repair			

4. What do you think about your ICT skill and knowledge?

Poor ☐ Fair ☐ Good ☐ Excellent ☐

5. Overall, when it comes to knowing how to use ICT which of the following statements best describes you and your colleagues in your school?

a. I usually know more than my colleagues ☐

b. My colleagues usually know more than I do ☐

c. Our skill and knowledge levels are usually about equal ☐

6. How confident are you in using these following software applications?

	Confident	Somewhat confident	Not confident
a. Word processor (Eq. Ms Word)			
b. Spreadsheet (Eq. Ms Excel)			
c. Presentation (Eq. Ms Power Point)			
d. Web browser (Eq. Internet Explorer, Mozilla)			
e. Search engine (Eq. Google, Bing)			

D. Training experience

1. Have you ever participating in an ICT's training? Yes ☐ No ☐

If YES, please answer Q's no. 2 -7 based on your experience on your latest training.
If NO, please jump to Q no. 8

2. What was the type of training? Face-to-face ☐ Blended (mix f2f and online) ☐ Online ☐ Other _____

3. How long was the training? _____ Days

4. Where was the training conducted? School ☐ Other place in your region/city ☐ Other region/city ☐

5. What did you learn in that the ICT's training?
   a. How to set-up computer Yes ☐ No ☐
   b. Operating system Yes ☐ No ☐
   c. Word processor application Yes ☐ No ☐
   d. Spreadsheet application Yes ☐ No ☐
   e. Internet browser Yes ☐ No ☐
   f. Other _____

6. Was the training covered topic on how to incorporate ICT in teaching and learning activity? Yes ☐ No ☐

7. How do you think your ICT's skill level after the training? Increase ☐ Only slightly Increase ☐ No Change ☐

8. Have you ever sought out on your own opportunities to learn more about ICT? Yes ☐ No ☐
   If YES, How? _____

9. Do you think have a good ICT's skill and knowledge is important for a teacher? Yes ☐ No ☐

10. Do you think you need an ICT's training for your professional development as teacher? Yes ☐ No ☐

E. Perception of mobile learning

The term of ***mobile learning*** in the following statements refer to a form of learning that offers learners opportunity using mobile devices to access learning resources anytime and anywhere so the learners can learn regardless time and place. Mobile device used in this study is mobile phone.

What is your opinion about these following statements?

	Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1.	I know what mobile learning is all about.					
2.	I want to know more about mobile learning.					
3.	I don't think I want to be involved in mobile learning.					
4.	I prefer conventional learning than mobile learning.					
5.	I think mobile learning is good for working adults who want to learn new skill for their professional development.					
6.	I don't mind paying extra money for mobile learning.					
7.	Mobile learning will make my life difficult.					
8.	I am not ready for mobile learning now.					
9.	I would like my tutor/instructor to integrate mobile learning in my training/course in addition to face-to-face meetings.					
10.	I am afraid I will spend more money on my mobile phone bill because of mobile learning.					
11.	I will be ready for mobile learning after 2 years.					
12.	I don't know how to use 3G facility in my mobile phone.					
13.	I would like my tutor/instructor to integrate mobile learning besides online forum in my training/course.					
14.	Mobile learning will save my learning time.					
15.	Mobile learning is an alternative to web based learning.					
16.	I need to learn how to use my mobile phone for mobile learning.					
17.	I am looking forward to engage in mobile learning.					
18.	I will upgrade my mobile phone if mobile learning is going to be implemented in my course.					
19.	Mobile learning is an alternative to conventional learning.					
20	I think I am not ready for mobile learning using mobile phone facility.					

Thank you very much for your participation in this survey.
Please collect your completed questionnaire to the researcher.

Appendix 2. Questionnaire of Survey 1 (Bahasa Indonesia version)

Kuisioner Penelitian

Judul: *Kesiapan guru-guru di Indonesia dalam menggunakan mobile learning untuk pelatihan TIK*

A. Profil responden

1. Jenis Kelamin Perempuan ☐ Laki-laki ☐
2. Umur _____ tahun
3. Latar belakang pendidikan Diploma ☐ Sarjana (S1) ☐ Magister (S2) ☐ Doktor (S3) ☐
4. Sudah berapa lama Bapak/Ibu mengajar? _____ tahun
5. Saat ini Bapak/Ibu mengajar di: Sekolah Menengah Pertama/sederajat ☐
   Sekolah Menengah Atas/sederajat ☐
6. Sekolah tempat Bapak/Ibu mengajar: Sekolah negeri ☐ Sekolah swasta ☐
7. Jenis sekolah tempat Bapak/Ibu mengajar: Sekolah Umum ☐ Sekolah Kejuruan ☐
8. Mata pelajaran yang Bapak/Ibu ajarkan saat ini:
   Matematika ☐ Bahasa Inggris ☐ Kimia ☐ Geografi ☐ Sejarah ☐ Lainnya: _____
9. Saat ini Bapak/Ibu mengajar di kelas : Program studi: (*jika ada*)
   Kelas 1 ☐ Kelas 2 ☐ Kelas 3 ☐ _____
10. Apakah Bapak/Ibu mempunyai tugas khusus/jabatan disekolah? Ya ☐ Tidak ☐
    Jika YA, sebutkan tugas/posisi tersebut: _____

B. Handphone

1. Apakah Bapak/Ibu mempunyai handphone? Ya ☐ Tidak ☐

Jika YA silahkan menjawab pertanyaan berikutnya;
Jika TIDAK, silahkan langsung menjawab pertanyaan di Bagian C.

2. Sudah berapa lama Bapak/Ibu menggunakan handphone ini? _____ bulan _____ Tahun
3. Merek handphone yang Bapak/Ibu miliki saat ini:
   Nokia ☐ Blackberry ☐ Mito ☐ Nexian ☐ Samsung ☐ Lainnya _____
4. Model/tipe handphone yang Bapak/Ibu miliki saat ini: (*Contoh: E71 or Bold*) _____
5. Ukuran layar handphone yang Bapak/Ibu gunakan saat ini: Kecil (1 - 2,4 inci / 2,54 - 6,1 cm) ☐ Besar (> 3,6 inci / 9.1 cm) ☐
   Sedang (2.5 - 3.5 inci / 6,35 - 8,9 cm) ☐
6. Jenis keyboard handphone yang Bapak/Ibu miliki saat ini:
   Standard ☐ QWERTY ☐ Virtual Keyboard ☐



7. Handphone Bapak/Ibu saat ini adalah handphone:

		Ya	Bukan	Tidak yakin
a.	GSM			
b.	CDMA			
c.	2G compatible			
d.	3G compatible			
e.	3.5G compatible			
f.	4G compatible			

8. Saat ini Bapak/Ibu berlangganan pada penyedia layanan selular:
   Telkomsel ☐ IM3 ☐ XL ☐ Three ☐ Smart ☐ Lainnya _____

9. Apakah fitur berikut terdapat pada handphone yang Bapak/Ibu gunakan saat ini?

		Ya	Tidak ada	Tidak tahu
a.	Kamera			
b.	Game			
c.	Voice call			
d.	Video call			
e.	Radio			
f.	Text messaging/SMS			
g.	Multimedia messaging/MMS			
h.	Bluetooth			
i.	Pemutar video			
j.	Pemutar audio/MP3			
k.	Jelajah internet			
l.	Perekam video			
m.	Perekam suara			
n.	Instant messaging			
o.	Kartu memori			

10. Untuk fitur yang terdapat pada handphone Bapak/Ibu gunakan, apakah Bapak/Ibu tahu cara menggunakannya?

		Ya	Tidak
a.	Kamera		
b.	Game		
c.	Voice call		
d.	Video call		
e.	Radio		
f.	Text messaging/SMS		
g.	Multimedia messaging/MMS		
h.	Bluetooth		
i.	Pemutar video		
j.	Pemutar audio/MP3		
k.	Jelajah internet		
l.	Perekam video		
m.	Perekam suara		
n.	Instant messaging		
o.	Kartu memori		

11. Jika Bapak/Ibu tahu cara menggunakan fitur pada handphone yang Bapak/Ibu miliki, seberapa sering Bapak/Ibu menggunakan fitur tersebut?

		Setiap hari/ hampir setiap hari	Sekali seminggu	Sekali sebulan	Beberapa kali dalam setahun	Tidak pernah
a.	Kamera					
b.	Game					
c.	Voice call					
d.	Video call					
e.	Radio					
f.	Text messaging/SMS					
g.	Multimedia messaging/MMS					
h.	Bluetooth					
i.	Pemutar video					
j.	Pemutar audio/MP3					
k.	Jelajah internet					
l.	Perekam video					
m	Perekam suara					
n.	Instant messaging					
o.	Kartu memori					

12. Apakah handphone Bapak/Ibu bisa membuka dan/atau membaca file-file berikut?

		Ya	Tidak	Tidak Yakin
a.	File Word			
b.	File Excel			
c.	File PDF			
d.	File Power Point			
e.	File video			
f.	File gambar			
g.	File audio/suara			

C. Penggunaan TIK dalam kegiatan belajar mengajar

1. Apakah Bapak/Ibu pernah menggunakan teknologi berikut sebagai media pembelajaran?

		Ya	Tidak
a.	Komputer/Laptop		
b.	Projector yang terhubung ke komputer		
c.	Over Head Projector (OHP)		
d.	Televisi dan video/DVD/CD player		

2. Seberapa seringkah anda melakukan hal berikut:

		Setiap hari/ hampir setiap hari	Sekali seminggu	Sekali sebulan	Beberapa kali dalam setahun	Tidak pernah
a.	Mencari bahan/materi pengajaran yang bisa menarik minat siswa Bapak/Ibu dalam belajar melalui internet					
b.	Mencari materi sebagai bahan untuk menyusun rencana pembelajaran melalui internet					
c.	Berinteraksi secara *online* dengan guru lain untuk berbagi pengalaman tentang bagaimana mengatasi masalah yang terjadi dikelas					
d.	Mencari hasil-hasil penelitian terbaru mengenai pendidikan ataupun bidang studi yang Bapak/Ibu ajarkan melalui internet					
e.	Menggunakan situs jejaring sosial seperti *facebook* untuk saling bertukar pikiran dengan guru lain					

3. Apakah menurut Bapak/Ibu hal-hal berikut ini menjadi hambatan untuk menggunakan TIK dalam kegiatan belajar mengajar?

		Hambatan besar	Hambatan kecil	Bukan hambatan
a.	Penolakan dari rekan sejawat disekolah			
b.	Kendala waktu			
c.	Kurangnya peralatan dan akses untuk penggunaan TIK			
d.	Kurangnya pengetahuan maupun pelatihan TIK			
e.	Kurangnya dukungan teknis, seperti pengesetan komputer, perawatan, dan perbaikan			

4. Menurut Bapak/Ibu, bagaimana kemampuan TIK yang Bapak/Ibu miliki saat ini?

Kurang ☐ Cukup ☐ Baik ☐ Sangat baik ☐

5. Secara umum, pernyataan manakah yang paling tepat menggambarkan kemampuan TIK Bapak/Ibu dibandingkan kemampuan guru-guru lain disekolah Bapak/Ibu?
   a. Kemampuan Bapak/Ibu lebih baik dibanding guru-guru lain ☐
   b. Kemampuan guru-guru lain lebih baik dibanding Bapak/Ibu ☐
   c. Kemampuan Bapak/Ibu sama dengan guru-guru lainnya ☐

6. Seberapa besarkah kepercayaan diri Bapak/Ibu dalam menggunakan aplikasi perangkat lunak berikut?

	Percaya diri	Kurang percaya diri	Tidak percaya diri
a. Word processor (Eg. Ms Word)			
b. Spreadsheet (Eg. Ms Excel)			
c. Presentation (Eg. Ms Power Point)			
d. Web browser (Eg. Internet Explorer, Mozilla)			
e. Search engine (Eg. Google, Bing)			

D. Pengalaman mengikuti Pelatihan TIK

1. Apakah Bapak/Ibu pernah berpartisipasi dalam pelatihan TIK? Ya ☐ Tidak ☐

Jika YA, silahkan menjawab pertanyaan no. 2 -7 berdasarkan pengalaman Bapak/Ibu dalam pelatihan TIK yan terakhir.
Jika TIDAK, silahkan langsung menjawab pertanyaan no. 8

2. Pelatihan tersebut diadakan secara: Tatap muka ☐ Blended (tatap muka dan online) ☐ Online ☐ Lainnya _____
3. Berapa lama pelatihan tersebut? _____ hari
4. Dimana pelatihan tersebut diadakan? Di sekolah ☐ Ditempat lain di dalam kota./kab ☐ Di kota/kab lain ☐
5. Apa yang Bapak/Ibu pelajari dalam pelatihan tersebut?
   a. Bagaimana merakit komputer Ya ☐ Tidak ☐
   b. Sistem operasi (Contoh: Windows) Ya ☐ Tidak ☐
   c. Aplikasi pengolah kata (Contoh: Word) Ya ☐ Tidak ☐
   d. Aplikasi perhitungan (Contoh: Excel) Ya ☐ Tidak ☐
   e. Penjelajah Internet (Contoh: Mozilla) Ya ☐ Tidak ☐
   f. Lainnya _____
6. Apakah materi yang diberikan dalam pelatihan tersebut mencakup tentang bagaimana menggunakan TIK dalam kegiatan belajar mengajar? Ya ☐ Tidak ☐
7. Bagaimana kemampuan TIK Bapak/Ibu setelah mengikuti pelatihan tersebut? Ada peningkatan ☐ Ada sedikit peningkatan ☐ Tidak ada peningkatan ☐
8. Pernahkan Bapak/Ibu berupaya mencari sendiri peluang untuk mempelajari TIK? Ya ☐ Tidak ☐
   Jika YA, Bagaimana caranya? _____
9. Apakah menurut Bapak/Ibu pengetahuan dan keterampilan TIK penting bagi guru? Ya ☐ Tidak ☐
10. Apakah Bapak/Ibu membutuhkan pelatihan TIK untuk pengembangan profesional Bapak/Ibu sebagai seorang guru? Ya ☐ Tidak ☐

E. Persepsi terhadap *mobile learning*

Istilah ***Mobile learning*** dalam pernyataan-pernyataan berikut merujuk pada suatu bentuk pembelajaran dimana pesertanya dapat mengakses materi pelajaran dimana saja dan kapan saja dengan menggunakan perangkat mobile sehingga pesertanya dapat belajar tanpa terkendala oleh tempat dan waktu.
Dalam penelitian ini yang dimaksud dengan perangkat mobile adalah handphone/hp/telepon genggam.

Apakah pendapat Bapak/Ibu akan pernyataan dibawah ini?

	Penyataan	Sangat setuju	Setuju	Netral	Tidak setuju	Sangat tidak setuju
1.	Saya tahu tentang *mobile learning*					
2.	Saya ingin tahu lebih banyak tentang *mobile learning*					
3.	Saya tidak ingin terlibat dalam *mobile learning*					
4.	Saya lebih senang cara pembelajaran konvensional dibandingkan *mobile learning*					
5.	Menurut saya, *mobile learning* baik bagi mereka yang ingin mengembangkan keterampilannya untuk peningkatan professional mereka					
6.	Tidak masalah bagi saya untuk mengeluarkan uang lebih untuk *mobile learning*					
7.	*Mobile learning* akan menyulitkan saya					
8.	Saat ini saya belum siap mengikuti *mobile learning*.					
9.	Saya berharap instruktur pelatihan yang saya ikuti mengintegrasikan *mobile learning* dengan metode tatap-muka dalam pelatihan.					
10.	Saya khawatir tagihan biaya *handphone* saya akan meningkat karena *mobile learning*					
11.	Saya akan siap untuk *mobile learning*					
12.	Saya tidak tahu bagaimana menggunakan fasilitas 3G di handphone saya.					
13.	Saya berharap instruktur pelatihan yang saya ikuti menggabungkan *mobile learning* dan forum *online* dalam pelatihan.					
14.	Dengan *mobile learning* saya bisa menghemat waktu belajar saya					
15.	Mobile learning adalah alternatif dari pembelajaran berbasis web.					
16.	Saya perlu belajar bagaimana menggunakan handphone saya untuk *mobile learning*.					
17.	Saya sangat ingin terlibat dalam *mobile learning*.					
18.	Saya akan mengganti *handphone* saya jika *mobile learning* akan diimplementasikan dalam pelatihan yang akan saya ikuti.					
19.	*Mobile learning* merupakan alternatif dari pembelajaran konvensional.					
20	Sepertinya saya tidak siap untuk berpartisipasi dalam *mobile learning* dengan memanfaatkan fasilitas yang ada di handphone.					

Terima kasih banyak atas partisipasi Bapak/Ibu dalam survey ini.
Silahkan mengumpulkan kuisioner yang telah Bapak/Ibu isi kepada peneliti.

Appendix 3. Ethics approval of Survey 1

6095 - SBREC Final Approval (3rd July 2013)

Human Research Ethics <human.researchethics@flinders.edu.au>

Wed 3/07/2013 4:49 PM

To:iin.yusri@flinders.edu.au <iin.yusri@flinders.edu.au>; Robert Goodwin <robert.goodwin@flinders.edu.au>; Carl Mooney <carl.mooney@flinders.edu.au>;

Dear Iin Karmila,

The Chair of the Social and Behavioural Research Ethics Committee (SBREC) at Flinders University considered your response to conditional approval out of session and your project has now been granted final ethics approval. Your ethics final approval notice can be found below.

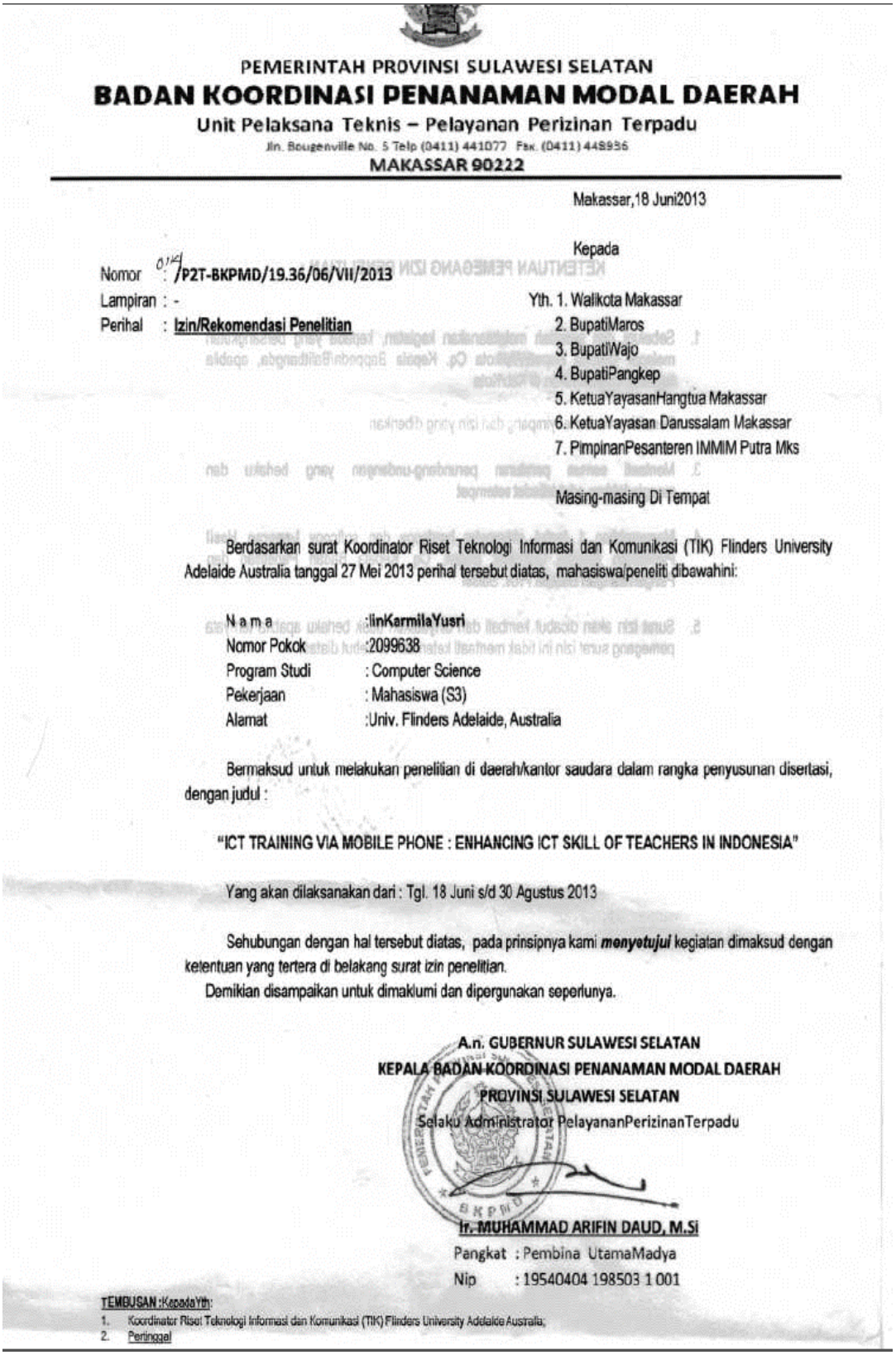
FINAL APPROVAL NOTICE

Project No.:	**6095**
Project Title:	ICT Training via mobile phone: Enhancing ICT skill of teachers in Indonesia
Principal Researcher:	Ms Iin Karmila Yusri
Email:	iin.yusri@flinders.edu.au
Address:	School of Computer Science, Engineering and Mathematics

Approval Date:	3 July 2013	Ethics Approval Expiry Date:	**30 April 2016**

The above proposed project has been **approved** on the basis of the information contained in the application, its attachments and the information subsequently provided.

Appendix 4. Permission for conducting Survey 1



PEMERINTAH PROVINSI SULAWESI SELATAN

BADAN KOORDINASI PENANAMAN MODAL DAERAH

Unit Pelaksana Teknis – Pelayanan Perizinan Terpadu

Jln. Bougenville No. 5 Telp (0411) 441077 Fax. (0411) 448936

MAKASSAR 90222

Makassar,18 Juni2013

Kepada

Nomor : 074/P2T-BKPMD/19.36/06/VII/2013

Lampiran : -

Perihal : Izin/Rekomendasi Penelitian

Yth. 1. Walikota Makassar
2. BupatiMaros
3. BupatiWajo
4. BupatiPangkep
5. KetuaYayasanHangtua Makassar
6. KetuaYayasan Darussalam Makassar
7. PimpinanPesanteren IMMIM Putra Mks

Masing-masing Di Tempat

Berdasarkan surat Koordinator Riset Teknologi Informasi dan Komunikasi (TIK) Flinders University Adelaide Australia tanggal 27 Mei 2013 perihal tersebut diatas, mahasiswa/peneliti dibawahini:

Nama	:IinKarmilaYusri
Nomor Pokok	:2099638
Program Studi	: Computer Science
Pekerjaan	: Mahasiswa (S3)
Alamat	:Univ. Flinders Adelaide, Australia

Bermaksud untuk melakukan penelitian di daerah/kantor saudara dalam rangka penyusunan disertasi, dengan judul :

"ICT TRAINING VIA MOBILE PHONE : ENHANCING ICT SKILL OF TEACHERS IN INDONESIA"

Yang akan dilaksanakan dari : Tgl. 18 Juni s/d 30 Agustus 2013

Sehubungan dengan hal tersebut diatas, pada prinsipnya kami ***menyetujui*** kegiatan dimaksud dengan ketentuan yang tertera di belakang surat izin penelitian.

Demikian disampaikan untuk dimaklumi dan dipergunakan seperlunya.

A.n. GUBERNUR SULAWESI SELATAN
KEPALA BADAN KOORDINASI PENANAMAN MODAL DAERAH
PROVINSI SULAWESI SELATAN
Selaku Administrator PelayananPerizinanTerpadu

Ir. MUHAMMAD ARIFIN DAUD, M.Si
Pangkat : Pembina UtamaMadya
Nip : 19540404 198503 1 001

TEMBUSAN :KepadaYth:
1. Koordinator Riset Teknologi Informasi dan Komunikasi (TIK) Flinders University Adelaide Australia;
2. Pertinggal

Appendix 5. Permission for conducting Survey 1 (English translation)

English translation

Makassar, 18 June 2013

Number : 0114/P2T-BKPMD/19.36/06/VII/2013
Attachment : -
Subject : Permission/Recommendation for research

To:
1. Mayor of Makassar
2. Regent of Maros
3. Regent of Wajo
4. Regent of Pangkep
5. Head of Hangtuah Makassar Foundation
6. Head of IMMIM Islamic Boarding School Makassar

Based on a letter from the coordinator of Enterprise ICT research in Flinders University on May 27, 2013 regarding the application of permission for research, the following student:

Name : Iin Karmila Yusri
Student ID : 2099638
Field of study : Computer Science
Occupation : PhD student
Address : Flinders University, Adelaide, Australia

Intends to conduct research in your area for the dissertation of her doctoral studies with the title
"ICT training via mobile phone: Enhancing ICT skill of teachers in Indonesia"
which will be held from June 18 until August 30, 2013.

Relative to the subject above, in principle we agree to give approval for the student to conduct research with provisions are listed in page 2 of this letter.
This letter was stated to be understood and used as needed.

On behalf of the Governor of South Sulawesi,
Chief of Capital Investment Coordination Agency
As administrator of integrated license service

Ir. Muhammad Arifin Daud, MSi.
Grade : *Pembina Utama Madya*
Employment ID:19540404 198503 1 001

CC.:
1. Coordinator of Enterprise ICT, Flinders University, Adelaide, Australia
2. Archive.

Appendix 6. Introduction letter of Survey 1 (English version)

Dr. Robert Goodwin

School of Computer Science, Engineering and Mathematics (CSEM)
Faculty of Science and Engineering

GPO Box 2100
Adelaide SA 5001

Tel: +61 8 8201 3113
Fax: +61 8 8201 2904
robert.goodwin@flinders.edu.au

www.flinders.edu.au/science_engineering/csem

CRICOS Provider No. 00114A

LETTER OF INTRODUCTION

Dear Sir/Madam,

I hold the position of Senior Lecturer in the School of Computer Science, Engineering and Mathematics at Flinders University.

Iin Yusri is a PhD student undertaking research leading to the production of a thesis and other publications on the subject of mobile learning for ICT training: Enhancing ICT skill of teachers in Indonesia.

I would be grateful if you would volunteer to assist in this project, by completing a questionnaire which covers certain aspects of this topic. No more than 15 minutes on one occasion would be required.

Be assured that any information provided will be treated in the strictest confidence and none of the participants will be individually identifiable in the resulting thesis, report or other publications. You are, of course, free to discontinue participation at any time or to decline to answer particular questions.

Any enquiries you may have concerning this project should be directed to me at the address given above or by telephone on +61 8 8201 3113 by fax on +61 8 8201 2904 or by email (robert.goodwin@flinders.edu.au).

Thank you for your attention and assistance.

Yours sincerely

Dr. Robert Goodwin
Senior Lecturer in Information and Communication Technology

This research project has been approved by the Flinders University Social and Behavioural Research Ethics Committee (Project Number 6095). For more information regarding ethical approval of the project the Executive Officer of the Committee can be contacted by telephone on 8201 3116, by fax on 8201 2035 or by email human.researchethics@flinders.edu.au

Appendix 7. Introduction letter of Survey 1 (Bahasa Indonesia version)

Dr. Robert Goodwin
Jurusan Ilmu Komputer, Teknik dan Matematika
Fakultas Sainis dan Teknik

GPO Box 2100
Adelaide SA 5001
Tel: +61 8 8201 3113
Fax: +61 8 8201 2904
robert.goodwin@flinders.edu.au
www.flinders.edu.au/science_engineering/csem
CRICOS Provider No. 00114A

Perihal : Surat Pengantar Kuisioner
Lampiran : 1 berkas

Kepada
Yth. Bapak/Ibu Guru Sekolah Menengah
Di –
Tempat

Dengan hormat,

Kami pengajar dan peneliti senior di Jurusan Ilmu Komputer, Teknik dan Matematika Universitas Flinders.

Iin Yusri adalah mahasiswa program doktoral kami yang sedang melaksanakan penelitian dalam rangka penyusunan tesis dengan topik '*Pelatihan TIK berbasis handphone untuk peningkatan kemampuan TIK guru-guru di Indonesia*'

Kami mohon kesediaan Bapak/Ibu untuk berpartisipasi dalam penelitian ini secara sukarela dengan mengisi kuisioner yang mencakup beberapa topik sehubungan dengan penelitian ini. Untuk melengkapi kuisioner ini hanya membutuhkan waktu tidak lebih dari 15 menit.

Seluruh informasi yang Bapak/Ibu berikan dalam penelitian akan kami jamin kerahasiaannya. Partisipasi Bapak/Ibu dalam penelitian ini bersifat sukarela. Bapak/Ibu bisa saja menolak untuk mejawab pertanyaan tertentu atau berhenti berpartisipasi dalam penelitian ini.

Jika Bapak/Ibu memerlukan informasi lebih lanjut mengenai penelitian ini, Bapak/Ibu dapat menghubungi kami di alamat yang tertera pada kop surat pengantar ini atau melalui telepon di +61 8 8201 3113, faks di +61 8 8201 2904 atau email robert.goodwin@flinders.edu.au.

Terima kasih atas perhatian dan partisipasi Bapak/Ibu.

Hormat kami,

Dr. Robert Goodwin
Pengajar dan Peneliti Senior
Bidang Teknologi Informasi dan Komunikasi

Proyek penelitian ini telah mendapatkan persetujuan dari Komite Etik Penelitian Bidang Sosial dan Perilaku Universitas Flinders (*Proyek Nomor. 6095*). *Untuk informasi lebih lanjut mengenai persetujuan etik untuk proyek ini, silahkan menghubungi Pejabat Eksekutif Komite Etik melalui telepon +61 8 8201 3116, faks +61 8 8201 2035 atau email human.researchethics@flinders.edu.au*

inspiring

Appendix 8. Information sheet of Survey 1 (English version)

Ms. Iin Karmila Yusri
School of Computer Science, Engineering and Mathematics
Faculty of Science and Engineering

Room 452, Level 4, Engineering Building
Flinders Drive, Bedford Park SA 5042

GPO Box 2100
Adelaide SA 5001

Tel: +61 8 8201 5678
Fax: +61 8 8201 2904
iin.yusri@flinders.edu.au

Web address:
www.flinders.edu.au/science_engineering/csem

CRICOS Provider No. 00114A

INFORMATION SHEET

Title: The readiness of teachers in Indonesia for mobile learning for training

Investigators:

Ms. Iin Karmila Yusri
School of Computer Science, Engineering and Mathematics
Faculty of Engineering and Science
Flinders University
Ph: +61 8 8201 5678

Description of the study:

This study is part of the project entitled '*Mobile learning for ICT training: Enhancing ICT skill of teachers in Indonesia'*. This project will develop an ICT training using mobile phone for teacher professional development in Indonesia. This project is supported by Flinders University School of Computer Science, Engineering and Mathematics.

Purpose of the study:

This project aims to investigate the readiness of teachers in Indonesia towards mobile learning

What will I be asked to do?

You are asked to complete a questionnaire which covers about your profile, your mobile phone, how you use ICT in learning activities, your experience of ICT training and your perception towards mobile learning. No more than 15 minutes on one occasion would be required. This is voluntary.

What benefit will I gain from being involved in this study?

Information you provided in this study will be used to design an ICT training system using mobile phone specifically developed to improve the quality of teachers in Indonesia.

Will I be identifiable by being involved in this study?

We ensure the confidentiality of any information that you provide in this study. The results will be published in the form of overall data, not individual data. Therefore none of the participants will be individually identifiable in the resulting thesis, report or other publications.

Are there any risks or discomforts if I am involved?

The investigator anticipates few risks from your involvement in this study. If you have any concerns regarding anticipated or actual risks or discomforts, please raise them with the investigator.

How do I agree to participate?

Participation is voluntary. You may refuse to answer any questions and you are, of course, free to discontinue participation at any time. Your completed questionnaire will regard as your consent.

Thank you for taking the time to read this information sheet and we hope that you will accept our invitation to be involved.

This research project has been approved by the Flinders University Social and Behavioural Research Ethics Committee (Project number 6095). For more information regarding ethical approval of the project the Executive Officer of the Committee can be contacted by telephone on 8201 3116, by fax on 8201 2035 or by email human.researchethics@flinders.edu.au

Appendix 9. Information sheet of Survey 1 (Bahasa Indonesia version)

Iin Karmila Yusri
Jurusan Ilmu Komputer, Teknik dan Matematika
Fakultas Sains dan Teknik
Gedung Teknik Lantai 4, Ruangan No. 452
Bedford Park SA 5042
GPO Box 2100
Adelaide SA 5001
Tel: +61 8 8201 5678
Fax: +61 8 8201 2904
iin.yusri@flinders.edu.au
Web:
www.flinders.edu.au/science_engineering/csem
CRICOS Provider No. 00114A

LEMBAR INFORMASI

JUDUL: '*Kesiapan guru-guru di Indonesia dalam menggunakan mobile learning untuk pelatihan TIK*'

Peneliti:

Iin Karmila Yusri
Jurusan Ilmu Komputer, Teknik, dan Matematika
Fakultas Sains dan Teknik
Universitas Flinders
Ph: +61 8 8201 5678

Deskripsi penelitian

Penelitian ini merupakan bagian dari proyek penelitian yang berjudul '*Pelatihan TIK berbasis handphone untuk peningkatan kemampuan TIK guru di Indonesia*'. Proyek ini akan membuat sistem pelatihan teknologi informasi dan komunikasi (TIK) berbasis *handphone* untuk pengembangan professional guru di Indonesia. Proyek penelitian ini didukung oleh Universitas Flinders, Jurusan Ilmu Komputer, Teknik dan Matematika.

Tujuan Penelitian

Penelitian ini bertujuan untuk mengetahui tingkat kesiapan guru di Indonesia dalam menggunakan *mobile learning* untuk pelatihan.

Apa yang harus saya lakukan?

Bapak/Ibu akan diminta untuk mengisi kuisioner yang terdiri dari 5 topik pertanyaan yaitu profil Bapak/Ibu, *handphone* yang Bapak/Ibu gunakan saat ini, bagaimana Bapak/Ibu menggunakan TIK dalam kegiatan belajar mengajar, pengalaman Bapak/Ibu mengikuti training TIK, dan persepsi Bapak/Ibu terhadap *mobile learning*. Untuk mengisi kuisioner ini hanya dibutuhkan waktu kurang dari 15 menit.

Apa keuntungan yang saya dapatkan dengan berpartisipasi dalam penelitian ini?

Informasi yang Bapak/Ibu berikan dalam penelitian ini akan digunakan untuk merancang sistem pelatihan TIK berbasis *handphone* yang khusus dibangun untuk peningkatan kualitas guru-guru di Indonesia.

Apakah keterlibatan saya dalam penelitian ini dapat teridentifikasi?

Kami menjamin kerahasiaan setiap informasi yang Bapak/Ibu berikan dalam penelitian ini. Hasil yang dipublikasikan akan berupa data keseluruhan, bukan data individual, sehingga tidak ada responden yang bisa teridentifikasi secara individual baik dalam tesis, laporan atau publikasi lainnya dari hasil penelitian ini.

Apakah ada resiko akan keterlibatan saya dalam penelitian ini?

Peneliti telah berupaya untuk mengantisipasi hal-hal yang mungkin menjadi resiko bagi Bapak/Ibu dengan terlibat dalam penelitian ini. Jika antisipasi yang dilakukan oleh Peneliti meragukan atau tidak sesuai menurut Bapak/Ibu, kami harapkan Bapak/Ibu segera menyampaikan hal tersebut kepada peneliti.

Bagaimana persetujuan saya untuk berpartisipasi?

Partisipasi dalam penelitian ini bersifat sukarela. Bapak/Ibu bisa saja menolak untuk menjawab pertanyaan dalam kuisioner dan mengundurkan diri dari penelitian ini. Dengan menjawab seluruh pertanyaan dalam kuisioner berarti Bapak/Ibu setuju untuk berpatisipasi dalam penelitian ini.

Terima kasih atas kesediaan Bapak/Ibu membaca lembar informasi ini dan kami harap Bapak/Ibu bersedia untuk berpartisipasi.

Proyek penelitian ini telah mendapatkan persetujuan dari Komite Etik Penelitian Bidang Sosial dan Perilaku Universitas Flinders (Proyek Nomor 6095). Untuk informasi lebih lanjut mengenai persetujuan etik untuk proyek ini, silahkan menghubungi Pejabat Eksekutif Komite Etik melalui telepon +61 8 8201 3116, faks +61 8 8201 2035 atau email human.researchethics@flinders.edu.au

Appendix 10. Information sheet and questionnaire of Survey 2 in English

Factors influencing teachers' acceptance of mobile learning for ICT training

Welcome to the survey on teachers' acceptance of mobile learning using mobile phone for ICT training

Dear Teachers,

You are invited to participate in an online survey on research with title: FACTORS INFLUENCING TEACHERS ACCEPTANCE OF MOBILE LEARNING FOR ICT TRAINING. This research study is conducted to investigate the acceptance of teachers in Indonesia on mobile learning using mobile phones for ICT training. It should take up to 15 minutes to complete.

PARTICIPATION
Your participation in this survey is voluntary. You may refuse to take part in the research or exit the survey at any time without penalty. You are free to decline to answer any particular question you do not wish to answer for any reason.

BENEFIT
Information you provided in this study will be used to design an ICT training system using mobile phone specifically developed to improve the quality of teachers in Indonesia.

RISKS
There are no foreseeable risks involved in participating in this study other than those encountered in day-to-day life.

CONFIDENTIALITY
Your survey answers will sent to a link at https://www.surveymonkey.com where data will be stored in password protected electronic format. Survey Monkey does not collect identifying information such as your name, email address, or IP address. Therefore, your responses will remain anonymous. No one will be able to identify you or your anwers, and no one will know whether or not you participated in the study.

CONTACT
If you have questions or problem associated with the practical aspects of your participation in the project, or wish to raise a concern or complaint about the project, then you should consult project coordinator: Dr. Robert Goodwin via email at robert.goodwin@flinders.edu.au or via phone at +61 8 8201 3113.

This research project has been approved by the Flinders University Social and Behavioural Research Ethics Committee (Project number INSERT PROJECT No. here following approval). For more information regarding ethical approval of the project the Executive Officer of the Committee can be contacted by telephone on 8201 3116, by fax on 8201 2035 or by email human.researchethics@flinders.edu.au

ELECTRONIC CONSENT:

You may print a copy of this consent form for your records.

Clicking on the button below indicates your consent.

◯ I consent to participate in this survey

If you do not wish to participate in the research study, please decline participation by clicking on the button below.

◯ I do not want to participate in this survey

Flinders UNIVERSITY
ADELAIDE • AUSTRALIA

Factors influencing teachers' acceptance of mobile learning for ICT training

Respondent Profile

* Gender:

- ◯ Female
- ◯ Male

* Age:

- ◯ 21 to 30 years old
- ◯ 31 to 40 years old
- ◯ 41 to 50 years old
- ◯ 51 to 60 years old
- ◯ > 60 years old

* Educational background:

- ◯ Diploma
- ◯ Bachelor
- ◯ Master
- ◯ PhD

* How long have you been teaching?

- ◯ <= 7 years
- ◯ 8 to 14 years
- ◯ 15 to 21 years
- ◯ 22 to 28 years
- ◯ 29 to 35 years
- ◯ > 35 years

* Do you currently teach at:

- ◯ Junior high school
- ◯ Senior high school
- ◯ Vocational high school

Your school location is:

- ◯ in capital city of province
- ◯ 100 - 200 km from capital city of province
- ◯ > 200 km from capital city of province

* Your subject of teaching is:

- ◯ Mathematics
- ◯ English
- ◯ Science
- ◯ Social science
- ◯ Bahasa
- ◯ ICT
- ◯ Other (please specify)

* Do you have another task/position in your school?

- ◯ Do not have
- ◯ Student advisor
- ◯ Student patron
- ◯ Laboratory staff
- ◯ Other (please specify)

Factors influencing teachers' acceptance of mobile learning for ICT training

Training experience

* Did you complete all sessions in the training?

- ◯ Yes
- ◯ No

Factors influencing teachers' acceptance of mobile learning for ICT training

Training experience

* If NO, what session that you did not complete? (you can choose more than one answer)

- [ ] Session 1
- [ ] Session 2
- [ ] Session 3

* Why did you not complete the session(s)?

- ( ) Did not have time
- ( ) Forgot
- ( ) Did not know how
- ( ) Other (please specify)

Factors influencing teachers' acceptance of mobile learning for ICT training

Training experience

When did you find convenient to do your task in this training?

Flinders UNIVERSITY
ADELAIDE • AUSTRALIA

Factors influencing teachers' acceptance of mobile learning for ICT training

Teachers' acceptance on mobile learning

* After trying to use mobile learning using a mobile phone for ICT training, what is your opinion on the following statements?

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
I know that mobile devices are the medium for mobile learning.	○	○	○	○	○
It is convenient to access mobile learning anywhere at anytime	○	○	○	○	○
Mobility is an outstanding advantage of mobile learning for training.	○	○	○	○	○
I could complete the task in mobile learning if I had the manuals for reference	○	○	○	○	○
I could complete the task in mobile learning if I had seen someone else using it before trying myself.	○	○	○	○	○
I could complete the task in mobile learning if I had someone who showed me how to do it.	○	○	○	○	○
I would like participate mobile learning for training if my institution asked me to.	○	○	○	○	○
I would like to participate in mobile learning training if a certificate of training completion was provided.	○	○	○	○	○

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
I would like to participate in mobile learning for training if my colleagues also want to participate.	○	○	○	○	○
Using mobile learning would save me much time.	○	○	○	○	○
Mobile learning would enhance my effectiveness in learning.	○	○	○	○	○
Overall, mobile learning would be useful.	○	○	○	○	○
Learning to use mobile learning was easy for me.	○	○	○	○	○
My interaction with mobile learning was clear and understandable.	○	○	○	○	○
Overall, I found mobile learning easy to use.	○	○	○	○	○
I intend to use mobile learning for training when it becomes available.	○	○	○	○	○
I predict that I would use mobile learning frequently.	○	○	○	○	○
I would recommend my colleague to use mobile learning for training.	○	○	○	○	○

Appendix 11. Information sheet and questionnaire of Survey 2 (Bahasa Indonesia version)

Faktor pengaruh dalam penerimaan guru terhadap pelatihan TIK dengan mobile learning.

Selamat datang di Survey mengenai penerimaan guru dalam menggunakan mobile learning untuk pelatihan

Yth. Bapak/Ibu

Kami mengundang Bapak/Ibu untuk berpatisipasi dalam survey online untuk penelitian yang berjudul: FAKTOR-FAKTOR YANG MEMPENGARUHI PENERIMAAN GURU TERHADAP PELATIHAN TIK DENGAN MOBILE LEARNING. Penelitian ini bertujuan untuk mengetahui bagaimana penerimaan guru di Indonesia terhadap pelatihan dengan mobile learning menggunakan handphone. Untuk mengisi kuisioner ini hanya mebutuhkan waktu sekitar 15 menit.

PARTISIPASI
Partisipasi Bapak/Ibu dalam survey ini bersifat sukarela. Bapak/Ibu dapat berhenti untuk berpartisipasi dalam penelitian ini kapan saja. Bapak/Ibu bebas untuk tidak menjawab pertanyaan yang tidak ingin Bapak/Ibu jawab.

KEUNTUNGAN
Informasi yang Bapak/Ibu berikan dalam penelitian ini akan digunakan untuk merancang sistem pelatihan TIK berbasis handphone yang khusus dibangun untuk peningkatan kualitas guru-guru di Indonesia.

RESIKO
Tidak ada resiko bagi keterlibatan Bapak/Ibu dalam penelitian ini selain yang ditemui dalam kehidupan sehari-hari.

KERAHASIAAN
Jawaban Bapak/Ibu dalam survey ini akan terkirim ke https://www.surveymonkey.net dimana data akan disimpan dalam format elektronik dan dilindungi kata kunci. Survey Monkey tidak akan mengumpulkan informasi yang bisa mengidentifikasi Bapak/Ibu seperti nama, alamat email, atau alamat IP. Partisipasi Bapak/Ibu bersifat anonim. Tidak ada yang bisa mengidentifikasi Bapak/Ibu maupun jawaban Bapak/Ibu, dan juga tidak akan ada yang bisa mengetahui apakah Bapak/Ibu berpartisipasi dalam survey ini atau tidak.

KONTAK
Jika Bapak/Ibu mempunyai pertanyaan atau masalah berkenaan dengan partisipasi Bapak/Ibu dalam proyek ini, atau Bapak/Ibu merasa keberatan atau ingin mengajukan keluhan, silahkan menhubungi koordinator proyek ini Dr. Robert Goodwin melalui email di
robert.goodwin@flinders.edu.au atau melalui telepon di +61 8 8201 3113.

Proyek penelitian ini telah mendapatkan persetujuan dari Komite Etik Penelitian Bidang Sosial dan Perilaku Flinders University (Proyek Nomor. INSERT PROJECT No. here following approval). Untuk informasi lebih lanjut mengenai persetujuan etik untuk proyek ini, silahkan menghubungi Pejabat Eksekutif Komite Etik melalui telepon +61 8 8201 3116, faks +61 8 8201 2035 atau email human.researchethics@flinders.edu.au

Lembar kesediaan elektronik.
Bapak/Ibu dapat mencetak salinan lembar kesediaan ini sebagai arsip.

Silahkan meng-klik tombol berikut untuk menunjukkan kesediaan Bapak/Ibu berpartisipasi dalam survey ini:

◯ Saya bersedia untuk berpatisipasi dalam survey ini

Jika Bapak/Ibu tidak bersedia untuk berpatisipasi dalam survey ini, silahkan meng-klik tombol berikut:

◯ Tidak bersedia

Faktor pengaruh dalam penerimaan guru terhadap pelatihan TIK dengan mobile learning.

Profil responden

* Jenis kelamin:

- ◯ Perempuan
- ◯ Laki-laki

* Usia:

- ◯ 21 - 30 tahun
- ◯ 31 - 40 tahun
- ◯ 41 - 50 tahun
- ◯ 51 - 60 tahun
- ◯ > 60 tahun

* Latar belakang pendidikan:

- ◯ Diploma
- ◯ Sarjana
- ◯ Magister
- ◯ Doktoral

* Sudah berapa lama Bapak/Ibu mengajar?

- ◯ <= 7 tahun
- ◯ 8 - 14 tahun
- ◯ 15 - 21 tahun
- ◯ 22 - 28 tahun
- ◯ 29 - 35 tahun
- ◯ > 35 tahun

* Saat ini Bapak/Ibu mengajar di:

- ◯ Sekolah Menengah Pertama (SMP)
- ◯ Sekolah Menengah Atas (SMA)
- ◯ Sekolah Menengah Kejuruan (SMK)

Sekolah tempat Bapak/Ibu mengajar terletak di:

- ◯ Ibukota provinsi
- ◯ < 100 km dari ibukota provinsi
- ◯ 100 - 200 km dari ibukota provinsi
- ◯ > 200 km dari ibukota provinsi

* Mata pelajaran yang Bapak/Ibu ajarkan:

- ◯ Matematika
- ◯ Bahasa Inggris
- ◯ Ilmu Pengetahuan Alam
- ◯ Ilmu Pengetahuan Sosial
- ◯ Bahasa Indonesia
- ◯ Teknologi Informasi dan Komunikasi (TIK)
- ◯ Lainnya

* Apakah Bapak/Ibu mempunyai jabatan atau posisi tambahan disekolah?

- ◯ Tidak punya
- ◯ Wali kelas
- ◯ pembina kemahasiswaan
- ◯ Staf laboratorium
- ◯ Lainnya

Flinders UNIVERSITY ADELAIDE • AUSTRALIA

Faktor pengaruh dalam penerimaan guru terhadap pelatihan TIK dengan mobile learning.

Pengalaman mengikuti pelatihan

* Apakah Bapak/Ibu menyelesaikan semua sesi dalam pelatihan ini?

- ◯ Ya
- ◯ Tidak

Faktor pengaruh dalam penerimaan guru terhadap pelatihan TIK dengan mobile learning.

Pengalaman mengikuti pelatihan

* Jika 'Tidak', sesi apa yang Bapak/Ibu tidak selesaikan? (Bapak/Ibu dapat memberikan lebih dari satu jawaban)

- [ ] Sesi 1
- [ ] Sesi 2
- [ ] Sesi 3

* Mengapa Bapak/Ibu tidak menyelesaikan sesi tersebut?

- ( ) Tidak ada waktu
- ( ) Lupa
- ( ) Tidak tahu caranya
- ( ) Lainnya (mohon jawaban spesifik)

Faktor pengaruh dalam penerimaan guru terhadap pelatihan TIK dengan mobile learning.

Pengalaman mengikuti pelatihan

Kapan Bapak/Ibu merasa nyaman mengerjakan tugas dalam pelatihan ini?

Flinders UNIVERSITY
ADELAIDE • AUSTRALIA

Faktor pengaruh dalam penerimaan guru terhadap pelatihan TIK dengan mobile learning.

Penerimaan guru terhadap pelatihan dengan mobile learning

* Setelah mencoba mengikuti pelatihan TIK dengan mobile learning menggunakan handphone, bagaimana pendapat Bapak/Ibu akan pernyataan berikut?

	Sangat tidak setuju	Tidak setuju	Netral	Setuju	Sangat setuju
Saya mengetahui bahwa perangkat selular adalah media yang digunakan dalam mobile learning.	◯	◯	◯	◯	◯
Sangat nyaman untuk mengakses mobile learning kapan saja dan dimana saja.	◯	◯	◯	◯	◯
Mobilitas merupakan keunggulan utama dari mobile learning.	◯	◯	◯	◯	◯
Saya dapat menyelesaikan tugas dalam mobile learning jika referensi manualnya tersedia.	◯	◯	◯	◯	◯
Saya dapat menyelesaikan tugas dalam mobile learning jika saya pernah melihat orang lain menggunakannya sebelum saya mencoba sendiri.	◯	◯	◯	◯	◯
Saya dapat menyelesaikan tugas dalam mobile learning jika ada orang lain memberikan contoh pada saya bagaimana menggunakannya.	◯	◯	◯	◯	◯

	Sangat tidak setuju	Tidak setuju	Netral	Setuju	Sangat setuju
Saya akan mengikuti pelatihan dengan mobile learning jika hal itu diminta oleh institusi saya.	○	○	○	○	○
Saya akan mengikuti pelatihan dengan mobile learning jika sertifikat tanda mengikuti pelatihan disediakan.	○	○	○	○	○
Saya akan mengikuti pelatihan dengan mobile learning jika ada teman saya juga ikut pelatihan tersebut	○	○	○	○	○
Menggunakan mobile learning untuk pelatihan sangat menghemat waktu.	○	○	○	○	○
Mobile learning meningkatkan efektifitas belajar saya.	○	○	○	○	○
Secara umum, mobile learning sangat bermanfaat.	○	○	○	○	○
Sangat mudah bagi saya untuk belajar menggunakan mobile learning	○	○	○	○	○
Menurut saya, interaksi dengan mobile learning jelas dan mudah dimengerti.	○	○	○	○	○
Secara umum, saya merasa mobile learning mudah digunakan.	○	○	○	○	○
Saya bermaksud menggunakan mobile learning untuk pelatihan jika tersedia.	○	○	○	○	○
Sepertinya saya akan sering menggunakan mobile learning	○	○	○	○	○
Saya akan menganjurkan kolega saya untuk mengikuti pelatihan dengan mobile learning.	○	○	○	○	○

Appendix 12. Ethics approval of Survey 2

7038 SBREC final approval notice (21 October 2015)

Human Research Ethics <human.researchethics@flinders.edu.au>

Wed 21/10/2015 11:49 AM

To:'iin.yusri@flinders.edu.au' <iin.yusri@flinders.edu.au>; Robert Goodwin <robert.goodwin@flinders.edu.au>; Carl Mooney <carl.mooney@flinders.edu.au>;

Importance: High

Dear Iin Karmila,

The Chair of the Social and Behavioural Research Ethics Committee (SBREC) at Flinders University considered your response to conditional approval out of session and your project has now been granted final ethics approval. This means that you now have approval to commence your research. Your ethics final approval notice can be found below.

FINAL APPROVAL NOTICE

Project No.:	**7038**
Project Title:	ICT training via mobile phone: Enhancing ICT skill of teachers in Indonesia (The 2nd stage)
Principal Researcher:	Ms Iin Karmila Yusri
Email:	iin.yusri@flinders.edu.au

Approval Date:	20 October 2015	Ethics Approval Expiry Date:	**30 April 2017**

The above proposed project has been **approved** on the basis of the information contained in the application, its attachments and the information subsequently provided.

Appendix 13. Permission for conducting Survey 2

PEMERINTAH PROVINSI SULAWESI SELATAN
BADAN KOORDINASI PENANAMAN MODAL DAERAH
Unit Pelaksana Teknis – Pelayanan Perizinan Terpadu
Jln. Bougenville No. 5 Telp (0411) 441077 Fax. (0411) 448936
MAKASSAR 90222

Makassar, 14 Juli 2015

Nomor : 11207/P2T-BKPMD/19.36/VII/02/2015
Lampiran : -
Perihal : **Izin Penelitian**

Kepada

Yth. 1. Walikota Makassar
2. Bupati Pangkep
3. Bupati Wajo
4. Bupati Maros

Masing-masing di Tempat

Berdasarkan surat Koordinator Riset Bidang Teknologi Informasi & Komunikasi Univ. Flinders Australia Nomor : - tanggal 13 Juli 2015 perihal tersebut diatas, mahasiswa/peneliti dibawah ini :

Nama	: **Iin Karmila Yusri**
NIM	: 2099638
Program Studi	: Computer Science
Pekerjaan	: Mahasiswa (S3)
Alamat	: University Flinders, Adelaide-Australia

Bermaksud untuk melakukan penelitian di daerah/kantor saudara dalam rangka penyusunan Disertasi, dengan judul :

"FACTORS INFLUENCING TEACHERS' ACCEPTANCE ON MOBILE LEARNING FOR ICT TRAINING"

Yang akan dilaksanakan dari : Tgl. 5 October s/d 4 December 2015

Sehubungan dengan hal tersebut diatas, pada prinsipnya kami ***menyetujui*** kegiatan dimaksud dengan ketentuan yang tertera di belakang surat izin penelitian.

Demikian disampaikan untuk dimaklumi dan dipergunakan seperlunya.

a.n. GUBERNUR SULAWESI SELATAN
Plt. KEPALA BADAN KOORDINASI PENANAMAN MODAL
DAERAH PROVINSI SULAWESI SELATAN
Selaku Administrator Pelayanan Perizinan Terpadu

H. IRMAN YASIN LIMPO, SH.
Pangkat : Pembina Utama Madya, IV/d
NIP : 19670824 199403 1 008

TEMBUSAN : Kepada Yth :
1. Koordinator Riset Bidang Teknologi Informasi & Komunikasi Univ. Flinders Australia
2. Pertinggal

website :http://p2tbkpmd.sulselprov.go.id ,email : p2t_provsulsel@yahoo.com

Appendix 14. Permission for conducting Survey 2 (English translation)

English translation

Makassar, 14 July 2015

To:

Number: 11207/P2T-BKPMD/19.36/VII/02/2015
Attachment : -
Subject: Permission for conducting research

1. Major of Makassar City
2. Regent of Pangkep Regency
3. Regent of Wajo Regency
4. Regent of Maros Regency

Based on the letter from the research coordinator of ICT enterprise in Flinders University, Australia on 13 July 2015 regarding the permission conducting research application for the following student:

Name	: Iin Karmila Yusri
Student ID	: 2099638
Field of study	: Computer Science
Occupation	: PhD student
Address	: Flinders University, Australia.

Intends to conduct research in your area of administration for her doctoral study with the title:

"Factors influencing teachers' acceptance on mobile learning for ICT training"

Which will be held from 5 October until 4 December 2015.

In connections to the subject of this letter, in principle we ***agree to give approval*** for this student to conduct research with provisions listed in the back of this letter.

This letter was stated to be understood and used as required.

On behalf of the Governor of South Sulawesi
Chief of Capital Investment Coordination Agency
As administrator of integrated license service

H. Irman Yasin Limpo, SH
Grade: *Pembina Utama Madya, IVd*
Employment ID: 19670824 199403 1 008

CC:
1. Coordinator research of ICT Enterprise, Flinders University, Australia
2. Archive